ADAPTATION FUND

FULLY DEVELOPED PROPOSAL FOR SINGLE COUNTRY

Title of Project/Programme: Climate Resilient and Inclusive Water Infrastructure for Rural Smallholders in Thanh Hoa and Nghe An provinces (CRWIS)

Country:	Viet Nam
Thematic Focal Area:	Multi-sector
Type of Implementing Entity:	Multilateral Implementing Entity
Implementing Entity:	International Fund for Agricultural Development (IFAD)
Executing Entities:	Provincial People's Committee (PPC) of Thanh Hoa; and Provincial People's Committee (PPC) of Nghe An
Amount of Financing Requested:	10,000,000 (in U.S Dollars Equivalent)
Letter of Endorsement (LOE) signed:	Yes ☒ No ☐

NOTE: The LOE should be signed by the Designated Authority (DA). The signatory DA must be on file with the Adaptation Fund. To find the DA currently on file check this page: https://www.adaptation-fund.org/apply-funding/designated-authorities

Stage of Submission:

☐ This proposal has been submitted before including at a different stage (concept, fully-developed proposal)

☒ This is the first submission ever of the proposal at any stage

In case of a resubmission, please indicate the last submission date: Click or tap to enter a date.

Please note that fully-developed proposal documents should not exceed 100 pages for the main document, and 100 pages for the annexes.

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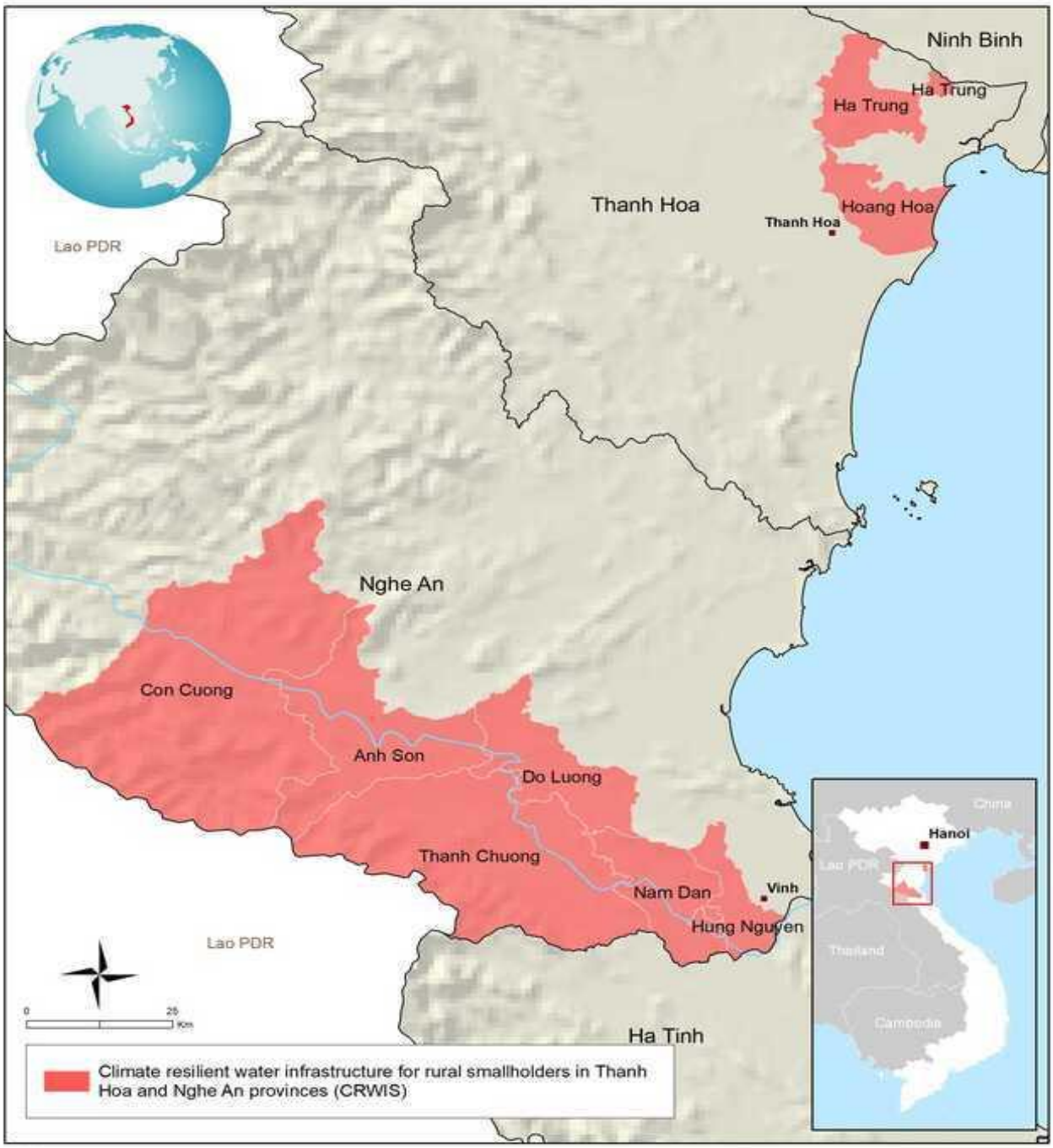
Acronyms

3R3G	Three Reductions, Three Gains
4P	Public-Private-Producer Partnership
AF	Adaptation Fund
AWD	Alternating Wetting and Drying
CC	Climate change
CIGs	Common Interest Groups
CIS	Climate Information System
COP	Conference of Parties (to UNFCCC)
COSOP	Country Strategic Opportunities Programme
CRWIS	Climate Resilient and inclusive Water Infrastructure for rural Smallholders in Thanh Hoa and Nghe An provinces
CSA	Climate Smart Agriculture
DAE	Department of Agriculture and Environment
DARD	Department of Agriculture and Rural Development
DOF	Department of Finance
DONRE	Department of Natural Resources and Environment
DPI	Department of Planning and Investment
EM	Ethnic Minority
ENSO	El Niño Southern Oscillation
ESCMP	Environment, Social and Climate Management Plan
ESP	Environment and Social Principle
FAO	United Nations Food and Agriculture Organisation
FFS	Farmer Field School
FGD	Focused Group Discussion
FM	Financial Management
FU	Farmers' Union
GALS	Gender Action Learning System
GAP	Good Agricultural Practice
GBV	Gender Based Violence
GESI	Gender Equality and Social Inclusion
GM	Gender Mainstream
GDP	Gross Domestic Product
GHG	Green House Gases
GoV	Government of Vietnam
HH	Households
IFAD	International Fund for Agricultural Development
JICA	Japan International Cooperation Agency
KM	Knowledge Management
M&E	Monitoring and Evaluation
MAE	Ministry of Agriculture and Environment
MARD	Ministry of Agriculture and Rural Development
MIS	Management Information System
MOF	Ministry of Finance
MOP-	Market-Oriented Participatory Socio-Economic Development Plan

SEDP	Socio Economic Development Plan
MPI	Ministry of Planning and Investment
NCFAW	National Committee for the Advancement of Women
MSME	Micro, Small and Medium Enterprise
NAP	National Adaptation Plan
NDCs	Nationally Determined Contributions
NTP-NRD	National Target Program for New Rural Development
OCOP	One Commune One Product
ODA	Official Development Assistance
OECD/DAC	Organization for Economic Cooperation and Development/Development Assistance Committee
PCU	Project Coordination Unit
PDO	Project Development Objective
PDT	Project Delivery Team
PIM	Project Implementation Manual
PMB	Project Management Board
PPC	Provincial People's Committee
PSC	Project Steering Committee
REDD+	Reducing emissions from deforestation and forest degradation in developing countries
SDG	Sustainable Development Goals
SLR	Sea Level Rise
SEDP	Socio-Economic Development Plan
SO	Strategic Objective
SRI	System Rice Intensification
TNAs	Technology Needs Assessment
UNFCCC	United Nations Framework Convention on Climate Change
US$	US Dollar
VC	Value Chain
VCAP	Value Chain Action Plan
VND	Vietnamese Dong
WB	World Bank Group
WDF	Women Development Fund
WEE	Women Economic Empowerment
WU	Vietnam Women's Union
WUG	Water User Group

Project Map Area



IFAD

The designations employed and the presentation of the material in this map do not imply the expression of any opinion whatsoever on the part of IFAD concerning the delimitation of the frontiers or boundaries, or the authorities thereof.

Map compiled by IFAD | 12-12-2023

PART I: PROJECT/PROGRAMME INFORMATION

A. Project/Programme Background and Context

Provide brief information on the problem the proposed project/programme is aiming to solve. Outline the economic social, development and environmental context in which the project would operate.

1. **Geography.** Vietnam is located in the tropical monsoon belt of Southeast Asia. Due to its topography that falls from the northwest to the southeast – extensive coastline in the east and mountainous borders with Lao PDR and China in the north and west, it has a warm climate that includes tropical and temperate regions (Figure 1)[1]. Viet Nam's long coastline, geographic location, and diverse topography and climate contribute to being one of the most hazard-prone countries of Asia and the Pacific Region[2]. Although over 70% of the country lies below 500m above mean sea level (MSL), more than 75% of the country is covered by plateaus, hilly regions and low mountains, and the other 25% is lowlands or plains[3]. Vietnam is divided into eight sub-regions (Figure 2) with distinct agro-ecological, socio-economic and climate profiles. Given that a high proportion of the country's population and economic assets are located in coastal lowlands and deltas, the World Bank ranked Viet Nam among the countries likely to be the most affected by climate change. Without effective adaptation measures, by the end of the 21st century, an estimated 12 million people will face permanent floods, primarily concentrated in the country's two low-lying mega-river deltas. In addition to the threat of permanent floods, livelihoods in Viet Nam's low-lying areas face major challenges from saline intrusion, which has already forced land-use changes, abandonment, and reduced yields in many provinces[1]. CRWIS provinces (Thanh Hoa and Nghe An) fall in the North-Central Coast Region and span all three climatic zones. The country has two major deltas which span 25% of its area: the Red River Delta in the north (16,700km^2) and the Mekong Delta in the south (40,000 km^2). Starting from Thanh Hoa's Ma River Basin to Binh Thuan at the end of the South-Central Coast, there is a chain of small narrow deltas with a total area of 15,000km^2.

2. **Climate.** Viet Nam has a tropical climate zone, with the entire country experiencing the effects of the annual monsoon. Due to its long territorial stretch in latitudes and diverse topography, Viet Nam witnesses significant climatic differences among the regions across the country. In the northern region, average temperatures range from 22–27.5°C in summer to 15–20°C in winter, while the southern areas have a narrower range of 28–29°C in summer to 26–27°C in winter. The annual average rainfall varies sharply among regions, ranging around 600 mm and 5,000 mm and most commonly around 1,400 mm and 2,400 mm. About 80-90% of total rainfall accumulates in the rainy season. Annual rainy days last from 60 to 200 days and differ among regions. The annual average relative humidity is about 80-85%. Vietnam's rainy seasons are linked to the southwest (Jun-Sep) and northeast monsoons (Dec-Mar): rainfall occurs between May-Oct in the north and south, and in the central regions from Sep-Jan. Thanh Hoa's annual precipitation is about 1828 mm and Nghe An receives an annual precipitation of about 1969 mm[4]; in both cases, 75-77% of the rains fall between May-September. The dry (winter) season extends from October-April and accounts for 25% of the annual rainfall (Figure 2.A.iii and Figure 2.A.iv). While northern Vietnam's average temperatures range from 22-27.5 degree Celsius in the summer and 15-20 degree Celsius in the winter, southern areas have lower diurnal variation (summer / wet: 28-29 degree Celsius, dry / winter: 26-27 degree Celsius).

3. El Niño-Southern Oscillation (ENSO) is a major driver of inter-annual climate variability in Vietnam. For the North Coastal region, including Thanh Hoa and Nghe An, there is a statistically significant relationship between ENSO years and annual rainfall – i.e., below normal rains in El Niño years for April-May and October-November[5]. This has direct impacts on agriculture: for example, below normal rains ahead of the southwest monsoon can delay and impact rice sowing / early growth of May-September rice and other crops. Analysis[6] of data between 1980-2007 shows that for southern parts of Nghe An (target of CRWIS), ENSO results in 10-30% reduction in September-November rainfall due to a weaking of northeast

[1] WBG, ADB, 2020. Climate risk country profile: Vietnam. The World Bank Group and the Asian Development Bank. https://www.adb.org/sites/default/files/publication/653596/climate-risk-country-profile-viet-nam.pdf

[2] Viet Nam is ranked 91 out of 191 countries by the 2019 INFORM Risk Index based on its high exposure to flooding (ranked 1st together with Bangladesh), tropical cyclones and their associated hazards (ranked 8th), and drought (ranked 82nd).

[3] Statistical Yearbook of Vietnam, 2022. https://www.gso.gov.vn/wp-content/uploads/2023/06/Sach-Nien-giam-TK-2022-update-21.7_file-nen-Water.pdf

[4] World Bank CCKP. Precipitation for 1991-2020. https://climateknowledgeportal.worldbank.org/country/vietnam/climate-data-historical

[5] Katzfey, J.J., McGregor, J.L., and Suppiah, R., 2014. High-Resolution Climate Projections for Vietnam: Technical Report. CSIRO, Australia. 266 pp. https://www.rccap.org/wp-content/uploads/2017/05/vietnam-projections-tech-report.pdf. Only in the Central Highlands is the relationship negative across all months.

[6] Vu, T.T., Nguyen, H.T., Nguyen, T.V., Nguyen, H.V., Pham, H.T.T., Nguyen, L.T., 2015. Effects of ENSO on Autumn Rainfall in Central Vietnam. *Advances in Meteorology*, vol. 2015: 264373. https://doi.org/10.1155/2015/264373

monsoon. Conversely, during La Nina years, the total rainfall between September-November increases between 9-19%.

Gender, Youth and the Thai Ethnic Minority.

4. **Gender and Social Inclusion:** In 2023, Vietnam has climbed 11 places on the latest World Economic Forum (WEF)'s Global Gender Gap Index[7] over the past year, marking a rise from 83rd to 72nd place out of 146 countries. This is a hallmark of the significant progress made by Vietnam in promoting gender equality in all sectors underpinned by the endorsement or revision of legal frameworks and policies on gender equality and the advancement of women, most notably the Gender Equality Law and the National Strategy for Gender Equality. Nevertheless, gender inequalities in agriculture, food and nutrition security are visible in labour and in access to resources (land, water, technology, finance), markets, training, and agricultural extension services. Women constitute a critical workforce in agricultural production, especially in rural areas, where 63.4 percent of working women are in agriculture compared to 57.5 percent of working men. Traditionally, women are more involved in agriculture as they are burdened with unpaid care work and women's knowledge, and skills remain limited when it comes to new technologies. Furthermore, although women are more involved in agriculture, they are also more likely to work on smaller farms and to cultivate subsistence crops such as rice and maize especially in Nghe An province and raise small numbers of livestock (such as poultry, pig and buffalo). In Thanh Hoa and Nghe An provinces, particularly for women from "poor and near poor" households, the land size for rice farming areas ranges[8] from 500 m2 to 2000 m2. Women's limited access to agricultural advisory and extension services, training and technology transfer is due to various gender-biased social norms, resulting in women's lower levels of education, increased time constraints and limited mobility, among other constraints.

5. Vietnam is particularly vulnerable to the adverse effects of climate change and natural disasters. Rural Vietnamese women's vulnerability to climate change is heightened by their greater concentration in the agricultural sector, particularly in subsistence production, and in the informal economy. This is manifested in rural women facing high risks of loss from drought and uncertain rainfall, with women in Nghe An and Thanh Hoa expressing loss of income due to drought and lack of water for irrigation which resulted in fifty percent decrease in annual rice productivity[9]. Further, climate change adds to water insecurity, which increases the burden and workload of women involved in small scale farming, as they spend more time and effort on land preparation, fetching water, watering and managing crops. A high dependency on land and natural resources for livelihood generation by women who are considered poor and from Ethnic Minority groups make them more vulnerable. Less access to resources, credit, markets and extension services seriously disadvantages poor women and men and limits their coping strategies.

6. In terms of decision-making in the household, in general, many poor women living in rural areas have less decision-making power regarding family businesses and the way that household income is spent. Attending village, ward or commune meetings is commonly considered a man's task. Women tend to go only to public meetings regarding climate change adaptation and disaster risk reductions when men are busy or absent. In terms of decision-making in the community, the proportion of women participating in the people's councils at provincial and district levels has reached 29 per cent but there is only 16% of members of the provincial Party committees in the 2020-25 tenure are women. In CRWIS project provinces, women's participation in local People's Committee Councils is significant but still limited: 27.5 percent at provincial, 29.2 percent at district and 28.1 percent at commune levels in Nghe An[10] and in Thanh Hoa the percentages are 20%, 28.27% and 29.43% respectively[11]. According to the 2022 Gender Social Norms of the 2022 Human Development Index Report, in Viet Nam, 93.75% of people still have at least one bias against gender equality and women's empowerment and 65.08% of the people still hold biases about the political role of men and women. Women's involvement in local Committees for Flood and Storm Control is limited to child-care and food distribution; women tend not to be involved in decision-making12. Even in Thanh Hoa and Nghe An Provinces, the management and decisions of water use were usually led by male group leaders.

7. Vietnamese women and men undertake different roles and responsibilities in agriculture: women's work is oft-perceived as 'light' tasks (sowing, transplanting seedlings, weeding, animal husbandry), and men's

[7] http://reports.weforum.org/globalgender-gap-report-2023
[8] Focus group discussions (FGDs) from Nghe An and Thanh Hoa provinces during PDR mission
[9] Focus group discussions (FGDs)from Nghe An and Thanh Hoa provinces during PDR mission
[10] DOLISA in Nghe An (2023) - https://dansinh.dantri.com.vn/nhan-luc/nghe-an-la-tinh-co-ty-le-nu-dai-bieu-quoc-hoi-cao-tren-toan-quoc-20241006150225085.htm
[11] https://vietnamnews.vn/society/1505946/viet-nam-among-countries-leading-the-world-for-women-in-politics.html; DOLISA Nghe An and Thanh Hoa (2023)
[12] https://asiapacific.unwomen.org

work as 'heavy' (land preparation, ploughing, spraying agro-chemicals). However, mechanisation and other factors may influence a change in roles (e.g., manual harvesting by women but use of combine harvester-thresher by men; women may spray pesticides when men are away). Despite their contributions and the fact that men typically seek wage employment for a majority of the agriculture season, women are less involved in production-related decisions or may have limited capacities. Women heavily engage in unpaid care work (household chores) and are paid less than men: across the industry, service and agriculture sectors, the wage gap is the highest for agriculture (unpaid family labour for women is 19.4% which doubles the figure (9.2%) for men's labour[13]). According to the 2023 Report on the implementation of NTPs on Gender Equality the average hours per week of women's unpaid care work is 16.13 vs men 8.75. Agricultural income may also be limited because women engage in subsistence or non-lucrative activities.

8. While irrigation is reported to save women's labour and time costs and water management is seen as a "women's task" , there are several challenges: (a) women cultivate vegetables, fruits and plantation crops, but rice and maize plots are prioritized for canal access (this is worse for Ethnic Minorities who live in areas where irrigation is lacking), and (b) due to lack of technical skills and inadequate participatory approaches, women are less likely to be employed in irrigation development, maintenance and operations or consulted in decision-making. Climate change worsens this as women have to spend more time watering crops or fetch water for domestic purposes.

9. Gender issues in Nghe An and Thanh Hoa provinces are similar to the national context described above. During the consultation meetings, although women and men recognized equal opportunities in accessing or participating in technical assistance, training programs and community meetings that have been conducted in the communes, actual participation levels between women and men seem to be varied. The annual training activities are focused on agriculture: cultivation skills, farming (pest caring), livestock raising and disease prevention. The cultivation/ farming activities are mostly attended by women, while land ploughing, husbandry and aquaculture activities are mainly by men. Therefore, direct and indirect targeting strategies of the project will be employed to reach women including women-headed households, women from Ethnic Minority groups and poor / near-poor women and engage them in technical capacity building and climate smart agriculture training programmes, which be conducted at timings and locations convenient to women.

10. **Youth**: Youth are defined as people between 16 and 30 and account for 22.5% of the population: 20.31% and 21.53% in Nghe An and Thanh Hoa respectively in 2022[14]. While this unique demography can be an advantage, youth unemployment rates have only increased from 3.5% (2010) to 7.4% (2022); the effect of COVID-19 on young women's employment was worse than young men, particularly because the consequences fell most on sectors employing a large proportion of women.

11. Of the youth in Nghe An and Thanh Hoa, about a third were engaged in agriculture-related activities (34.05% in Nghe An, 32.3% in Thanh Hoai) in 2022, and an equal proportion leave the district or province for employment (34.17% of Nghe An, 27.5% of Thanh Hoa). Thanh Hoa (27.5%) has a higher proportion of youth employed in the industry or service sector, particularly in Hoang Hoa factories, compared to Nghe An (5.95%). Naturally, a higher proportion of youth are employed in Thanh Hoa (87.5%) than in Nghe An (63%)[15]. Rural youth engaged in agriculture face multiple challenges, including insufficient capital and awareness of technologies, and limited access to land. Consequently, youth prefer to migrate or work in non-agricultural sectors.

12. In an effort to address unemployment, the government has instituted policies and programmes on vocational training and entrepreneurship[16]. For example, young people can borrow money from the National Youth Union Fund for new start-ups; however, the size of the loans is limited (about 100 million VND, USD 4,217). Nghe An and Thanh Hoa officials are keen to engage youth in high-value agriculture with agri-businesses, and encourage youth participation in eco-tourism, traditional crafts, and other activities. There's also potential for youth to be up-skilled in irrigation development and operations.

13. **Ethnic Minority.** The Ethnic Minorities (EM) of Vietnam span 53 ethnic groups, typically live in mountainous areas, midland areas and along the Laos border districts, and face several challenges (e.g.,

[13] Nhuan NH, Huyen NTT, & Ly NT (2023). Overview of gender mainstreaming in agriculture and rural development in Vietnam. *The VMOST Journal of Social Sciences and Humanities*, *65*(1), 100-109.A
[14] DOLISA in Nghe An and Thanh Hoa
For Nghe An: https://drive.google.com/drive/folders/1ImpN2HSEPqjdLL76PK_DwDR2WngyXmu0
For Thanh Hoa: https://drive.google.com/drive/folders/1S4VI5LusH0YPVJ-PSlzT1KfLqktJcC8K
15 Data provided by Youth Union of Nghe An and Thanh Hoa Provinces, 2024.
[16] Decision 1331/QD-TTg on the Vietnamese Youth Development Strategy 2021-2030 was released on 24 July 2021.

high poverty, high malnutrition, early marriage and high teenage fertility rate) – some of which are unique to their geographical location.

14. Ethnic Minorities constitute about 16.19% of the 2022 Thanh Hoa population (27 different groups) and 13.5% of the 2022 Nghe An population (39 different groups). Among the EM, the Thai ethnic minority peoples dominate in terms of population across Nghe An and Thanh Hoa provinces. Two provinces are also home to the Tho, Kho Mu, H'Mong, Tay, Muong, O Du, H'Mong, and Dao peoples. The proportion of Ethnic Minorities is much lower in most CRWIS districts. In Thanh Hoa province, percentage of EM are 1.49% and 0.4% respectively in Ha Trung and Hoang Hoa districts. In Nghe An, Nam Dan, Hung Nguyen and Do Luong districts have not ethnic minorities (i.e., assimilated with Kinh peoples). However, Con Cuong (74.54%), Anh Son (20.03%) and Thanh Chuong (4.4%) are home to several EM groups[17]. The living areas of EM peoples in the project areas are characterized by rugged terrain, dense forests, and river valleys, which shape their way of life and economic activities. Social conditions, religious practices, and decision-making processes of the Thai Ethnic Minority are influenced by their unique cultural heritage and historical background. More information is available in annex 4 and 5.

15. Ethnic Minorities have distinct customary political, cultural, and economic institutions and practices. For instance, people in the higher elevations may still practice shifting/swidden cultivation; some groups prefer all communication in their indigenous language. More than 81% of EM population is employed in agriculture with activities spanning crop cultivation, plantation and forestry (Acacia auriculiformis-Keo, Solanum trilobatum-Ca gai leo, Dendrocalamus barbatus-Met), and livestock. In the post-cultivation season, some EM peoples engage in traditional handicrafts, such as bamboo articles, weaving clothes and ceramic ware. In some Ethnic Minority areas of Nghe An, tea cultivation (Shan tea) was introduced as a livelihood intervention, but some groups also traditionally produce products yellow flower (camellia) tea and wild bamboo shoots that are fairly well-recognized[15]; in fact, most of Vietnam's tea is grown on small farms of Ethnic Minorities, requires few inputs and is labour intensive. There may be potential to increase incomes for the communities through improved market linkages and reduced transaction costs (through middlemen) as well as certifications and improved quality.

16. The average monthly per capita income of Ethnic Minorities was only 49% of the national average and 45% of the Kinh people in 2018; however, female-headed EM households consistently have a higher average monthly income than male-headed EM households across groups, rural-urban areas and economic regions[15]. As a result of low productivity, nutrition insecurity and limited economic opportunities, the risks of Ethnic Minorities falling back into poverty are high when there are economic shocks or natural disasters.

Overview of target area

17. Starting from 2024 until July 2025, the Government of Vietnam has launched a comprehensive administrative reform, which includes merging ministries, provinces, and communes, as well as abolishing the district level. This adjustment of administrative boundaries aims to streamline the government apparatus, reduce bureaucratic burdens, and enhance the effectiveness and efficiency of state management. The CRWIS project was designed prior to this reform, so some information, data, and names of districts and communes are still used in the proposal. Currently, official updates on the newly established administrative units, as well as their socio-economic conditions, environment, and population status, are still being completed.

18. **Thanh Hoa** is the fifth largest province of Vietnam, located in the North Central Coast, with an area of 11,129.48 km^2. The population is 3,640,128 people, ranking third in Vietnam, just behind Ho Chi Minh City and Hanoi, out of which 541,404 and 3,098,725 people are living in the urban and rural areas, respectively in 2022[18]. Thanh Hoa's topography is complex, much divided and lower in the West - East direction. From the West to the East, there are mountainous and midland terrain, lowland, and coastal regions accounting for 73.3%; 16%; and 10.7% of the province area. Thanh Hoa has 102 km of coastline. Thanh Hoa province, before the merging process, includes a total of 24 districts and 2 cities, two districts of which are targeted by the CRWIS project – namely, Hoang Hoa and Ha Trung districts. The province is heavily affected by climate change and extreme weather events, with heavy rainfall, storms and typhoons causing floods in the delta and river floods nearby the riverbank areas, flash floods, tube floods and landslides in the mountainous and midland areas, and saltwater intrusion and sea level rise in the coastal plain.

[17] Data provided by Committees of Ethnic Minorities of Nghe An and Thanh Hoa Provinces, 2024
[18] General Statistics Office, 2022. Statistical yearbook of Vietnam.

19. **Nghe An** is the largest province in the country, located in the tropical monsoon-affected region – the centre of the North Centre of Vietnam with a natural area of 16,486.5 km^2. Its population ranks 4th in the country with 3.42 million people, of which 0.53 million people are living in the urban areas respectively, and 12.64% are categorised as poor and near-poor households (108,919 households or approximately 435,676 people) in 2022[19]. The geography of the province is also complex, and its topography tilts in the Northwest – Southeast direction with three ecological regions: high mountainous areas, low mountainous/hilly areas, and coastal plains. The mountainous and hilly areas occupy about 83% of the territory. The province has 83 km of coastline with 6 estuaries of 6 main rivers: Lam, Hoang Mai, Do Ong, Thai, Bung, and Cam rivers. Nghe An province, before merging process, includes a total of 17 districts, 3 towns and Vinh city – six districts of which are targeted by the CRWIS project: namely, Con Cuong, Anh Son, Thanh Chuong, Do Luong, Nam Dan and Hung Nguyen districts. Under these natural conditions, the province is seriously affected by heat stress and dry spells in dry seasons, heavy rainfall and storms causing floods in the riverbanks and low lands; flash floods, landslides and soil erosion in the mountainous and midlands areas; saltwater intrusion and coastline erosion in the coastal areas.

20. Both provinces have a high density of rivers and streams as well as coastal estuaries. Nghe An has 6 estuaries from its 6 main rivers: Lam/Ca, Hoang Mai, Do Ong, Thai, Bung, and Cam with a total length of 9,828 km – of which the biggest is Lam, a transboundary river with 361 km of its 512 km length within Vietnam. Thanh Hoa has 4 main river systems: Hoat, Ma, Yen, and Bang River with a total length of 881 km, and 264 interlocking streams. Thanh Hoa province has about 1,760 reservoirs, dams, weirs and pumping stations (525 reservoirs alone) and Nghe An has about 1,061 reservoirs, 423 weirs, 702 pumping stations, and 22 hydropower plants; these are managed either by state-owned irrigation companies or communities themselves. The reservoirs provide water for irrigation and aquaculture and were intended to enable flood protection and generate electricity.

21. **Poverty situation**. Despite the growth rate of gross regional domestic product (GRDP) of Thanh Hoa in 2022 reached 12.51%, ranking 7th in the country, it however remains unsustainable, with the rate of poor and near-poor households accounting for 15.47%[20] of the total households in the province. Within the coastal region, Hoang Hoa shows the highest rate of poor households with 3.26% (2037 households), about 1% above the average; and 3.95% of near-poor households, the lowest in the area with about 2% lower than the average. According to the results of the poor and near-poor households' assessment in Thanh Hoa in 2022, Ha Trung is the district with the highest poverty rate in the delta region of the province, with 2.95% of poor households (1003 households) and 4.19% of near-poor households (1423 households)[21]. Thanh Hoa is known as the locality with the largest number of people leaving their home in search of job opportunities in the big cities.

22. In Nghe An, the economy has been performing well in recent years, with its GRDP growth ranging from 7.5% to 9.08% during the years 2016 to 2022. Like in the national context, the economic growth in the province has been contributed to declining the poverty rates. From 17.7% in 2016, the poverty rate[22] in the province dropped to 6.41% in 2022 but still much higher than the national rate of 4.3%. However, Nghe An is always in the top 15 of the provinces with the highest poverty rate in the country. The poverty rate varies across different ethnic groups and geographical regions. Poverty and low living standards are still prevalent in remote and mountainous areas and Ethnic Minority communities[23]. Among the six project districts in Nghe An, the highest rate of poor and near poor households is found in remote mountainous district of Con Cuong (19.94% and 16.85% respectively), where is still very high especially compared to the provincial poverty rates of 6.2% and 6.41%. The lowest poverty rate is found in the plain districts of Nam Dan and Hung Nguyen (0.87% and 3.17% in Nam Dan; 1.87% and 2.86% in Hung Nguyen respectively). Poverty rates are much higher amongst ethnic minorities being 71.4% of the poor[24].

Table 1. Poverty and income statistics for CRWIS districts

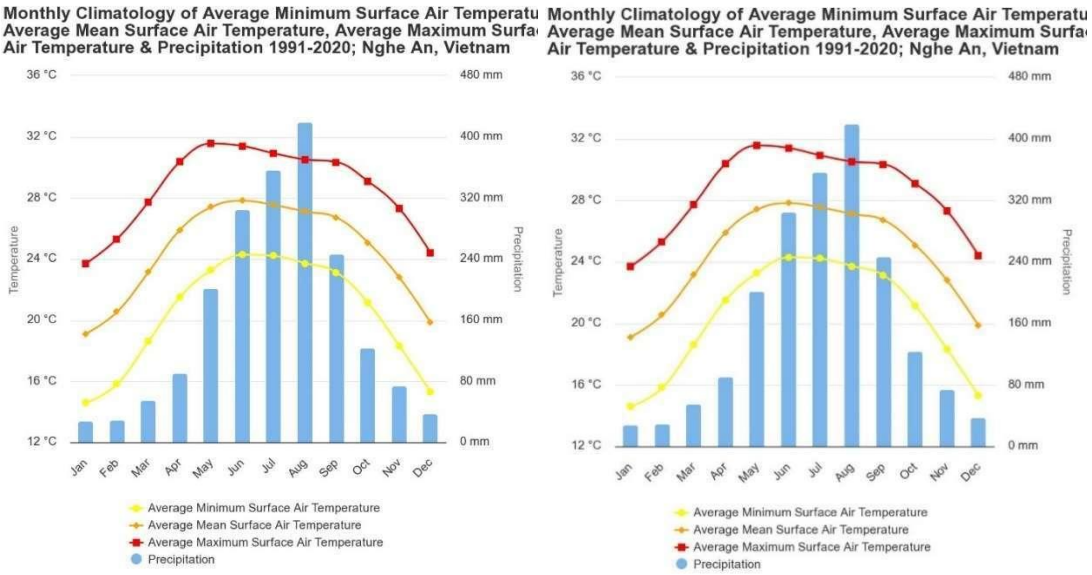
CRWIS District (before merging)	Households	Poor house-holds, 2022	Proportion of poor, 2022	Near-poor house-holds,	Propor-tion of near-poor,	Average per capita income, 2022,	Proportion of Ethnic Minorities

[19] General Statistics Office, 2022. Statistical yearbook of Vietnam.
[20] May 2022 poverty review with the new criteria, following MOLISA circular 02/2022/TT-BLDDTBXH, dated March 30 2022
[21] Data and information provided by the Thanh Hoa DOLISA during the design mission in September-October, 2024
[22] From 2016, poverty rate is based on the new national poverty line set by the GoV for period 2016- 2020 (multi-dimension poverty criteria). And from 2021, poverty rate is based on the multi-dimensional poverty regulation for the period of 2021-2025
[23] ADB. 2022. Agriculture, Natural Resources and Rural Development Sector Assessment, Strategy and Road Map - Viet Nam 2021–2025. Sector Assessment, Strategy and Road Map/ Asian Development Bank (ADB)
[24] Data and information provided by the Nghe An DOLISA during the design mission in September-October, 2024

				2022	2022	thousand VND	
Thanh Hoa[25]	**1,000,579**	**49,893**	**4.99%**	**68,946**	**6.89%**	**51,708**	**16.19%**
Ha Trung	33,996	1003	2.95%	1423	4.19%	50,928	1.49%
Hoang Hoa	62,545	2037	3.26%	2372	3.79%	60,288	0.00%
Nghe An[26]	**863,388**	**55,348**	**6.41%**	**53,571**	**6.2%**	**43,532**	**13.45%**
Con Cuong	18,313	3,651	19.94%	3,085	16.85%	38,500	74.54%
Anh Son	31,058	1,828	5.89%	2,732	8.8%	42,240	20.03%
Thanh Chuong	62,149	2,703	4.35%	3,993	6.42%	46,100	4.45%
Do Luong	59,359	1,739	2.93%	2,293	3.86%	65,760	0.01%
Nam Dan	42,511	368	0.87%	1,348	3.17%	62,000	0.00%
Hung Nguyen	34,325	641	1.87%	981	2.86%	48,000	0.01%
National	**27,628,253**	**1,057,374**	**4.03%**	**915,274**	**3.49%**	**56,076**	**14.7%**

Climate change.

23. Vietnam has three climatic zones across its eight geographic regions (see figure 3 below) i.e., *humid subtropical, monsoon climate, and tropical savannah climate*. Due to its complex topography, there is a wide spatial variation in temperature and rainfall patterns. The country is influenced by El Niño Southern Oscillation (ENSO) that drives inter-annual rainfall and temperature variability. While both Thanh Hoa and Nghe An are in the North-central Coast Region, Thanh Hoa falls in the humid subtropical zone whereas Nghe An spans all three climatic types. Thanh Hoa and Nghe An are subject to monsoonal rainfall patterns (NE monsoon – Dec-Mar, SW monsoon – Jun-Sep) and are exposed to tropical cyclones and typhoons. Thanh Hoa's annual rainfall is around 1827 mm and Nghe An receives about 1969 mm; the dry (winter) season extends from Oct-Apr and accounts for 25% of the annual rainfall, and the rainy season is May-Sep and accounts for 75% of annual precipitation[27]. Analysis[28] of data between 1980-2007 shows that for southern parts of Nghe An (target of CRWIS), ENSO results in 10-30% reduction in September-November rainfall due to a weakening of northeast monsoon. Conversely, during La Nina years, the total rainfall between September-November increases between 9-19%.



[25] Thanh Hoa, October 2024, Results of Thanh Hoa poor households and near-poor households assessment. https://drive.google.com/file/d/16px5VsZG9iCOi43oiNOr0tAiZIVUk1JR/view?usp=drive_link

[26] Nghe An, Decision No. 4258/QD-UBND dated December 29, 2022. Results of Nghe An poor and near-poor households assessment. https://drive.google.com/file/d/1I5JcZGXqlo27Sx4vYozMbmWJ43xPJODd/view?usp=drive_link

[27] Tran, P.T., Vu, B.T., Ngo, S.T., Tran, V.D., Ho, T.D.N., 2022. Climate change and livelihood vulnerability of the rice farmers in the North Central Region of Vietnam: A case study in Nghe An province, Vietnam. Environmental Challenges, 7 (2022), 100460, https://doi.org/10.1016/j.envc.2022.100460.

[28] Vu, T.T., Nguyen, H.T., Nguyen, T.V., Nguyen, H.V., Pham, H.T.T., Nguyen, L.T., 2015. Effects of ENSO on Autumn Rainfall in Central Vietnam. *Advances in Meteorology*, vol. 2015: 264373. https://doi.org/10.1155/2015/264373

Figure 1. Nghe An's climatology[29]

Figure 2. Thanh Hoa's climatology[30]

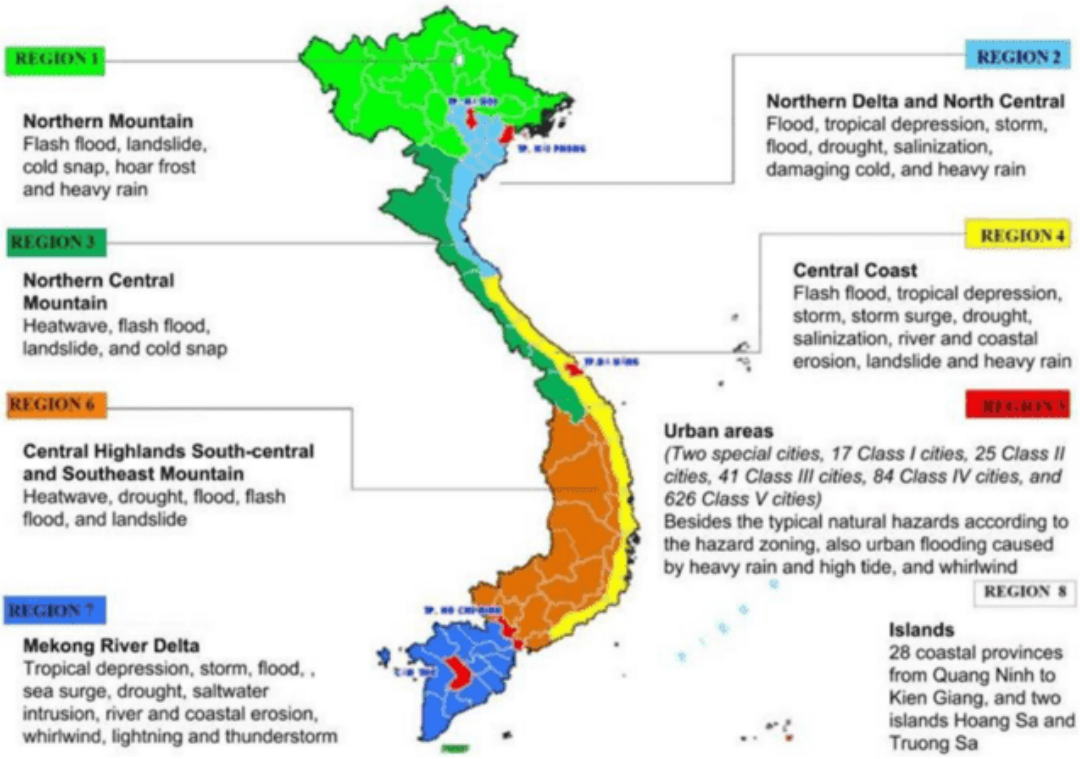


Figure 3. Disaster map of Vietnam[31]

24. Vietnam has a high disaster risk and was ranked 91 out of 191 countries in the 2019 INFORM Risk Index[32]; it is the 58th most climate vulnerable country and 93rd most ready country in the ND-GAIN Rankings[33]. The country is vulnerable to floods, droughts, and typhoons as well as flash floods, landslides, salinity intrusion from sea-level rise and storm surges, heat waves, and cold spells. Vietnam is hit by 6-7 typhoons and tropical storms each year; between 1990 and 2010, there were 74 flood events[34]. One-third of households in the North-central Coast experienced different forms of severe weather event. At the national level, average annual loss from disasters is USD 1.9 billion (around 1.3% of Vietnam's GDP)[32]. At the province level, as reported by the PPCs, damages from natural disasters in 2021 and 2022 was: USD 2.72 million (M) and USD 27.83 M for Thanh Hoa, and USD 28.6 M and USD 51.8 M for Nghe An. Per Vietnam's disaster zoning map (Figure 3): Nghe An and Thanh Hoa experience several types of weather and climate disasters: floods, droughts, storms and heavy rains, and salinization affect coastal areas and plains/lowlands of both provinces; heatwaves, flash floods, landslides and cold snaps affect Nghe An's lowlands and hilly/mountainous regions.

25. Flash floods occurred on a large scale in Thanh Hoa in 2018 and 2019, and a high intensity typhoon Ketsana in 2009 caused storm surges and heavy rainfall in Nghe An, which resulted in nearly historical floods (i.e., 1999)[35]. Validation of events by communities occurred during field visits to the project areas with concerns about floods, flash floods and droughts dominant (and salinization in Thanh Hoa).

26. **Temperature**. Climate change has contributed to an increase in temperature of 0.15-0.35 degree Celsius per decade throughout Vietnam between 1961-2011.[36] For the period 1971-2010, the estimated rate of warming at 0.26 ± 0.10 degree Celsius per decade is reported as being twice the rate of global warming over the same period.[37] Warming has accelerated in the recent decades: between 1971-2020, average

[29] World Bank CCKP, as of 8 Dec 2023. https://climateknowledgeportal.worldbank.org/country/vietnam/climate-data-historical
[30] World Bank CCKP, as of 8 Dec 2023. https://climateknowledgeportal.worldbank.org/country/vietnam/climate-data-historical
[31] https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Climate-Change
[32] https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Climate-Change
[33] https://gain-new.crc.nd.edu/country/viet-nam
[34] Tran, P.T., Vu, B.T., Ngo, S.T., Tran, V.D., Ho, T.D.N., 2022. Climate change and livelihood vulnerability of the rice farmers in the North Central Region of Vietnam: A case study in Nghe An province, Vietnam. Environmental Challenges, 7 (2022), 100460, https://doi.org/10.1016/j.envc.2022.100460.
[35] Ibid
[36] Katzfey, J.J., McGregor, J.L., and Suppiah, R., 2014.
[37] Nguyen, D. Q., Renwick, J., & Mcgregor, J., 2014. Variations of surface temperature and rainfall in Vietnam from 1971 to 2010. *International Journal of Climatology*, 34: 249–264. https://doi.org/10.1002/joc.3684

mean surface air temperature increased by 0.25 degree Celsius per decade, and between 1991-2020, the increase was 0.32 degree Celsius per decade.[38]

27. The minimum temperature in each region of the country showed an increasing trend between 1961-2010, and maximum temperatures increased in some regions, including North Central Coast, but was inconsistent (increase or decrease) for Southern regions.[39] While the average maximum temperature between 1991-2020 increased by 0.32 degree Celsius per decade, the increase in average minimum temperature over the same period was 0.33 degree Celsius per decade – with high relevance for agricultural sector.[40] Temperature trends for Thanh Hoa and Nghe An are shown in the figures below.

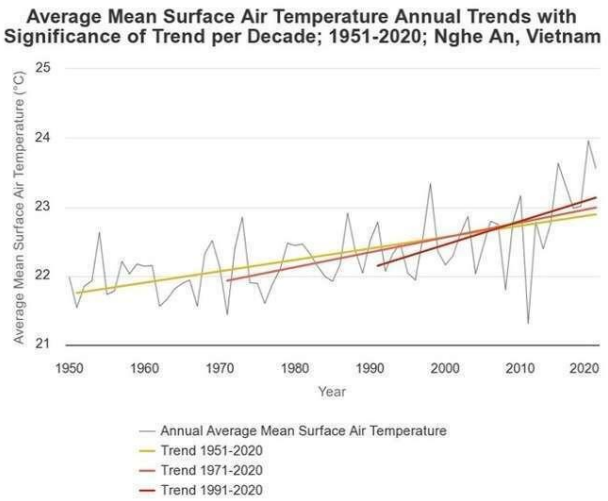


Figure 4. Nghe An's temperature trend

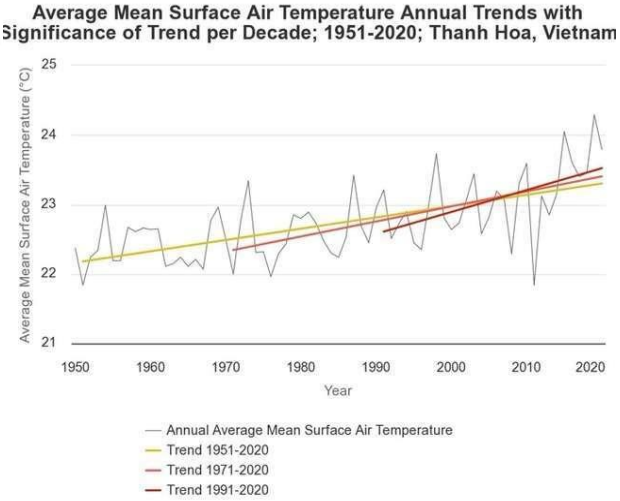


Figure 5. Thanh Hoa's temperature trend

28. Under RCP8.5 and by 2035[41], Thanh Hoa's average annual temperature is projected to increase by 0.9-1.0°C compared to baseline (1986-2005). By 2050, the average annual temperature increase will be between 2.1-2.2°C. The number of hot days (daily temperature > 37°C) would increase to 1-3 days/year, and by 2100, the annual temperature is likely to increase by 3.6-3.9°C. In Nghe An, by 2065[42], the average annual temperature is projected to increase by 1.6°C-2.1°C compared to the baseline period (1986-2005) under RCP4.5 and RCP8.5. By 2100, the temperature is projected to increase by 3.8°C under RCP8.5.

29. **Precipitation**. Trends in rainfall are mixed with annual and extreme rainfall declining in some regions (e.g., North West) and the same variables showing an increase in other regions (e.g., Southeast and South Central Coast). The North Central Coast shows a decline of about -2.6% per decade between 1961 and 2011, but this is not statistically significant.[43] Mean rainfall over Vietnam does not show any significant increase or decrease on a national level since 1960. The proportion of rainfall falling in heavy events has not changed significantly since 1960, nor has the maximum amount falling in 1-day or 5-day events. However, on a sub-national level some changes are significant, the general trend has been towards increased rainfall in central regions, and reduced rainfall in northern and southern regions. 8 El Niño remains a major influencer of trends in precipitation.

30. Under RCP8.5[38], annual rainfall in Thanh Hoa will increase as well: at the beginning of the century, projections suggested an increase from 2-24% by mid-century, and 10-35% by 2100. Increases are associated with monsoon months and are projected to have greater year to year variability. At the same time, the region might experience increase in number and severity of droughts. The average annual rainfall projections suggest an increase of 18.3% by 2065 and 19.4% by 2099 under RCP8.5[39].

Impacts of Climate change

31. The main impacts of climate change in Thanh Hoa and Nghe An is manifested through water shortages/uncertain water availability and floods impacting agricultural productivity, rural infrastructure,

[38] World Bank CCKP, as of 3 Dec 2023. https://climateknowledgeportal.worldbank.org/country/vietnam/trends-variability-historical
[39] UNDP, 2015.
[40] World Bank CCKP, as of 3 Dec 2023. https://climateknowledgeportal.worldbank.org/country/vietnam/trends-variability-historical
[41] Synthesis report for Climate Change Action Plan of Thanh Hoa 2020
[42] Synthesis report for Climate Change Action Plan of Nghe An 2023
[43] Katzfey, J.J., McGregor, J.L., and Suppiah, R., 2014.

and local ecosystems. ND-GAIN Index[44] notes that Vietnam has one of the worst scores for projected changes in cereal yields (rice, maize, wheat) under RCP4.5 by mid-century (2040-2069) compared to 1980-2009 baseline. Riverbank erosion due to upstream developments, salinity intrusion from a combination of human (aquaculture, degradation of coastal mangroves) and non-human factors, and landslides in upland areas are climate risks specific to CRWIS's target districts. Finally, extreme heat and heat waves affect human health and labour as well as livestock and crop productivity through water shortages and increased wet bulb temperatures; by end-of-century and under RCP8.5, an increase in number, length and intensity of heat waves is projected.

32. In North Central Coast, Nghe An and Thanh Hoa are most affected by extreme weather. Between 1949 to 2017, Nghe An experienced 18 storms and Thanh Hoa experienced 23 storms[45]. Between 1961-2010, there is not an evident trend in the frequency of typhoons and tropical depressions making landfall in Vietnam. The typhoon season tends to end later, and those with medium intensity tended to decrease while those with highest intensity tended to increase. The number of depression spells also tended to increase[46].

33. **Temperature**. Currently, the Greater Mekong Region – particularly its western part – experiences the highest number of days where maximum temperature (Tmax) >= 35°C in March-May. But large areas of Thanh Hoa and Nghe An – particularly the plains and coastal districts – are also experiencing such temperature anomalies. FAO's CAVA (Climate and Agriculture Risk Visualization and Assessment) shows that during the June-August period Thanh Hoa and Nghe An continue to show a high number of days where Tmax exceeds 35°C while in contrast, the Tmax days >=35°C days for Greater Mekong declines.

34. Due to modelling uncertainty, FAO's CAVA is not able to set specific spatial patterns for temperature related observations for example the number of heat waves or number of consecutive days >= 40°C, in the whole year or for a given time period. FAO's CAVA assessment however is able to indicate that the whole country will be affected by an increase in number of days with maximum temperature >=30°C. For cold extremes, current observations do not show a spatial variation across Vietnam; however, Northwestern and Western districts of Nghe and Thanh Hoa are expected to among the regions with anomaly in number of days when minimum temperature falls below 0°C. By 2041-2060, temperature anomalies are predicted to most affect the Red River Delta, North Central Coast (hosting Thanh Hoa and Nghe An), the Mekong River Delta, and the southern part of Northeast and some parts of the Southeast regions.

35. **Precipitation**. Considerable uncertainty clouds projections of future precipitation change, none of the end-of-century changes across the four emissions pathways are statistically significant. Comprehensive analysis of climate projections on a regional level by Katzfey et al. (2014)[47] suggests that there is no strong consensus around either significant increases or decreases in annual rainfall. By contrast, modelling conducted by the Vietnam Ministry of Natural Resources and Environment shows more confidence in projections of annual precipitation increases across all mainland regions of Vietnam. Changes projected are typically in the range of 10% to 20% by 2046–2065 under both the RCP4.5 and RCP8.5 emissions scenarios.[48] Some variation in extreme rainfall amounts is reported, with some increases in extreme rainfall projected in southern and central Vietnam, and slight reductions projected elsewhere. These projections are broadly in line with global trends[49]. Extreme rainfall shows an upward trend over 1961-2010 in Vietnam, and extreme rainfall mainly occurred in April-July though somewhat earlier in the North. Extreme rainfall (daily max rainfall, five-day max rainfall) tended to increase significantly in most stations of North Central Coast. Mean sea level has increased in the East Sea, along Vietnam's eastern coastline, by around 2.8 mm per year[50].

36. FAO's CAVA assessed that regionally, precipitation extremes appear more pronounced in the Northcentral Coast (Thanh Hoa and Nghe An) and Southcentral Coast. For instance, between September-November, these regions have a higher number of high rainfall (precipitation >= 50mm) days and higher values for total precipitation occurring on high rainfall days. September through November is

[44] https://gain-new.crc.nd.edu/country/viet-nam
[45] Tran, P.T., Vu, B.T., Ngo, S.T., Tran, V.D., Ho, T.D.N., 2022. Climate change and livelihood vulnerability of the rice farmers in the North Central Region of Vietnam: A case study in Nghe An province, Vietnam. Environmental Challenges, Volume 7 (2022). https://doi.org/10.1016/j.envc.2022.100460
[46] UNDP, 2015. Viet Nam: Special Report on managing the risks of extreme events and disasters to advance climate change adaptation. United Nations Development Programme: Hanoi. https://www.undp.org/vietnam/publications/viet-nam-special-report-managing-risks-extreme-events-and-disasters-advance-climate-change-adaptation
[47] Katzfey, J., McGregor, J., Suppiah, R. (2014). High-resolution climate projections for Vietnam: Technical Report. CSIRO, Australia.
[48] MONRE (2020). Climate change and sea level rise scenarios for Vietnam. Vietnam Ministry of Natural Resources and Environment (MONRE) - kich-ban-bien-doi-khi-hau-phien-ban-cap-nhat-nam-2020.pdf.
[49] World Bank, Asian Development Bank, (2021) Climate Risk Country Profile Vietnam. (Accessed June 2024) https://climateknowledgeportal.worldbank.org/sites/default/files/2021-04/15077-Vietnam%20Country%20Profile-WEB.pdf
[50] MONRE (2020). Climate change and sea level rise scenarios for Vietnam. Vietnam Ministry of Natural Resources and Environment (MONRE) - kich-ban-bien-doi-khi-hau-phien-ban-cap-nhat-nam-2020.pdf

hence when river floods occur in Northcentral Coast of Vietnam due to intense precipitation, steep topography, and dearth of water storage options.

37. By 2041-2060, while regional differences in precipitation anomalies are harder to discern (with seemingly little variation across Vietnam) or is more pronounced in regions such the Mekong River, there are some indications of potential dry spells or droughts in April-October (the rainy season). However, MONRE (2020)[51] analysis shows that North Central region is one of the regions – together with other parts of the North as well as Central Coast and parts of South and Central Highlands – where the change in annual rainfall (%) is projected to be higher than 20%.

38. **Sea-Level Rise (SLR).** Vietnam is one of the world's most vulnerable countries to sea-level rise. Without adaptation an estimated 12 million people face permanent inundation on higher emissions pathways, primarily concentrated in the nation's two low- lying mega-river deltas. An estimated 2.4% of Vietnam's GDP is at risk from permanent inundation in the Red River Delta region.[52] If the sea level rises by 100cm, 32.2% of agricultural land is at risk of flooding[53]. There is currently no SLR research available for the targeted areas in the adjacent Thanh Hoa Province, however consultations have shown that saline water intrusion is already affecting the livelihoods of the farmers. The national and provincial governments of Vietnam are already working to protect their coastline, primarily through hard infrastructure, and in some cases through mangrove restoration. In 2017, the Ministry of Natural Resources and the Environment published an assessment of the vulnerability to sea-level rise identifying vulnerable areas in the Red deltas, with 50cm of sea-level rise potentially inundating 6.9% of the surface area. In addition to the threat of permanent inundation, livelihoods in Vietnam's low-lying areas face major challenges from saline intrusion, which has already forced land-use changes, abandonment, and reduced yields in many provinces. During particularly severe dry seasons, such as in 2016, salt has intruded up to 50km inland from the coast and estuary, resulting in major crop damage.[54]

39. Sea-level rise affecting both CRWIS districts (Hoang Hoa and Ha Trung) in Thanh Hoa[38], and one CRWIS district (Hung Nguyen) in Nghe An[39], will worsen inland saline intrusion – exacerbating water shortages and challenges to land use planning. About 16,000 hectares of Hung Nguyen's land (the only coastal district in Nghe An) is projected to be permanently inundated under RCP 4.5[39]. Under the impacts of increasing temperature and sea-level rise coupled with a decrease in freshwater flow upstream of Lam River, saline intrusion in Nghe An is projected to increase in terms of intensity and frequency.

40. **Droughts.** All of Vietnam has experienced agricultural and hydrological droughts between 1979 and 2007, but the frequency of droughts is higher in North Vietnam (including Nghe An and Thanh Hoa) whereas frequency is lower but duration longer in South Vietnam (particularly around Mekong). Drought events are projected to increase considerably in Northcentral and Southcentral Vietnam with the coastal regions of North Vietnam (including Nghe An and Thanh Hoa) are projected to experience longer drought events. The mountain regions of Northcentral Vietnam are the source of rivers such as Lam and Ma and will aggravate the overall pattern of increased agricultural vulnerability. The severity of droughts has tended to increase across regions, with high frequency in January-April and May-August, but winter droughts (January-April) are more frequent than summer-autumn droughts (May-August); in North Central Vietnam, droughts are more common in May-August. [55]

41. **Fisheries and aquaculture** represent major components of the Vietnamese economy, typically contributing around 6-7% of GDP and a similar proportion of employment. Potential climate change impacts include rapid onset events such as river and coastal flooding, as well as saline intrusion, which are known to reduce the productivity of aquaculture operations.[56] Climate-smart technologies and innovations that build sustainability and resilience in aquatic food systems need to be developed to tackle climate change impacts. Prioritizing inclusive, sustainable and climate-resilient aquatic food systems and developing climate information services for aquaculture can assist farmers to manage risks associated

[51] MONRE (2020). Climate Change and Sea Level Rise Scenarios for Viet Nam. Ministry of Natural Resources and Environment: Hanoi. kich-ban-bien-doi-khi-hau-phien-ban-cap-nhat-nam-2020.pdf
[52] Neumann, J., Emanuel, K., Ravela, S., Ludwig, L., & Verly, C. (2015). Risks of Coastal Storm Surge and the Effect of Sea Level Rise in the Red River Delta, Vietnam. Sustainability: 7: 6553–6572.
[53] Vietnam NDCs (2022). https://unfccc.int/sites/default/files/NDC/2022-11/Viet%20Nam_NDC_2022_Eng.pdf
[54] Duc, D.M., Yasuhara, K., Hieu, N.M. and Lan, N.C. (2017). Climate change impacts on a large-scale erosion coast of Hai Hau district, Vietnam and the adaptation. Journal of Coastal Conservation, 21, 47–62.
[55] Katzfey, J.J., McGregor, J.L. & Suppiah, R. (2014). High-Resolution Climate Projections for Vietnam: Technical Report. CSIRO, Australia. 266 pp. https://www.rccap.org/wp-content/uploads/2017/05/vietnam-projections-tech-report.pdf
[56] World Bank, Asian Development Bank, (2021) Climate Risk Country Profile Vietnam. (Accessed June 2024) https://climateknowledgeportal.worldbank.org/sites/default/files/2021-04/15077-Vietnam%20Country%20Profile-WEB.pdf

with climate variability and extreme weather conditions experienced in food production.[57]

42. **Agriculture**. Climate change will influence food production via direct and indirect effects on crop growth processes. Direct effects include alterations to carbon dioxide availability, precipitation and temperatures. Indirect effects include through impacts on water resource availability and seasonality, soil organic matter transformation, soil erosion, changes in pest and disease profiles, the arrival of invasive species, and decline in arable areas due to the submergence of coastal lands and desertification. On an international level, these impacts are expected to damage key staple crop yields, even on lower emissions pathways. Analysis estimates 5% and 6% declines in global wheat and maize yields respectively even if the Paris Climate Agreement is met and warming is limited to 1.5°C.[58] Shifts in the optimal and viable spatial ranges of certain crops are also inevitable, though the extent and speed of those shifts remain dependent on the emissions pathway.[59]

43. **Rice** is perhaps the most important crop in Vietnam's agricultural sector. While 52% of paddy rice production is from the Mekong River Delta the North-East and the North-Central Coast are also important rice production areas. In most zones, irrigated rice is cultivated in two to three crops per year, the continued rise in rice production is largely due to improved irrigation, new rice varieties and new rice technologies. Development has involved increasing control over natural hydrological processes and has involved water and land management trade-offs which have at times disadvantaged poorer groups. [60] Notably, the average size of farms remains very small, even in Vietnam's most productive regions, at around 1 hectare.[61]

44. Climate change threatens multiple stressors on rice production, including high temperatures (particularly during development stages), saline intrusion, drought, and flood (crop submergence). However, some of these negative impacts may be partially offset by the benefits of increased atmospheric CO_2 concentrations. Study[62] suggests that by the 2040s irrigated rice could be facing yield reductions of up to 23% under higher emissions pathways. Another analysis[63] estimates the net impact of climate change on rice yields all of Vietnam and suggests losses can be expected, at 5%–10% by 2040, with similar values under both RCPs 4.5 and 8.5. It is suggested that there is a possibility that adaptations in production methods may be sufficient to mitigate these losses.[64]

45. The impact of climate change such as drought, salt intrusion and lack of irrigated infrastructure caused by the rice productivity in Thanh Hoa province has decreased by 28% and 52% of rice productivity in Nghe An province compared to normal seasons.

46. **Maize** is the second most important food crop substituting as a staple good in periods of rice shortage, especially for people in rural areas and mountainous regions. Maize is also the primary source of feed for Vietnam's poultry and livestock industry and is therefore an important source of income for many farmers. The outlook for maize production is also poor due to its sensitivity to high temperatures (Figure below).

[57] Tran, Nhuong; Chan, Chin Yee; Aung, Yee Mon; Bailey, Conner; Akester, Michael; Cao, Quyen Le; Trinh, Tu Quang; Hoang, Cuong Van; Sulser, Timothy B.; and Wiebe, Keith D. 2022. Foresighting future climate change impacts on fisheries and aquaculture in Vietnam. Frontiers in Sustainable Food Systems 6: 829157. https://doi.org/10.3389/fsufs.2022.829157

[58] Tebaldi, C., & Lobell, D. (2018). Differences, or lack thereof, in wheat and maize yields under three low-warming scenarios. Environmental Research Letters: 13: 065001.

[59] World Bank, Asian Development Bank, (2021)

[60] Chapman, A., & Darby, S. (2016). Evaluating sustainable adaptation strategies for vulnerable mega-deltas using system dynamics modelling: Rice agriculture in the Mekong Delta's An Giang Province, Vietnam. Science of the Total Environment. 559: 326–338.

[61] USAID/UNDP (2016). Economics of climate change adaptation: Agriculture sector analysis for Viet Nam. USAID Climate Change Adaptation Project Preparation Facility for Asia and the Pacific/United Nations Development Programme.

[62] USAID/UNDP (2016). Economics of climate change adaptation: Agriculture sector analysis for Viet Nam. USAID Climate Change Adaptation Project Preparation Facility for Asia and the Pacific/United Nations Development Programme

[63] Li, S., Wang, Q., & Chun, J. A. (2017). Impact assessment of climate change on rice productivity in the Indochinese Peninsula using a regional-scale crop model. International Journal of Climatology, 37(April), 1147–1160.

[64] World Bank, Asian Development Bank, (2021) Climate Risk Country Profile Vietnam. (Accessed June 2024) https://climateknowledgeportal.worldbank.org/sites/default/files/2021-04/15077-Vietnam%20Country%20Profile-WEB.pdf

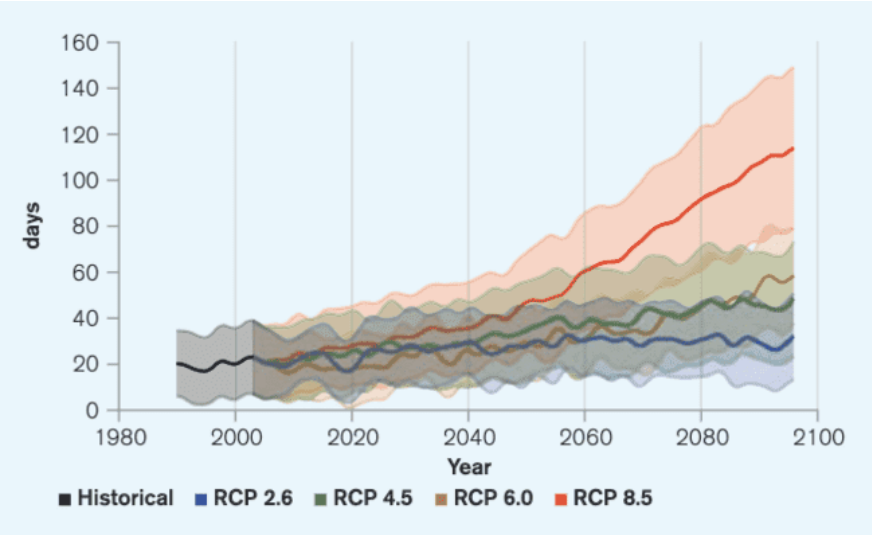


Figure 6. Annual average number of hot days (T>35°C) under RCP2 6 (Blue) and RCP8 5 (Red). The values shown represent the median of 30+ GCM model ensemble with the shaded areas showing the10th–90th percentiles.[65]

47. Thanh Hoa and Nghe An have an urgent need to upgrade irrigation and flood protection to cope with the increasingly severe impacts of climate change. Additionally, since climate impacts are already having a detrimental impact on production of rice, maize, vegetable, and aquaculture through decrease in yields and area under cultivation, farmers, agricultural cooperatives and water user groups require support in the form of (a) technical knowledge on climate-smart agriculture, (b) linkages to markets / finance to support production diversification and increase agricultural incomes, (c) support for investments in mechanization for sustainable intensification of production, (d) timely and actionable advisories based on weather forecasts and climate risks during the agricultural season, and (e) capacity development on water management and operations / maintenance of irrigation infrastructure. Since women, youth, and Ethnic Minorities are particularly vulnerable to climate change, CRWIS will focus on their unique needs, priorities, and inclusion in project activities and decision-making structures. At the policy and institutional level, CRWIS will aim for better integration of climate change trends and forecasts into their planning processes and programs.

Target group and Project area

48. CRWIS will be implemented through a combination of geographical targeting and direct beneficiary targeting approaches aimed at the most climate-vulnerable communities. The project will adopt an inclusive targeting strategy in the selection of farm-level tertiary irrigation and pumping stations, and early warning systems (EWS) to be rehabilitated and/or installed under Component 1, with consideration to (i) current climate change vulnerability and future trends, (ii) agricultural production/productivity potential, (iii) multidimensional poverty index, and (iv) presence of complementary government projects for alignment and synergy. While an irrigation scheme's command area may not entirely overlap with district or commune boundaries, for the purpose of project management, the district and commune will remain the focus of both Component 1 and Component 2 activities.

49. CRWIS beneficiary targeting strategy is informed by the assessment of the livelihoods, constraints and aspirations of the different target groups of which 40% of women and 20% of youth including from ethnic minorities (where relevant). Direct beneficiaries will be selected from the following socio-economic groups: (i) poor and near-poor rural households, (ii) water-insecure and climate vulnerable smallholder farmers, and (iii) women (including women-headed households) and youth farmers. CRWIS develops a gender and social inclusion strategy (see Annex 4) that is aimed at the empowerment of women and youth (including from ethnic minorities where relevant) informed by province-specific gender social norms assessment to determine women's climate adaptive capacity; Implementation of a household methodology for improved gender relations to enhance climate adaptation and business skills at household and community levels; grants for increased climate adaptation of poor and near poor women

[65] World Bank, Asian Development Bank, (2021) Climate Risk Country Profile Vietnam. (Accessed June 2024) https://climateknowledgeportal.worldbank.org/sites/default/files/2021-04/15077-Vietnam%20Country%20Profile-WEB.pdf

and youth and ethnic minorities; climate smart agriculture (CSA) technical and skill trainings for women and youth as members of cooperatives and water user groups; and capacity building of project implementers on gender equality and women empowerment (GEWE), gender action learning system (GALS) for increased women's climate adaptive capacity.

50. Other direct beneficiaries will include: (i) Provincial and district public institutions, who will receive support to strengthen policy, sectoral planning and institutional capacities for an integrated and inclusive water management for irrigation and flood control, and to support the development of pro-poor, gender-transformative, and climate adaptation agriculture development; (ii) Public and private service providers of extension services and business development services engaged in promotion of CSA technologies and practices; (iii) cooperatives, water users' entities, and farmer organizations such as Common Interest Groups (CIGs), with priority to those managed by women, ethnic minorities, and youth; and (iv) Producer groups and private actors involved in small-scale processing and marketing of project area's agricultural products.

51. In order to identify poor and near-poor households (including women-headed households), Ministry of Labour, Invalids, and Social Affairs' (MOLISA) household level assessment of multidimensional poverty (MDP) standards will be used. The underlying assumption for MOLISA MDP indicators is that additional data collection will not be required; the project will use the last available household-level assessment. MOLISA's approach includes five dimensions and 10 indicators: (i) Health (indicators: nutrition and child mortality, each is weighted 1/6), (ii) Education (indicators: adult education and children education, each is weighted 1/10), (iii) housing (indicators: per person housing area and housing quality, each is weighted 1/10), (iv) Living standard (indicators: water and sanitation, each is weighted 1/10) and (v) access information (indicators: usage of telecom services and assets for accessing information, each is weighted 1/10). Each person who fails to meet the deprivation cutoff is identified as deprived in that indicator. In MOLISA's approach, a person is identified (by Alkire-Foster methodology) as multi-dimensionally poor if the person's weighted deprivation score is equal to or higher than the poverty cutoff of 33.33%. Since identification of some direct beneficiaries (e.g., water insecure and climate vulnerable households, youth farmers) will require additional data collection, CRWIS will use participatory mapping approaches during the planned FPIC process (in the E&S plan), to map households for beneficiary targeting.

52. In terms of climate hazards and vulnerability, as mentioned in previous sections; both Thanh Hoa and Nghe An provinces are already subject to higher climate change risks vis-à-vis other regions. Since MOLISA's multidimensional poverty standards for selection of poor / near-poor households does not sufficiently consider climate vulnerability, additional indicators and thresholds will be needed, such as: natural disasters over the past 3 or 5 years (timeframe to be determined during implementation); OR (b) if household's agricultural plot(s) cannot or has limited access to the in-field (tertiary) canals to mitigate risk of drought – as evidenced by no or limited summer or winter cultivation during the last agricultural season and effect during the last significant drought; OR (c) if household's plot(s) location makes it vulnerable to water release from other rice fields during excessive rains – as evidenced by last significant heavy rainfall or flood event; OR (d) households that are in low-lying areas and have been marooned by floods in the recent past; OR (e) if households have limited or no information regarding the climate hazard early warning. For Thanh Hoa, salinity intrusion risk in crop or aquaculture ponds will be used as an indicator as needed. Of note, while the data on compensation disbursement to households should be available at the commune level, other climate vulnerability indicators may involve additional discussions for each hamlet to ensure targeting accuracy/efficiency.

53. Geographically, the project will be targeting the most climate-vulnerable communities in 13 communes (after merging) in Thanh Hoa province within the Ma river watershed, and 19 communes (after merging) in Nghe An province within the Lam river watershed (See the map of project area above and the table 2 below). Project interventions will (i) improve irrigation water availability and management for approximately 4,000 ha of agricultural land in Ma river (1500 ha in Thanh Hoa province) and Lam river (2500 ha in Nghe An province) watersheds, and strengthen flood control and prevention for approximately 2000 ha of agricultural and residential land along the Hoat and Cung rivers (1000 ha in Thanh Hoa province), and Lam river (1000 ha in Nghe An province); (ii) assist smallholder farmers build resilience to climate change through concrete activities including helping farmers find solutions to a climate change aggravating factor namely that of equitable water management along the two rivers in both provinces; (iii) raise awareness about the challenges farmers face, and also find workable solutions through a participatory approach; and shared of drought and flooding Early Warnings with all actors to ensure timely interventions either in the prevention of flooding or ameliorating periods of drought. It is expected that at least *10,000 households (5000 HHs in each province)* equivalent to 40,000 beneficiaries will benefit from

these interventions. Of this, 40% of beneficiaries (16,000 people) will be women, 20% of beneficiaries (8000 people) will be youth, and 800 Ethnic Minority households (4000 people) in Chau Khe commune, Nghe An province will be targeted. The project further aims to develop concrete adaptive solutions in building capacity for at least 8000 farmers and 1800 EMs in CSA and on-farm water management and ensuring that the 2,186 ha of land (1,844 ha in Thanh Hoa, 342 ha in Nghe An) is made climate-resilient through the provision of climate adaptive crops and irrigation. Farmers will further be supported in price negotiation with the development and deployment of a crop prices app as well as the development of 4Ps to assist 2000 farmers and 800 EMs connect with value chain producers for the project selected VCs including rice, potato, solalum procumbens, cucumber, squash, vegetable, Eunice viridis (clam worm), and Pila conica (snail). The project will aim to furthermore facilitate the agreements between producers and smallholders to ensure fair and equitable contracts.

54. Details on the project communes and beneficiary households are depicted in the table below:

Table 2. Project Targeted Communes and Beneficiary Households

Districts targeted by CRWIS (before merging process) (*)	Total Number of Communes (Before merging process)	Total Population (HHs)	Number of Communes targeted by CRWIS (after merging process)	Total Population targeted by CRWIS (HHs)
Thanh Hoa Province				
Ha Trung	20	33,996	5	2620
Hoang Hoa	37	62,545	8	2380
Sub-total	**57**	**96,541**	**13**	**5,000**
Nghe An Province				
Nam Dan	19	42,511	3	800
Hung Nguyen	18	34,325	2	1000
Do Luong	33	59,359	4	900
Thanh Chuong	38	62,149	7	700
Anh Son	21	31,058	2	800
Con Cuong	13	18,313	1	800**
Sub-total	**142**	**247,715**	**19**	**5,000**
Total	**199**	**344.256**	**32**	**10,000**

(*) Before merging process, Thanh Hoa province has a total of 559 communes in 27 districts with a population of 1,000,579 households, and Nghe An province has a total of 430 communes in 21 districts with a population of 863,388 households.

B. Project/Programme Objectives:

List the main objectives of the project/ programme.

55. The **Project Goal** is to *strengthen climate resilience and social inclusion of water-insecure rural communities for sustainable socio-economic development in Thanh Hoa and Nghe An provinces*.

56. The Project Development Objective is to increase adaptive capacity of communities to respond to the impacts of climate change

57. This will be achieved through the two interlinked outcomes over a four-year implementation period of:

- Improved water availability and control through climate-resilient infrastructure development;
- Improved capacity of and coordination between local institutions and water user groups for climate-informed and inclusive water management and strengthened the resilience of smallholders'

agricultural businesses.

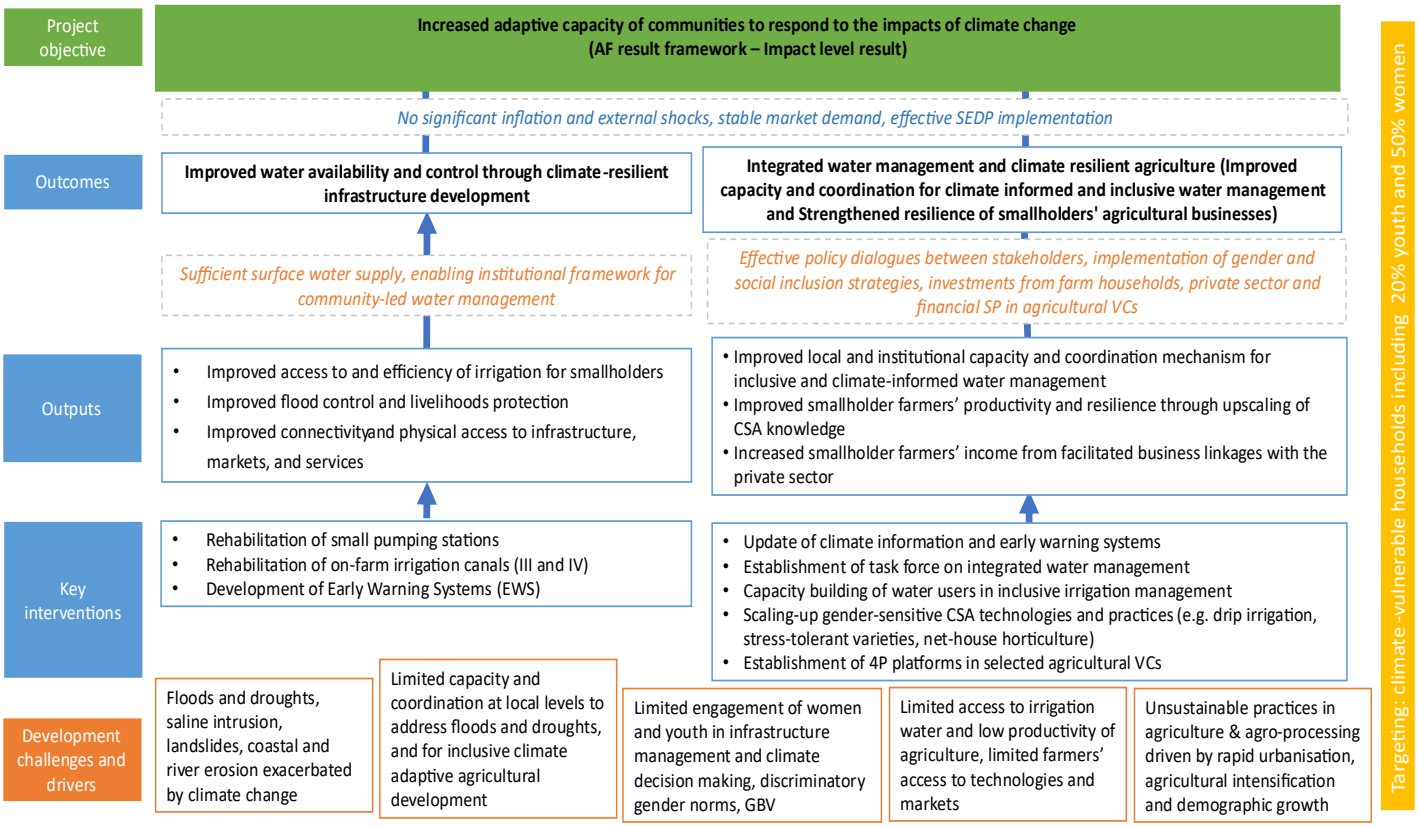


Figure 7. Theory of change

58. CRWIS will address the underlying challenges hampering the socio-economic development of water-insecure and climate vulnerable rural communities in Thanh Hoa and Nghe An provinces, with particular attention to transforming unequal social norms affecting women and youth. Inclusive rehabilitation of critical water infrastructure will strengthen smallholders' adaptive capacity to climate risks because it will result in improved water availability and control (outcome 1) by protecting their productive assets, improving their mobility and physical access to markets and services, and providing them with opportunities to diversify production, and increase and stabilize yields. By improving the capacity and coordination mechanisms of local institutions in integrated water management and strengthening resilience of smallholders' agricultural businesses (outcome 2), the project will i) improve livelihoods resilience by enhancing the enabling environment for improved access to climate information, efficient water resources management, and increased engagement of rural women in decision making ; ii) ensure the sustainability of the gains from the infrastructure investments, improve smallholder farmers' productivity and resilience through upscaling of CSA knowledge, and increase smallholder farmers' income from facilitated business linkages with the private sector supported by effective public-private-producer partnerships (4P).

59. Promotion of gender transformative outcomes and the enhanced inclusion of women and young smallholders will be specifically achieved by creating unique opportunities for changing discriminatory gender norms and imbalanced power relations and by fostering favourable conditions for these groups, including through engagement with water user groups and increased institutional support for gender equality and women's empowerment. The support for women's inclusion through the implementation of gender transformative approaches is also expected to strengthen their standing and voice in their households and communities, thus leading to greater women's empowerment.

60. The TOC is built on the assumptions that: (i) surface water in the selected sub-projects is sufficient to ensure adequate water supply for the targeted irrigation schemes, downstream users and minimum environmental flow in the target watersheds; (ii) the current institutional framework is allowing water users'

entities to implement community-led water management for both large-scale public infrastructure and on-farm irrigation schemes; (iii) policy dialogues within 4P platforms will result in effective and actionable outputs for value chain development; and (iv) capacity building on CSA technologies and practices combined with an enabling environment and market opportunities will translate into adoption and replication of profitable business models by smallholders.

C. Project/Programme Components and Financing:

Table 3. Project components

Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)		
			Thanh Hoa	Nghe An	Total
1. Improved water availability and control through climate-resilient infrastructure development	1.1 Improved access to and efficiency of irrigation for smallholders	Improved water availability and control through climate-resilient infrastructure development	701,900	1,200,000	1,901,900
	1.2 Improved flood control and livelihoods protection		1,000,000	1,000,000	2,000,000
2. Integrated water management and climate resilient rural livelihoods	2.1.1 Improved capacity and coordination for integrated water management	Integrated water management and climate resilient agriculture	250,000	250,000	500,000
	2.1.2 Strengthened resilience of smallholders' agricultural businesses		2,228,000	1,786,100	4,014,100
Project Costs			4,179,900	4,236,100	8,416,000
6. Project Execution Cost – Project management component (8.7%)			397,100	403,500	800,600
7. Total Project Cost			4,577,000	4,639,600	9,216,600
8. Project Cycle Management Fee charged by the Implementing Entity (8.5%)					783,400
Amount of Financing Requested					**10,000,000**

Indicate the dates of the following milestones for the proposed project/programme

Table 4: Projected Calendar

Milestones	Expected Dates
Start of Project/Programme Implementation	2026
Mid-term Review (if planned)	2028
Project/Programme Closing	2030
Terminal Evaluation	2030

PART II: PROJECT/PROGRAMME JUSTIFICATION

A. Project Components

Describe the project/programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

Component/Outcome 1. Improved water availability and control through climate-resilient infrastructure development

61. Vietnam has 16 major river basins and nearly 3,500 rivers in a dense and complex river network with ample average rainfall of almost 2,000mm a year. However, much of Vietnam's water lies beyond its direct management as two-thirds of water resources flow in from neighbouring countries upstream. Consequently, Vietnam ranks low in the region for internal renewable water resources - 4,200 m3 per person against an average of 4,900 m3 for Southeast Asia. Water resources are also highly seasonal, with precipitation and runoff concentrated in a short rainy season followed by a long, hot, dry season. Rivers are in flood during the rainy season, but flows are low in the dry season and rainfall, and water resources are unevenly distributed across the country. The adverse impacts of climate change on the livelihoods of farmers are being aggravated by the rapid development, and the development of hydro powered energy needs that is beginning to stress the water resource growth in demand have produced stresses. The 2030 Water Resources Group (WRG) study found that the inter alia the Ma basin is already registering unsustainably high rates of extraction in the dry season, the below figure demonstrates the comparatively limited water availability in the Ma and Lam/Ca watersheds for the Thanh Hoa and Nghe An provinces respectively.[66]

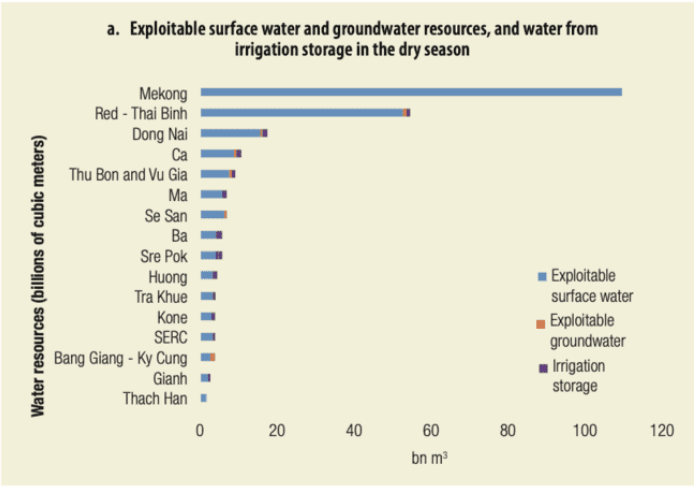


Figure 8. Exploitable water resources and irrigation storage, and national water runoff[65]

62. **Integrated Early Warning Systems (EWS).** Multi-hazard early warning systems are important to anticipate and mitigate the interconnected, cascading and mutually aggravating nature of risks and their impacts across sectors and systems including agri-food systems. Effective multi-hazard early warning systems, which are inclusive and people-centred, inform communities, including the most vulnerable, of upcoming risks and crises, and enable them to take the most appropriate early/anticipatory actions to prevent and mitigate losses in lives, livelihoods, properties, and infrastructure. Successful multi-hazard early warning systems leverage the knowledge, and expertise of a diverse pool of sources, including local, traditional, and Ethnic Minority (EM) communities, hydro-meteorological services, sectoral agencies and other scientific institutions to effectively monitor, identify, and communicate alerts ahead of disasters, within and across sectors. With the development of adequate multi-hazard EWS, local and national authorities will be informed in their decision and policymaking and can adopt early measures, including scaling social protection measures, which mitigate the immediate impact of disasters on the population's

[66] 2030 WRG (Water Resources Group). 2017. Vietnam: Hydro-Economic Framework for Assessing Water Sector Challenges. Washington, DC: 2030 Water Resources Group. https://www.2030wrg.org/wp-content/uploads/2017/08/Vietnam-Hydro-Economic-Framework.pdf .

livelihoods and food security, while setting up the foundations for increased resilience to future shocks. The timely dissemination of understandable and actionable alerts through a variety of means of communication also empowers communities to ensure their continuous access to food and minimize disruptions in agricultural activities before and after disasters strike. That is why timely, actionable, impact-oriented early warning systems are a key prerequisite for food crises prevention.

Sub-component/Output 1.1. Improved access to and efficiency of irrigation for smallholders

63. To reduce the climate-vulnerability of the targeted beneficiaries, it is necessary to enhance the efficiency of farm-level water use to ensure greater water and food security. The design mission has found tertiary on-farm canals to be in poor condition with field-to-field irrigation is still being practiced due to incomplete on-farm canals and this causes difficulties for water distribution between fields. Farmer frequently complained at the length of time that it took for water to arrive to their fields and requested for the irrigation system to ensure that the water can be pumped out during flooding, as well as in as flooding frequently causes problems especially the loss of crops. Some of the main concerns raised included the elevated tidal level of the river, the unpredictable nature of precipitation, coming sooner in year and more erratic. Also, in some villages mainly in Ha Son commune, Ha Trung district, Thanh Hoa province, the hydro-electric dams release water when it rains causing floods and limits water release during periods of drought. As shown in the above figure, water availability during the dry season is severely restricted and to address this the project will aim to enhance water management capacity. It will aim to achieve this through the piloting of an integrated approach of enhancing on-field water management capacity though improving farm-level tertiary irrigation including the ability to regulate water levels sufficiently to be able to practice water saving Alternating Wetting and Drying (AWD) paddy rice irrigation (under output 2.1.2).

64. For selection of the water infrastructure works in the project areas, CRWIS used a two-layer screening process. First, CRWIS used a set of criteria introduced by the Adaptation Fund in the “Strategic Priorities, Policies and Guidelines of the Adaptation Fund”. The criteria for selection include: (i) Level of vulnerability; (ii) Level of urgency and risks arising from delay; (iii) Lessons learned in project and program design and implementation to be captured; (iv) Securing regional co-benefits to the extent possible, where applicable; (v) Maximizing multi-sectoral or cross-sectoral benefits; and (vi) Adaptive capacity to the adverse effects of climate change. The description and mechanism for the prioritization of water infrastructure are in Annex 1. Infrastructure schemes that passed all the above criteria were shortlisted for investment under CRWIS. Second, the feasibility study was conducted to assess the viability of the shortlisted water infrastructure schemes. The feasibility study consisted of hydrological analysis to support the viability of water infrastructure supporting the irrigation schemes in addition to topographic analysis, soil and agronomic assessments, climate change scenarios and risks, and estimation of crop water requirements. The feasibility study was conducted for the shortlisted schemes in full consultation with beneficiary communities. Key elements of the feasibility study include: i) analysis of the targeted watersheds (Lam and Ma, Ca, and Cung), collection and analysis of rainfall and river flow time series, ii) estimation of river flow and sediment transport in current and future conditions especially during the most critical periods of the year corresponding mainly to the lowest and highest water levels/flows under different assumptions of return periods and climate change scenarios (the target provinces focus on RCP8.5, 2040-59), iii) Considerations regarding existing and planned water abstractions upstream and downstream of the targeted infrastructure and assessment of water balance and adequacy of water flow to satisfy irrigation water requirements at least on monthly basis; and iv) assessment of multi-reservoir regulations, particularly on Lam River in Nghe An province.

65. As results, in Nghe An, four irrigation systems in the mountainous communes (belong to the previous districts of Con Cuong and Anh Son) have been selected for upgrading 6.1 km of main irrigation canal, 4.9 km of on-farm canal and 3.4 km of management roads (see table 5 below). Currently, these irrigation systems are providing irrigation services to 342 hectares of agricultural land, mainly rice fields and other crops, such as maize, sugarcane, and vegetable. The schemes will serve 550 households, including 143 ethnic minority households - "Thai" of Chau Khe commune.

66. In Thanh Hoa, the Da Vet community small pumping station together with the related inlet and outlet canals in Hoat Giang commune have been selected for upgrading. Currently, the pumping station supplies water to 300 ha of rice fields and drains rainwater for 350 ha, including 50 ha of rural residential villages with 1,350 households during the rainy season. In Hoang Hoa district, 2.7 km of two on-farm irrigation systems in Hoang Phu and Hoang Dong communes and a water regulation gate - Cong Gom have been selected for upgrading. Currently, the two on-farm irrigation systems supply water to about 44 ha of rice

fields of 1,085 households. Cong Gom water regulation gate is regulating water irrigation services for 1,500 ha of rice fields of 3,240 households (see table 5 below).

Table 5. Selected water infrastructure sub-projects for investment

	Sub-project	Location	Investment items	Irriga-tion area [Ha]	No. of Benefited House-holds [HH]
Nghe An province				**342**	**550**
1	Irrigation system 2/9	Chau Khe Commune	Upgrade 4.6km of branch canal, 0.1km of management road	114	143
2	Vinh Son irrigation system	Vinh Son commune	Upgrade 2.5km of branch canal	50	92
3	Lang Son irrigation system	Lang Son commune	Upgrade 1.4km branch canal, 1.3km management road	40	130
4	Tao Son irrigation system	Tao Son commune	Upgrade 1.5km of main irrigation canal, 1.0km of branch canal, upgrade 2.0km of management road	138	185
Thanh Hoa province				**1,844**	**5,675**
1	Da Vet irrigation system	Hoat Giang commune	Construction of new pumping station with bigger capacity, meeting the required irrigation and drainage capacity with house for operator; rehabilitate 0.3 km of main canal and 0.7 km branch canal	300	1,350
2	Branch irrigation canal	Hoang Dong commune	Upgrade 1.25 km, branch canal	22	745
3	Branch irrigation canal	Hoang Phu commune	Upgrade1.5 km branch canal	20	340
4	Gom regulation gate	Hoang Phu commune	Upgrade Gom regulation gate	1500	3240

67. The development and implementation of this output will follow a phased approach. Phasing principles will be around two axes: i) the first axis consists of development activities' phasing for each subproject. In this regard, the following activities have been identified and will be sequentially developed under this subcomponent i.e. Detailed Design, Construction/Rehabilitation works, and infrastructure works supervision and handing over; ii) the second axis consists of phasing the development of all the water infrastructure and irrigation schemes in 4 years in such a way that the first year will observe the pilot phase consisting of implementing a relatively a small batch of schemes. This will allow careful monitoring of the procurement, implementation and technologies' performance (e.g. capacity to regulate the inflow and outflow the water, the adoption of AWD) and adequacy, gathering feedback from beneficiaries, and addressing any unexpected issues. Once lessons are learnt from the pilot phase, CRWIS will proceed with the full-scale development phase observing an incremental implementation during the second and third years.

68. **Detailed Engineering Design**: Based on feasibility study recommendations, with a focus on modernisation of farm-level tertiary irrigation canals with the capacity to regulate the inflow and outflow of water depending on the needs of the farmers, the project will prepare necessary bidding documents for the procurement of services to conduct a detailed engineering design. The detailed design will be carried out by specialized consulting firms competitively recruited and will have a particular focus on identifying appropriate technical options for sustainable water management and adequate irrigation systems (from head works up to farm level, as required by each specific site/sub-project). The design of water infrastructure should optimize a sustainable balance between investment costs, robustness to the impacts of climate change and extreme events, in addition to simplicity and affordability of operation and maintenance. The project management unit (PMU) will be responsible for Quality Assurance and adequate technical assistance will be mobilized to ensure that designs meet quality standards and support

the review and validation processes. The output of this activity will consist of the elaboration of bidding documents inclusive of engineering drawings, Bill of Quantities (BoQ) and cost estimation. The design will ensure capturing innovative and practical water resources and rural infrastructure (WRRI) models resilient to climate change and supporting smart cropping patterns (e.g. AWD, SRI) with suitable designs adapting to the specific conditions of each sub-project area.

69. Additional analysis related to ESMP will be needed before carrying out the rehabilitation works and during the preparatory phase, including the elaboration of resettlement and rehabilitation action plans to review the compensation for any potential acquisition of public/private land, and/or impacts on farming activities and to mitigate any risk that may arise during site clearance.

70. **Construction or rehabilitation works**: The development of critical water infrastructure, across both provinces, will be planned in such a way that all works should be achieved within the mandated 4 years, ideally one year before CRWIS completion. The project will procure water infrastructure construction or rehabilitation works from qualified bidders/contractors. Construction or rehabilitation works will be conducted according to the technical specifications provided by the detailed engineering designs and will be supervised by the PMU and/or the design consulting firm. The construction/rehabilitation process will be flexible to align with ongoing socio-economic and technical requirements, after discussion with the work supervisor, the PMU and community consultations (FPIC). The PMU will play an important role in ensuring Value Analysis and Value Engineering (VA/VE), in controlling the costs of infrastructure through advanced procurement activities, front loading long lead items, avoiding underbidding and subsequent excessive cost variations. The monitoring and supervision system will be developed at all levels, i.e. province, and commune/community level to ensure high quality of construction works and timely solving of unforeseen issues through the Grievance Redress Mechanism.

71. In beneficiary communes, youth (working age, above-18 years) represent the main human resources for the workforce; interested women farmers, women-headed households, Ethnic Minority households, and poor and near-poor households will be prioritized for participation in construction works. Cooperatives, commune technical staff and engineers will be technical human resources to support beneficiary communities during the construction process.

72. **Works Supervision and Handing over**: The PMU and the design consulting firm will oversee the work supervision. Beneficiary communities would also be involved in supervising works at farm level and external technical assistance will be mobilized as needed to deliver practical training on site, for beneficiary communities on basic technical supervision of construction works. Collaboration with the Provincial Women's Unions and Youth Unions will be sought to organize skills training in construction for interested women, youth and other vulnerable groups to ensure they are trained and skilled adequately to garner optimal benefit for their labour.

73. Once construction works are achieved, the contractor will be legally responsible for any defect which can appear in the work during the defects liability period indicated in the contract. A joint inspection of the completed works shall be planned. The final inspection team will consist of the scheme managing entity (cooperative or villages), PMU, contractor, work supervisor, and beneficiaries' representatives. If the final inspection reveals that all construction works have been completed properly (in accordance with the technical specifications, detailed designs and the signed contract), the contractor will preliminarily hand over the scheme/water infrastructure back to the PMU. The infrastructure/scheme must be tested during the defects liability period. If the test run reveals that the infrastructure/scheme is fully functional, the final handing over from the contractor to PMU will take place at the end of the defects liability period, and an asset management transfer agreement will then be signed between the PMU and the scheme managing entity. This entails the transfer of all responsibilities for the sustainable operation, maintenance and management of the infrastructure to the irrigation cooperative/village.

Subcomponent/Output 1.2. Improved flood control and livelihoods protection

74. The feasibility study and consultations during the concept note development and the design have highlighted the need for a multi-hazard Early Warning Systems (EWS) to help farmers adapt to multiple risks. Nghe An province identified building monitoring systems and creating warning maps in areas at risk of floods, flash floods, drought and saline intrusion as priority interventions for environmental protection in the provincial Master Plan for the period 2021-2030. Currently, Nghe An has 53 monitoring points for surface water and will add 5 new ones by 2030[67]. Similarly, Thanh Hoa identified monitoring and early

[67] Discussion with Department of Natural Resource and Environment (DONRE) of Nghe An province in May and October 2024

warning systems as a priority area under protection of environment, use of natural resources, disaster prevention and control and climate change response. The province has 47 river monitoring points and plans to add 7 new ones by 2030 in watershed and pollution-prone areas. The CRWIS targeted communes are not covered by existing EWS and some communes must rely on a flood warning station 300 km away in another province[68]. Additionally, climate change and sea level rise are also making the estuarine water increasingly more brackish, while when it floods, following by heavy rains, the water turns fresh. The uncertainty about the quality of the water is difficult for farmers to manage as crops and fish/prawn production are sensitive to sudden changes in water quality and levels. Currently farmers do not have access to information relating to the quality of water (e.g. salinity) that would help them in deciding in the selection of types of fish and prawns either more or less saline or fresh water tolerant. The multi-hazard EWS will therefore also include automatic water pollution and salinity (brackish) warning systems that would help communes particularly those along on the coastline with low-intensity fish and prawn production, adapt and mitigate some of the associated risks.

75. CRWIS will support the existing monitoring network in both provinces by the upgrade and expansion of the EWS. The EWS will integrate various elements and be tailored to the different conditions in each province of Thanh Hoa and Nghe An. The feasibility study undertaken during the design (please see Annex 1) has identified the monitoring sites, water quality parameters, monitoring frequencies, and adequate monitoring equipment (stream gauge, stilling well, multi-parameter water quality sensors, etc.) according to the specific context of watersheds and rivers, and tailored to the monitoring goals and capacities of the districts and communes (monitoring flash floods and floods, saline intrusion, nutrient pollution, sediments, insect, AWD etc.). It is noted that prior to installation, alignment of critical nodes for river monitoring with updated drought, flood and salinity maps will be ensured. The selected infrastructure and/or equipment to be installed will be owned by the CPCs and managed by relevant departments and divisions under DAE. Figures below present types of EWS proposed for CRWIS investment. Technical specifications, locations, and cost are presented in Annex 1.

Figure 9. Smart rainfall monitoring station

Figure 10. Floating water level and water quality/salinity monitoring

[68] Discussion with Department of Natural Resource and Environment (DONRE) of Thanh Hoa province in May and October 2024

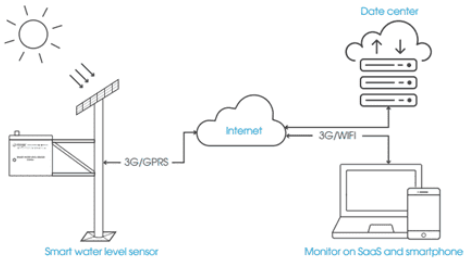


Figure 11. Fixed station of water level and water quality monitoring

Figure 12. Smart sensor measures water level in rice fields for AWD

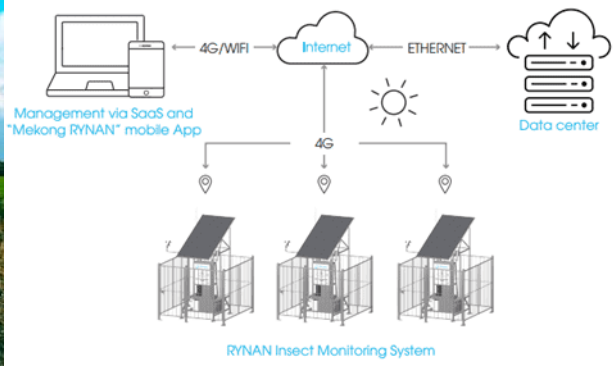


Figure 13: Smart insect monitoring stations

76. CRWIS will also develop a digital information system for large-scale and timely dissemination of early warnings (e.g. agro-meteorological forecasts, pests and disease[69], risk of flooding or drought, and salinity levels) and climate information to management agencies and local communities in the project target areas, especially the water users. Current channels available to people include printed notices from upstream communes on water release, regular bulletins (available online) from IMHEN on flash flood and drought warnings, weather, and climate disaster warnings on mass media (TV, radio) and social media groups. The project will develop accessible digital platforms to provide real-time and/or regular (every day, 7 days, 10 days, 14 days) climate-informed actionable agricultural advisories and early warnings on extreme events to local communities, smallholder farmers and other water users including women. MEKONG App[70] is an example of agricultural platform linked to water monitoring and insect monitoring that has been tested in the Mekong delta and could have a potential for upscaling in the target communes.

[69] Livelihoods of farmers in the project areas are further increasingly affected by pests resulting from climate change. To help farmers adapt to this phenomenon that is expected to increase in the future, the design proposes the development and implementation of an insect monitoring system as part of the multi-hazard EWS, as this would help improve the pest response mechanism.

[70] https://apps.apple.com/vn/app/mekong/id1260839043?l=vi

77. The development of the early warning system will follow the same process including the two axes as identified for the water infrastructure works under output 1.1 (feasibility study and detailed technical design, procurement, construction and supervision of works). CRWIS will ensure that specialised technical assistance (hands-on support by specialised EWS development company such as RYNAN[71]….) and capacity building on EWS operation and maintenance will be provided to specialised agencies including the regional and provincial Centre for Hydro - Meteorological Forecasting, DAE. The EWS developed by the CRWIS will be integrated into the existing EWS networks and handed-over to the aforementioned agencies for management. This will amplify the impact and ensure the sustainability of the EWS.

78. The early warning systems once in place will provide significant benefits to farmers by offering timely and accurate information about potential weather hazards, pest outbreaks, and other environmental threats. These systems enable farmers in project areas to take timely decisions on crop production as well as proactive measures to protect their crops and livestock, reducing the risk of damage and loss. As for the case of Ha Son commune, Thanh Hoa province, by receiving early information about an impending flood, farmers can implement measures to prevent flood (e.g. operating pumping station, drainage canals.) or adapt to the situation. Similarly, warnings about severe storms or pest infestations allow farmers to take preventive actions, such as securing equipment or applying appropriate treatments. However, early warning systems alone are unable to sufficiently transform information into action. Decision-making, based on an analysis of this information, is key in leading to action and making a concrete and positive impact for vulnerable populations. To this extent, CRWIS will ensure sufficient capacity building for farmers (see output 2.1) in transforming EWS information into action.

79. Not only farmers will benefit, the early warning systems also greatly benefit management agencies by enhancing their ability to coordinate and make informed decisions, as well as provide accurate advisory services (e.g. extension services by DAE). These systems provide real-time data and predictive analytics on potential threats such as natural disasters, disease outbreaks, or environmental changes. With this information, agencies can develop and implement timely response strategies, allocate resources more efficiently, and communicate effectively with stakeholders. For example, with early warnings of drought or flood in the Lam/Ca river of Nghe An province, PPC, and DAE can coordinate with relevant stakeholders including private sector the management/coordination plans, deploy emergency services, and inform the public promptly. This proactive approach not only mitigates the impact of disasters but also ensures a more organized and effective response, ultimately safeguarding communities and infrastructure. Again, the transformation of information into action will require efforts to build both institutional and individual capacity which will be addressed under output 2.1 below.

Component/Outcome 2. Integrated water management and climate-resilient agriculture

80. To meet the developmental needs of an economy that has emerged recently as a lower middle-income country, Vietnam has developed a network of hydrological dams for electricity generation. Consultations have shown however that this has at times come that the expense of the small farmers that cultivate land along the Ma, Ca, Cung rivers in Thanh Hoa province, and Lam River in Nghe An province. While farmers suffer from sea-level rise and the resulting increase in salinity as well as flooding and the increased unpredictability of rainfall, water management along the river plays a significant role. The challenges facing the farmers in terms of water management are multiple with some beyond their control requiring institutional coordination between the hydropower dam operators, the irrigation companies that deliver and maintain the irrigation canals and the farmer cooperatives. Farmers are at the end of water chain of actors that largely determine the availability of water without being consulted as to their needs and have frequently complained that during times of drought, dams tend not to release sufficient water leading to the lowering of the river and the aggravation of the dry season's drought. Combined with SLR and the estuarine tide, the water is becoming increasingly brackish and scarce. Equally, during the rainy season the dams release excess water resulting in the flooding of agricultural land and the destruction of agricultural activities including crops, fish / prawn ponds and small ruminants with reportedly only livestock remaining standing. Consultations have identified frequent episodes of when farmers have lost their entire livelihoods that they have heavily invested in.

81. Food security remains a long-standing concern in Viet Nam and although the country is the second largest exporter of rice, many rural households remain net buyers of food and are vulnerable to food shortages

[71] https://rynantech.vn/

and price volatility, as experienced during the rice crisis of 2008. This has been the case resulting from consultations of smallholder famers in the target areas. Farmers are ageing as the youth are migrating to send remittances home meanwhile agricultural production is limited to largely to meet subsistence needs. Design consultations have identified various value chains that the villages currently engage in primarily including, paddy rice, solanum procumbent, sugarcane, fresh water and fish farming, maize, peanut, beans and subsistence small ruminants (poultry, goats) and occasional cattle. As production varied between communes some also engaged in pig farming, in the more mountainous areas among other alternative income-generating activities, but pig farming was uncommon as many farmers cited not being able to comply with stringent environmental and sanitary regulations.

82. This component prepares and assists local authorities and water user entities to optimize and sustain productive use of water resources and infrastructure (developed under Component 1) by providing enabling conditions for water use efficiency and water productivity, increasing and stabilizing agricultural productivity, and strengthening farmers' resilience and adaptive capacity to climate shocks. This comprises (i) strengthening capacity and coordination mechanism of local institutions within watersheds in integrated water management, improving disaster risk management of climate-vulnerable water-dependent communities, (ii) building the capacity of water users in efficient and sustainable management of water supply in agriculture, ensuring effectiveness and sustainability of water infrastructure for smallholder farmers, and (iii) increasing adaptive capacity and profitability of irrigated agricultural business models, strengthening the resilience of rural livelihoods to climate change. Component 2 will directly build on the outcome of Component 1 and draw on the lessons learned from similar initiatives in country and region.

Sub-component/Output 2.1 Improved capacity and coordination for integrated water management.

83. To address the cross-sectoral challenges in water management the project will aim to improve the awareness and capacity for integrated water management. This aims to leverage the benefits of the multi-hazard EWS developed under output 1.2 for a coordinated approach to reducing the smallholder risk to life or livelihood. An integrated multi-hazard EWS with analysis, warnings and results being shared with all stakeholders who's interests and livelihoods depend on the availability of water, will aim to improve communication on activities as well as a greater awareness about the impacts thereof with the aim to ensure that there is a more efficient and equitable use of water**.** Key to enhancing the equitable sharing of limited water resources is awareness raising and facilitating a multi-stakeholder dialogue including with provincial and commune agencies Provincial People's Committee (PPC), Department of Agriculture and Environment (DAE), Department of Finance (DOF), hydropower plants, irrigation companies, and cooperatives for improving coordination in water management. The project will therefore use the data gathered as a basis for informed decision-making for improved water management and to foster an environment with the goal of enhancing cooperation and coordination between all stakeholders.

84. The project will aim to strengthen the flow of information between stakeholders regarding water use planning and management, land use, and weather data and climate information for improved planning and programming. To achieve this the project will promote a platform where the identified stakeholders, are able to discuss the evidence-driven issues inter alia generated by the multi-hazard EWS but also the concerns of all stakeholders with a view to find a mutually acceptable solution to limited access to water. Based on the findings of the output the project will develop a strategy paper on communal water use and agreed actions. This will then form the basis of an institutional capacity building plan for equitable water use in the watershed by improving inter-sectoral, inter-commune coordination and cooperation in water planning and management. Ultimately the project will prepare and integrate sector plans (for example the Climate Change Adaptation and Disaster Risk Management Action Plans and the Agricultural Development Plans) that would inform the development of an operational plan for an inclusive institutional coordination mechanism on integrated water management.

85. Along the Lam/Ca river in Nghe An province, and the Ma, Len, Cung, Lach Truong rivers in Thanh Hoa province, forming the CRWIS project targeted area, there are various water users e.g. hydro power plants, factories, irrigations companies, cooperatives, and residents/farmers who have multiple and sometimes conflicting interests in water use. Use of water from one entity might influence others and vice versa. Currently, planning and coordination between and within the various units responsible for water management in those rivers are very limited. This threatens the sustainability of the water resources management, the ecological integrity of the area, and communities' livelihoods. To address these risks, CRWIS will update the climate information, based on the databased and information generated by the

EWS developed under Output 1.2, as an important input for improved coordination and capacity of water user entities; strengthen local and institutional capacity and coordination mechanism in integrated water resources management; and build capacity of water users for optimization and sustainable use of water infrastructure and resource.

86. **Update commune Climate Information**: This intervention will ensure provision of timely advisory to support not only local institutions (CPCs) for inter-sectoral and inter-district/commune coordination and cooperation in water management, but will also benefit farming households in their planning, decision-making for risk management (what to grow, when to plant or harvest, how to allocate labour, etc.), enabling their capacity to adopt Climate-Smart Agriculture (CSA) technologies and practices (Output 2.2). Updating climate information will entail the following activities:

    - Development or update of drought, flood and salinity risk maps for communes in the project target areas. The project will work with the Vietnam's Institute of Meteorology, Hydrology and Environment (IMHEN), particularly its Research Center for Agro-meteorology, under MAE to provide technical assistance and develop interactive maps for identifying vulnerable areas exposed to climate risks / natural disasters and projecting the risks of disaster occurrence considering future climate scenarios for Vietnam. These maps will be developed using existing and free access software such as the Hydrologic Engineering Center's (CEIWR-HEC) River Analysis System (HEC-RAS) to undertake relevant hydraulic calculations, simulate long-term trends for water flow and provide early warnings using real-time weather data (Output 1.2). Capacity building will be provided to relevant divisions under DAE to operate the software, institutionalise the use of risk maps and package the produced maps for ease of use for the broader audience (CPCs, Communities).
    - Support to in-person monthly meetings between relevant divisions under DAE (e.g. hydrology, meteorology, plant protection, aquaculture, etc.) to exchange information on weather, seasonal plans, water quality, and consolidate them into climate-informed actionable agricultural advisories to be disseminated to smallholder farmers though existing and new extension systems.

87. **Improve local and institutional capacity for equitable water use in the watershed by improving inter-sectoral, inter-district/commune coordination and cooperation in water planning and management**: Building on existing effort of the provincial DAE in promoting the inter-sectoral and inter-commune coordination and cooperation in water management, CRWIS will promote a task force or a committee in each province consisting but not limited to provincial and commune agencies (PPC, DAE, DOF, CPC), hydro power plants, irrigation companies, cooperatives, with the objectives to (i) Enhance cooperation between agencies/entities responsible for water management; (ii) Strengthen information flow between agencies/entities regarding water use planning and management, land use, and weather data and climate information for better planning and programming; (iii) Promote understanding of the potential negative impacts of physical developments on water resources and ways of mitigating these, including systematic consideration of complementarities with other projects that involve ecological and nature-based investments; and (iv) Promote understanding of the positive contributions of the better water management to the socio-economic status of communities within the project area.

88. The taskforce/committee will be led directly by the PPC to ensure engagement of all relevant stakeholders at different levels. DAE will assist PPC to implement this activity. DAE will undertake a capacity needs assessment of the aforementioned agencies and actors to design and deliver a tailored capacity building program on improved inter sectoral, inter-commune coordination and cooperation in water planning and management. This involves the assessments of roles and responsibilities of actors in water use and management in target areas, the preparation and integration of the various sector plans (e.g. the Climate Change Adaptation and Disaster Risk Management Action Plans, and the Agricultural development Plans) which inform the development of an operational plan for an inclusive institutional coordination mechanism on integrated water management.

89. The key outputs of this activity are: a) an operational plan for an inclusive institutional coordination mechanism on integrated water management; and b) local institutions with strengthened capacity in water management and planning. The operational plan, which is formed as a legal basis, sets milestones and actions for the taskforce/committee to operate. This ultimately contributes to (i) enhancing cooperation between agencies/entities responsible for water management; (ii) strengthening information flow between agencies/entities regarding water use planning and management; (iii) promoting understanding of the

potential negative impacts of physical developments on water resources and ways of mitigating these; and (iv) promoting understanding of the positive contributions of the better water management to the socio-economic status of communities within the project area.

90. **Improve capacity of water users for inclusive irrigation water management**: Complementary to the strengthened institutional capacity, this activity aims to build the capacity of local water users in the project areas in efficient and sustainable management of irrigation water supply, enhancing productivity and profitability of irrigated farming and ensuring effectiveness and sustainability of irrigation operation and maintenance.

91. Formally, management of irrigation systems is vested in irrigation companies, cooperatives, and villages (hereafter call water user entities). Irrigation companies manage inter-commune pumping stations, and headworks and secondary irrigation canals. Cooperatives or villages manage within commune pumping stations, and tertiary and on farm canals. Water user fee is highly subsidized (free of charge, in theory) and operational fee is fully subsidized by the Government of Vietnam. Fees for repairing and maintenance of irrigation systems are in the hands of water user entities that require mobilization/contribution from water users. The current irrigation systems are deteriorated because of long time of use (some from 1970s/1980s)) but also lack of proper management and finance for maintenance and repair.

92. CRWIS will strengthen the capacity of cooperatives, and villages to ensure that they fulfil their mandate adequately for water supply and intensify the use of their irrigation systems, and to ensure the sustainability of all improved water infrastructure. Doing so includes: (i) preparation of internal rules and regulations; (ii) facilitation of inclusive dialogues at communes and village levels to establish clear and equitable regulation on water use, and ensure climate information is fully considered in seasonal planning and within-season decision-making; (iii) improving/setting-up accounting system to ensure recovery of operation and maintenance (O&M) costs, and anticipating and budgeting for unexpected repair costs; (iv) agreeing on routines and responsibilities for operating and maintaining irrigation infrastructure, including frequency of inspections and cleaning; (v) setting up leadership quotas for women in cooperatives and setting a minimum quota for women's participation/membership in these water user entities, and (vi) subsequent gender-responsive capacity building in sustainable and climate-informed community-led water management and maintenance of infrastructure. Finally, communities will be encouraged to improve their waste management plans, particularly solid waste to reduce pollution and blockage of upgraded canals.

93. Water users will be trained on operation, maintenance and system adaptation, on rules and on administration. Mobilization of sufficient fee for irrigation system O&M will be among the key topics for training, discussions, and hence implementation. The capacity building spans the full project period, starting with formal training in the first and second years and on-the-job coaching in subsequent years. Exchange visits between water user entities will provide the opportunity to learn from entities with advanced management capacity. Training will be provided by PMU, DAE staff with assistance of outsourced experts on O&M and irrigation agronomy, and collaboration with the Provincial Women's Unions and Youth Unions on gender and social inclusion. CRWIS will target at least 80 water user entities (cooperatives, villages) in target communes of Thanh Hoa and Nghe An sustainably managing water resources. Table 6 below entails the targeted indicators for the Output 2.1.

Table 6. Target indicators for Output 2.1

Target indicators	Thanh Hoa	Nghe An	Total
Number of Communes having updated disaster risk maps	14	18	32
Number of people trained to operate and maintain innovative climate information and early warning systems	200	500	700
Number of people trained to develop and disseminate climate-informed agricultural advisories	50	80	130
Number of people (by gender, EM) provided with climate information services, Of Which - Women	10,000 4000	15,000 6000	25,000 10000

- Ethnic Minority	--	1800	1800
Number of taskforces/committees established for integrated water management	1	1	2
Number of water regulations proposed	2	2	4
Number of water-user entities (cooperatives, villages) supported to sustainably manage water resources and climate-related risks	30	50	80
Number of people (by gender, EM) demonstrating an improvement in empowerment	800	1000	1800
Of Which			
- Women	400	500	900
- Ethnic Minority	--	350	350

Sub-component/Output 2.2. Strengthened resilience of smallholders' agricultural businesses

94. This output aims to increase adaptive capacity and profitability of irrigated agricultural business models, thus strengthening the resilience of rural livelihoods to climate change. This output will be achieved through two key interventions: (i) improving smallholder farmers' productivity and resilience through upscaling of CSA knowledge; and (ii) establishment of public-private-producer partnership (4P) platforms to facilitate business linkages and integration of smallholder farmers in agricultural value chains.

95. **Upscale Climate-Smart Agriculture knowledge to improve smallholder farmers' productivity and resilience**: Consultations and feasibility study (Annex 2) have shown that farmers are increasingly suffering crop failure from heat stress and lack of water, as well as changing water salinity and flooding. Farmers explained that they have been trying many different crops to adapt to the changing agroclimatic conditions, however that despite their many attempts, crops have continued to fail. When pressed as to who was providing the crops and whether they were actually climate-resilient crop varieties, it emerged that many farmers were trying through trial and error as well as hearsay from other farmers as to which crops were more likely to be successful against heat and water stressors. The combined effects of improved access to water supply and timely climate information (Output 1.1, 1.2, and 2.1), better planning and coordination at the landscape level to reduce risks (Output 2.1), as well as increased market opportunities and business linkages will create an enabling environment for agricultural transformation and strengthen the climate resilience of rural livelihoods. Climate-Smart Agriculture (CSA) technologies and practices will improve farmers' productivity and resilience to climate, environmental and economic shocks.

96. Within the context of CRWIS, CSA will revolve around three pillars, namely (i) sustainably increasing agricultural productivity from crops, livestock and aquaculture, to contribute to achieving food and nutrition security, as well as higher incomes; (ii) adapting to climate change, with a focus on reducing exposure to short-term risks, enhancing capacity to adapt and develop in the face of shocks and long-term stresses; and (iii) reducing and/or removing greenhouse gas emissions where possible. Lessons learned drawn from other CSA initiatives[72] emphasize that: (a) having a clear idea of what farmers need and want is important not only for scaling up processes but also for transition to and sustained uptake of new practices; (b) new technologies and practices take long time to be adopted by farmers (up to 3 or 4 years of continued capacity building and awareness campaigns); and (c) CSA technologies and practices may take relatively long periods of time before benefits arise (e.g. improving organic matter and water holding capacity in soils, planting trees and managing landscapes). The project will address these lessons learned by emphasizing on participatory approach to ensure farmers' needs and interests are well captured during the selection process of CSA models, conducting a mapping and assessment of agricultural models and their feasibility, and ensuring CSA capacity building covering various topics will be provided continuously to farmers throughout the entire project implementation period.

97. To ensure uptake and sustainability of the proposed CSA models, CRWIS will undertake the following key interventions.

    i. Mapping and in-depth assessment of agricultural models adapted to the agro-ecological, climatic

[72] https://climateknowledgeportal.worldbank.org/sites/default/files/2019-06/CSA_Profile_Vietnam2.2.pdf & IFAD. 2016. Climate Smart Agriculture (CSA) Investment Catalogue. Vietnam.

and socio-economic context of the targeted communes, by capitalizing evidence-based models from research, empirical farmer knowledge and other development projects' success stories, combined with undertaking multi-stakeholder surveys. This will be led by DAE in the first year of implementation through a dedicated technical assistance, in parallel and closely linked with the feasibility studies for value chains. The project will apply the climate smart agriculture rapid appraisal (CSA-RA)[73], a mixed method approach that draws on participatory bottom-up, qualitative, and quantitative tools to assess the heterogeneity of local contexts and prioritize context-specific CSA options. Focus will be on identifying CSA practices, technologies and services adapted to smallholder farmers including women and youth farmers in the targeted project areas (see more in Annex 2). The output is to develop tailored CSA guidelines, with actionable and feasible models for smallholder farmers to support their decision-making, and highlighting potential loss, gain or risk associated with the proposed CSA models.

ii. Inclusive climate action planning and participatory selection process of CSA models at village and commune levels. The project will raise awareness of farmers including women and youth farmers on the climate and economic vulnerabilities of their current practices, use the developed CSA guidelines to propose adaptation alternatives and facilitate planning and selection process of CSA models at local level. DAE will lead this intervention in coordination with Farmers' Union, Women's Union, Youth Union and Cooperative Alliance to support farmer organizations (cooperatives, villages).

iii. Rural extension and advisory services (REAS) in CSA. To build the farmers and farmer organizations' capacity in implementing their selected CSA models, REAS will be provided as gender sensitive and socially inclusive trainings and capacity building through existing channels at local level (Farmer Field Schools, extension services provided by agricultural extension officers or cooperatives, etc.). DAE will lead this intervention in coordination with Farmers' Union and Cooperative Alliance to support farmer organizations (cooperatives, villages).

iv. Upscaling CSA models through community-based technologies and investments. To pilot innovation and de-risk the adoption of CSA models by smallholder farmers, especially when it entails (a) transforming from a subsistence farming approach to market-oriented one, (b) switching from a less productive and/or more vulnerable commodity to a higher value and/or more resilient commodity, or (c) adopting an improved and innovative technology or practice, the project will provide CSA support in terms of community-owned and managed equipment (tractor attachments such as direct seeders, laser land levelers - LLL, etc.), small-scale technologies for climate-resilient and sustainable production (net houses for vegetable growers, compost turners, drip/sprinkle irrigation, Three Reductions, Three Gains" (3R3G), alternate wet and dry (AWD), system of rice intensification (SRI), etc.), and inputs (stress-tolerant and high-quality seeds and seedlings, compost turners for organic manure, animal feed, etc.) to the most climate-vulnerable and/or poor households (see Annex 2 for more introduced CSA models). This CSA starter support is intended to be a one-time support and the following years, beneficiaries are expected to contribute through their own investments to sustain the CSA models. A dedicated capacity building on operation and maintenance will be provided to the recipient communities to sustainably manage the CSA equipment and technologies. PMU will define a specific targeting strategy and a guideline for the provision of CSA support per commune in line with the CSA models selected by the communities, approved by the PPC, and in compliance with national regulations and eligibility for grant-financed interventions while considering the specific needs of women, young farmers and poor and near-poor households. Additionally, the project will invest in nature-based solutions for environmental protection (ecological embankments, native tree planting / natural forest management, improvement of degraded uplands, etc.) to strengthen communities' resilience to landslides and river erosion.

98. **Increase smallholder farmers' income from facilitated business linkages:** Improved water productivity (component 1), water user capacity (sub-component 2.1), agricultural productivity through CSA, and agricultural sales and values are the objectives of agricultural transformation. This activity aims at improving agricultural sales and values by smallholder farmers. It involves improving and enhancing selected value chains (VC) that are key for the project area, through the use of Public Private Producer Partnerships (4Ps) which will improve market access, climate adaptiveness, and ensure increased income for smallholders in the value chains. Value chains provide a mechanism for linking multiple actors

[73] https://alliancebioversityciat.org/publications-data/climate-smart-agriculture-rapid-appraisal-csa-ra-prioritization-tool-outscaling-0

around a common objective by creating space for dialogue, knowledge exchange and capacity building, and strengthening negotiation capacities, and can act as a delivery mechanism for government and private extension services, credit, and subsidy programmes. Agricultural value chains provide market-driven demand that support and enhance adoption of improved technologies and practices. All contribute to creating jobs for farmers, especially women, youth and ethnic minorities.

99. The value chain studies with subsequent value chain action plans (VCAP) will validate interventions that offer higher income potential, are inclusive of poor, women and youth, can be adapted to climate change and can be linked to private sector and/or off takers. The VCs have already been identified and include the following: rice, maize, potato, peach blossom, Solanum Procumbens, tuberose, sugarcane, cucumber, Eunice viridis, squash, Pila Conica, ground peanut, beans, sesame, fish and shrimp. The inclusive multi-stakeholder 4P platforms (4Ps platforms) will improve value chain governance by enhancing coordination and strengthening relationships between actors in selected value chains with a particular focus on addressing the future challenges of climate adaptation. The project will work closely with the national target programs (NTPs) and the one commune one product program (OCOP) to mobilize/converge their investments in the sub-component.

100. During the design, feasibility study of 16 water prone, climate resilient, and gender sensitive value chains in the project was conducted (Annex 2). The Multi-Criteria Decision Analysis (MCDA) approach was recruited in priority selection of value chains for CRWIS. The approach takes into consideration of the climate risks, economic, social, environmental, institutional, and technical indicators including (i) availability of inputs (e.g. land, stress-tolerant and high-quality seeds, organic inputs); (ii) potential for competitiveness; (iii) potential for expansion (price or produced quantity); (iv) added value for the target group; (v) potential for scaling up and out (e.g. farming contract, OCOP); and (vi) cross-cutting issues (gender, youth, vulnerable groups, environment, climate impact). As results, seven value chains out 16 value chains were prioritised including rice, potato, Solanum procumbens, cucumber, squash, Eunice viridis (clam worm), and Pila conica (snail) (Table 22 of Annex 2). It is noted that in the project areas some pilot value chain initiatives implemented by the government to partner local smallholders with producers that have been successful and worth replicating. This was the case also in Chau Khe commune where in an effort to diversify away from sugar cane, the commune entered into a pilot agreement with a processing company for 2ha of solanum procumbent, known for its medicinal properties. Farmers who were hesitant to begin with upon seeing its success subsequently went on to overproduce 10ha of the produce which is out of contract. Connecting farmers with producers will be an important element of helping ensure the climate-resilience of smallholders with specific high-value food value chains.

101. In the first year of the project, mapping and assessment of agricultural models to identify relevant stakeholders will be conducted for the seven selected value chains (See Annex 3 for guidance of value chain strategy and planning). The VCAPs will concretely map out the commodity actors, processes, the added value at each link, and an initial identification of bottlenecks/ challenges and opportunities. The VCAPs will identify interventions that offer higher income potential, are inclusive of poor and near-poor households, ethnic minorities, women and youth, are adapted to climate change and that can be linked to private sector technical support and/or off-takers either through producer organizations, cooperatives or lead farmers.

102. To improve value chain governance by enhancing coordination and strengthening relationships between actors within seven selected value chains as well as mobilize financial resources (NTP, OCOPs, other programs, private sector) to value chain investment, the Public Private Producer Partnership (4P) platform will be organized at each project commune. The 4P consists of relevant stakeholders within a value chain, including farmer representatives, farmers' and private sector organizations (including identified business partners), government representatives, traders, processing enterprises, input suppliers, consumer representatives, and financial institutions. The 4P will attend to the participation of women as it will facilitate commitment and support from men at all levels to achieve. Expected results of the 4P include improved networking and coordination for tangible results like higher producer prices, improved market transparency, trade contracts or product branding, farming contract, and partnerships. 4P are flexible in view of composition and agenda and can change over time according to participants' perception of problems and relevance of the platform. The main measured output will be the number of plans prepared and events organized in the framework of multi-stakeholder platforms. Most 4P interventions will in the given context fall under the categories: (i) Improved market transparency and market information; (ii) Improved linkages between value chain (VC) actors in terms of number and quality; (iii) Improved access to value chain financing, including access to credit, to national target programs (New Rural Development, Sustainable Poverty Reduction, Ethnic Minority), and OCOP; (iv) Joint and coordinated action; (v)

Enabling framework conditions for trade and commerce; (vi) Mutual understanding between VC actors and conflict resolution; (vii) Goal-oriented capacity development of VC actors; and (iix) Sector advocacy and support to local government agencies to solve specific bottlenecks.

103. Apart from 4P meetings, follow-up action is organized flexibly, including break-off sub-committees and bilateral communication with key stakeholders. The PMU's ability to understand the context, to proactively interact with relevant actors and to organize and facilitate meetings and events is decisive for the success of the 4P. When promising interventions have been identified, and stakeholder commitment has been ensured, collaborative action is planned for. Bilaterally or in subgroups, detailed action plans are developed, resources, support and stakeholder contributions are secured. It is important to find a good balance applying timely and consequent follow-up and close involvement of stakeholders, but without overstretching their capacity.

104. It is not expected that the 4P platforms turn into formal public organs – the expected main outcome of the platforms during project duration is increased awareness and ability for networking and coordination. However, during implementation, it should be discussed with local governments at commune and provincial level, and with relevant stakeholders, whether there is local commitment to continue the dialogue and exchange (e.g. through NTPs, OCOP) that has been promoted by CRWIS, and how future activities should be organized.

105. Considering the country context and the nature of the project, the project will create a limited number of job opportunities (permanent ones, not counting temporary employment from infrastructure works), mainly related to Component 2. For instance, (i) updating Climate Information and Early Warning Systems in the targeted communes is expected to create some high skilled job opportunities related to innovative technologies for youth, such as operating the software to produce interactive hazard risk maps, maintaining the digital system for timely and large-scale dissemination of climate information, or operating and maintaining new/updated river monitoring systems. (ii) Through upscaling CSA, the project is expected to strengthen the institutional capacity to provide tailored agricultural advisories and rural extension services to farmers, which can expand the need for human resources to ensure last-mile delivery. (iii) By facilitating business linkages between cooperatives and private sector, the project will expand the productive capacity of either parties which can also create some new employment opportunities within the involved cooperatives and/or rural enterprises. Moreover, the development of agricultural value chains, enabled by dedicated 4P platforms, will be indirectly promoting youth agri-entrepreneurship, which will create to some extent sustainable job opportunities.

Table 7. Target indicators for Output 2.2

Target indicators	Thanh Hoa	Nghe An	Total
Number of Communes organising participatory selection of CSA models	14	18	32
Number of people (by gender, EM) involved in participatory selection of CSA models	1,000	1,200	2,200
Of Which			
- Women	400	480	880
- Ethnic Minority	--	300	300
Number of tailored CSA guidelines with actionable decision-support for smallholder farmers developed by the project	8	8	16
Number of people (including commune staff) trained to provide rural extension and advisory services regarding CSA	240	370	610
Number people (by gender, EM) trained in CSA production practices and technologies	10,000	10,000	20,000
Of Which			
- Women	4000	4000	8000
- Ethnic Minority	--	1600	1600

Number of farmers (by gender, EM) whose awareness on the climate and economic vulnerabilities of their current practices increased thanks to the project Of Which - Women - Ethnic Minority	10,000 4000 --	10,000 4000 1600	20,000 8000 1600
Hectare of land brought under climate-resilient practices	1,500	2,500	4,000
Number of households receiving CSA (by EM) support as inputs, equipment or small-scale infrastructure Of Which - Ethnic Minority	4,000 --	4,000 500	8,000 500
Number of functioning multi-stakeholder platforms supported	3	7	10
Number of households reporting adoption of environmentally sustainable and climate-resilient technologies and practices	4,000	4,000	8,000
Number of rural producers' organisations engaged in formal partnerships or contracts with public/private entities	8	10	18
Number of people with new employment opportunities related to facilitated business linkages	100	150	250

B. Describe how the project/programme provides economic, social and environmental benefits

Economic Benefits

106. Vietnam is one of the world's most vulnerable countries to sea-level rise and without adaptation an estimated 12 million people face permanent inundation on higher emissions pathways, primarily concentrated in the nation's two low-lying mega-river deltas alone. An estimated 2.4% of Vietnam's GDP is at risk from permanent inundation in the Red River Delta region.[74] The national and provincial governments of Vietnam are already working to protect their coastline, primarily through hard infrastructure, and in some cases through mangrove restoration. Vietnam's water resources already experience significant pressures from human development processes with key issues being over-utilization of groundwater, land-use changes (notably to aquaculture) and rapid, sometimes unplanned, urban development. Considerable uncertainty clouds projections of change in future precipitation and cyclone activity. In the context of uncertainty research has focused on the development of systems for more efficient water management and ensuring water security. These include wastewater reuse, managing saline intrusion, and soft measures for improving water and irrigation use efficiency. Dam construction is having a significant impact on the hydrology in Viet Nam, and overexploitation of groundwater resources represents a major pressure that will aggravate the future impacts of climate change.

107. Climate change will influence food production via direct and indirect effects on crop growth processes with direct effects including alterations to precipitation and temperatures. Indirect effects include through impacts on water resource availability and seasonality, soil organic matter transformation, soil erosion, changes in pest and disease profiles, the arrival of invasive species, and decline in arable areas due to the submergence of coastal lands and desertification. Research suggests that climate change may damage rice yields in the long term. The outlook reported for rain-fed rice is particularly poor across all time horizons with yield declines potentially over 50% on higher emissions pathways by 2040. Irrigated rice fares better in the shorter-term showing some yield improvements up to 2030. By the 2040s irrigated

[74] Church, J. a., Clark, P. U., Cazenave, A., Gregory, J. M., Jevrejeva, S., Levermann, A., Unnikrishnan, A. S. (2013). Sea level change. In Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (pp. 1137–1216). Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.

rice could also be facing yield reductions of up to 23% under higher emissions pathways.[75]

108. Through the early warning system, efficient water use, climate-resilient agriculture and value chain development, the project will sustainably increase incomes in the short and medium term. The project will result in increased income and food security for an estimated 10,000 households -HH (5000 HHs in each province) of which 10% will be female-headed HH, and ~ 800 Ethnic Minority household in Chau Khe commune, Nghe An province. This will happen through reduced harvest and post-harvest losses caused by a lack of information on water availability and early awareness of drought, flood and pest onset warnings through the generation and sharing of information linked to early warning and contingency planning. Improved incomes and earnings will also result from the introduction of heat and drought resistant crops, improved access to producers through VCPs; the promotion of climate-resilient high-value crops and improved price negotiating power through the development of an app for sharing market prices for vegetables. Research also shows[76] that the Alternate Wetting and Drying (AWD) increased farmers income through reduced water pumping expenses and fuel consumption decrease increasing farmers' income—by 38% in Bangladesh, 32% in the Philippines, and 17% in southern Vietnam, AWD technology has a high rate of return, with benefit-cost ratio of 7:1.

Social Benefits

109. The provinces targeted by the project have a higher incidence of poverty project focuses on the most vulnerable namely women, youth and Ethnic Minorities. This economic vulnerability is aggravated by climate change through increasingly prolonged droughts, higher temperatures and increased SLR. The project will aim to provide social benefits by introducing a multi-hazard Early Warning System (EWS) that will help farmers adapt to a changing climate. The impacts of climate change is compounded with the reliance on hydroelectric power that further aggravates the problem of access to water for human consumption and agricultural irrigation. Crop losses due to drought translate into food and nutritional security problems for smallholder farmers, as they are largely producing on a subsistence basis, supported by remittances. With the support of the project smallholder livelihoods will become more climate resilient by introducing crops and irrigation technology and methodologies that will enable more efficient use of water. The project will also aim to connect cooperatives and communes with district and provincial authorities including dam operators and irrigation companies to improve the regulation of water both during periods of drought and flooding. Project efforts including the improved access to market and VC development will have a direct impact on the food and nutrition security of beneficiary families. The transfer of skills to farmers, including women, youth and Ethnic Minorities, will give them access to more information, knowledge and skills on transformative climate actions that they can implement in the economic activities they carry out, which in turn will increase their resilience and capacity to adapt to extreme weather conditions. It is estimated that around 20,000 family members, of which 40% (8,000 members) will be women, and 1800 EM members will be the direct beneficiaries of the project components.

110. To ensure women and men have equal opportunities to participate into project activities and receive comparable social and economic benefits, the project has set quotas at the outreach level which will ensure that at least 40% of targeted beneficiaries are women. In addition, the project will ensure that at least 30% of all project related decision-making bodies and at least 50% of trainees of all project-related capacity building activities are women. The project will work to change gendered power dynamics by addressing societal norms, practices, attitudes, beliefs, and value systems that operate as structural barriers to women's and girls' economic empowerment and inclusion, and access to climate adaptation knowledge. By establishing membership and/or leadership quotas in activity groups, as well as adopting enabling measures such as training approaches that increase their participation, activities will be implemented with an explicit gender focus, engaging women and young people fully as participants and beneficiaries. CRWIS will ensure that also people with disabilities (PWD) living in the target area, if any, will benefit from project activities through specific targeting approaches and closer engagement, ensuring their voices are heard, and project activities are tailored to their needs. CRWIS will track PWDs at the outreach level in the M&E system.

111. In the target areas having EM, all consultation processes during implementation will consider EM groups and their goals and needs for improved livelihoods, which will be identified and addressed within their cultural context and rights. When dealing with members of EM groups due diligence and Free Prior

[75] Jiang, Z., Raghavan, S. V., Hur, J., Sun, Y., Liong, S.-Y., Nguyen, V. Q., & Van Pham Dang, T. (2018). Future changes in rice yields over the Mekong River Delta due to climate change—Alarming or alerting? Theoretical and Applied Climatology

[76] Rubenito M. Lampayan, Roderick M. Rejesus, Grant R. Singleton, Bas A.M. Bouman, Adoption and economics of alternate wetting and drying water management for irrigated lowland rice, Field Crops Research, Volume 170, 2015, Pages 95-108, ISSN 0378-4290, https://doi.org/10.1016/j.fcr.2014.10.013.

Informed Consent (FPIC) shall be used in line with AF policies on engagement with EM peoples. District implementation teams will be gender-balanced, and members will be able to communicate in ethnic local languages. Project extension agents who speak the languages of EM groups will be recruited, and local ethnic officials of communes in target project areas will be mobilized and mentored.

112. The project is built on a social empowerment model, in which local people are fully involved in the planning process, identifying and implementing their top socio-economic development priorities. Through the project's co-management structure, which ensures full participation and empowerment of all stakeholders, including the poor, the near-poor, youth, smallholder farmers, ethnic minorities, and female-headed households, the project's social impacts on community empowerment will be long-term. Through their participation in social awareness, capacity-building training courses, planning, and direct co-management activities, the project's direct and indirect targeting techniques will generate social development outcomes that are sustainable for these vulnerable groups.

Environmental Benefits.

113. Environmental benefits are at the foundation of the CRWIS project made possible through Adaptation Fund support that help mitigate the identified adverse environmental and climate risks from a changing climate in terms of water scarcity and flooding and the impact this will have on agricultural production and food security. A total of 25,000 people (of which 10,000 women and 2,000 EM) will be provided with climate information and 32 communes (14 in Thanh Hoa and 18 in Nghe An) with updated disaster risk maps. Through a participatory approach the project will work at the institutional level to help regulate structural water availability from the dams, and at farm-level improve water availability through reservoirs and improved irrigation infrastructure (13,7km with 10km in Thanh Hoa and 3.75 in Nghe An) and water-saving irrigation techniques including climate-resilient crops and Alternating Wetting and Drying (AWD) paddy rice irrigation. The project targets 2,200 HHs adopting environmentally sustainable and climate resilient technologies and practices. Research shows[77] that AWD delivers multiple environmental benefits, such as reduced water consumption, significantly reducing methane (CH_4) emissions and the global warming potential by 90% with negligible Nitrous Oxide (N_2O) emissions. AWD also significantly reduced cadmium content by 40%, and increases nutritional elements like cupper, selenium, zinc and reduces irrigation water input by up to 38% with no yield reductions.[78] The project will also include the "Three Reductions, Three Gains" (3R3G) technique shown to reduce production costs, improve farmers' health, and protect the environment in irrigated rice production in Vietnam through the reduced use of seeds, nitrogen fertilizer, and pesticides.[79]

114. CRWIS project aims to improve water management through the introduction of micro-level on-farm efficient water saving irrigation systems as well as the restoration of irrigation canals. In Nghe An province, 342 ha of irrigation area will be supported benefitting 550 HHs whilst in Thanh Hoa, 1,844 ha of irrigation area will benefit 5,675 HHs. Drip irrigation is widely recognised among the best irrigation solutions for efficient and effective irrigation in Vietnam as it improves water efficiency by as much as 40 percent and effectively reduces the cost of water, making it more accessible to the most vulnerable. Within this context, the project will support 80 (30 in Thanh Hoa and 50 in Nghe An) water user entities (e.g. cooperatives/villages) to manage water resources and climate related risks. CRWIS will also raise awareness among the smallholder climate vulnerable farmers as well as the general public (around 10,000 households) of the impact climate change is having and the necessity for application of climate smart agriculture (CSA). It will further establish 93 EWS stations (33 in Thanh Hoa and 60 in Nghe Anh) and train 700 people (200 in Thanh Hoa and 500 in Nghe An) to operate and maintain EWS as well as build the capacity of ~5000 climate vulnerable farmers and provide them with no-regret and low-cost adaptive solutions to better cope with conditions of drought, flooding, and salinity intrusion.

C. Describe or provide an analysis of the cost-effectiveness of the proposed project/programme.

115. The cost-effectiveness of CRWIS is present throughout all the project's components and activities as shown in the table below. CRWIS will help address some of the most pressing concerns facing Nghe An and Thanh Hoa provinces in terms of reducing water supplies, increasing climate risks, a lack of

[77] Maite Martínez-Eixarch, Carles Alcaraz, Mercè Guàrdia, Mar Català-Forner, Andrea Bertomeu, Stefano Monaco, Nicole Cochrane, Viktoria Oliver, Yit Arn Teh, Brigitte Courtois, Adam H. Price, Multiple environmental benefits of alternate wetting and drying irrigation system with limited yield impact on European rice cultivation: The Ebre Delta case, Agricultural Water Management, Volume 258, 2021, https://doi.org/10.1016/j.agwat.2021.107164

[78] Rubenito M. Lampayan, Roderick M. Rejesus, Grant R. Singleton, Bas A.M. Bouman, Adoption and economics of alternate wetting and drying water management for irrigated lowland rice, Field Crops Research, Volume 170, 2015, Pages 95-108, ISSN 0378-4290, https://doi.org/10.1016/j.fcr.2014.10.013.

[79] Huelgas, Zenaida M.; Templeton, Deborah J.; Castanar, Pamela Three Reductions, Three Gains (3R3G) Technology in South Vietnam: Searching for Evidence of Economic Impact, 2008 http://dx.doi.org/10.22004/ag.econ.6014

knowledge as to what farmers are able to do to improve their livelihoods.

Table 8: CRWIS cost-effectiveness measured against project alternative

Component	Benefits Generated	Alternative to Project.
Component 1 Improved water availability and control through climate-resilient infrastructure development	The project will support the modernization of farm-level tertiary irrigation canals with the capacity to regulate the inflow and outflow of water depending on the needs of the farmers. Improve farm-level infrastructure to enable the adoption of water saving AWD paddy rice production. Construct integrated water reservoirs for enhanced water security and introduce other water-efficient irrigation techniques such as drip irrigation and introduction of drought and saline tolerant crop varieties. The project will also improve climate-resilience through the development of a multi-hazard early warning system. This EWS will help farmers including Ethnic Minorities anticipate and mitigate the interconnected, cascading and mutually aggravating nature of climate and environmental risks and their impacts including, flooding, drought and pest management. It is expected that at least 10,000 households (5000 HHs in each province) equivalent to 40,000 beneficiaries, of which 40% will be women, and ~ 800 Ethnic Minority households (5000 persons) in Chau Khe commune, Nghe An province will benefit from this component. An estimated area of irrigated will be 2,186 ha (342 ha in Nghe An, 1,844 ha in Thanh Hoa)	There are no alternatives to modernizing the irrigation infrastructure, due to the impacts of drought, flooding and saline intrusion through sea level rise that are already being felt by farmers. Without the project the farmers will continue to be unable to adapt, despite their home-grown efforts to find more climate-resilient crops. farmers will continue to consume more water than needed for rice production. Additionally farmers will not have the added safeguards of water reservoirs to help in extending the period of irrigation in addition to the reduction in water consumption. Additionally, without the project the targeted smallholders will continue to suffer from unannounced periods of flooding and drought that cannot be planned for in the short-term. Without an integrated multi-hazard EWS farmers will also not be able to monitor water salinity levels that would help them in being able to adjust fish farming activities.
Component 2 Integrated water management and climate resilient agriculture	The component aims to assist smallholder farmers build resilience to climate change through concrete activities. These include in the first instance helping farmers find solutions to a climate change aggravating factor namely that of equitable water management along the two rivers in both provinces. The aim is to achieve this by facilitating communication between the water stakeholders, namely the dam operators, the irrigation companies, provincial agencies, and communes as well as the smallholders represented by the communes and cooperatives. The project will raise awareness about the challenges farmers face, and also find workable solutions through a participatory approach, sharing of drought and flooding Early Warnings with all actors to ensure timely interventions either in the prevention of flooding or ameliorating periods of drought. Secondly, the component will also develop concrete adaptive solutions in building capacity for at least 8000 farmers and 1800 EMs in CSA and on-farm water management and ensuring that 4000 ha of land is made climate-resilient through the provision of climate adaptive crops and irrigation. Farmers will further be supported in price negotiation with the development and deployment of a crop prices app as well as the development of 4Ps to assist 2000	In the absence of the project the status quo will prevail meaning that farmers will continue to be unable to adequately plan for extreme weather events that are aggravated by the current management of limited water supplies either during periods of drought or flooding. This will continue to have the effect of loss of livelihood either because of crop failure or livelihoods being washed away. Farmers will continue to not have access to certified climate-resilient crops or learn about best practices in paddy rice irrigation with the benefits of enhancing incomes and reducing water consumption and environmental impacts such as CH_4 and N_2O emissions, cadmium, the reduced use of seeds, nitrogen fertilizer, and pesticides. Without the project farmers will also not benefit from the enhanced nutritional elements such as cupper, selenium and zinc in paddy rice production. The status quo would furthermore continue in terms of continued climate

Component	Benefits Generated	Alternative to Project.
	farmers and 800 EMs connect with value chain producers for the selected value chains of the project. The project will aim to furthermore facilitate the agreements between producers and smallholders to ensure fair and equitable contracts.	vulnerability due to an inability to increase incomes through better price negotiation or establishing long-term contracts with producers for high-value crops.

D. Describe how the project/programme is consistent with national or sub-national sustainable development strategies

116. The project's objective and strategy are fully aligned with the national sustainable development strategies and socio-economic development action plans at the national level as follows:

- **Sustainable development goals (SDGs)**. Promotion of sustainable and resilient agricultural practices and access to water for irrigation can improve agricultural productivity contributing to food security and reducing hunger (SDG 2: Zero hunger), and leading to increased income for farmers and helping to lift people out of poverty (SDG 1: End Poverty), reducing inequalities in income (SDG10) and contributing to empowering women in economic participation and decision making (SDG 5: gender equality). Efficient water supply and sustainable water management would enhance access to water and contribute to SDG 6 (Clean Water and Sanitation). Improved irrigation can lead to enhanced work conditions and reduced farmers' burden, increased agricultural productivity, and creation of job opportunities in the agricultural sector, contributing to economic growth. (SDG 8: Decent Work and Economic Growth). Efficient water use in agriculture and building farmers capacity to manage irrigation water would support sustainable and responsible production practices, aligning with the SDG 12 goal (Responsible Consumption and Production). Sustainable irrigation management and efficient irrigation water use, in addition to CSA practices, all contribute to combating climate change impact and strengthening climate resilience (SDG 13: Climate Action).
- **National Sustainable Development Strategy in Viet Nam for 2020-2030** (Government's Resolution 136/NQ-CP on 25th September 2020). The national strategy aims at maintaining sustainable economic growth aligning with social advancement, equality and environmental, ecological protection, effective management and use of natural resources, proactive responses to climate change, ensuring people equally participate and benefit from development. The national sustainable development strategy 2020-2030 identified its objectives as identical to the project objectives, such as "enhanced access to water, efficient water use in agriculture, and sustainable management water resources". The project will be aligned with the Strategy through the promotion of environmentally friendly and climate resilient water efficient technologies that will minimise water consumption while simultaneously improve product quality and yields, whilst also reducing labour costs in time and money.
- **National Adaptation Plan (NAP) for the period 2021-2030, a vision to 2050**. The NAP's objective is mitigating vulnerability and risks driven by climate change through strengthening resilience capacity of the country's economic, natural and social systems, ensuring social advancement and reducing damage/loss due to increasing disasters and climate extremes caused by climate change. Among the tasks, the NAP aims at enhancing resilience and adaptive capacity of natural, economic and social systems, ensure sustainable livelihoods by investing in adaptation actions to effectively use and prevent the reduction and degradation of water and land resources; developing CCA and climate-smart agriculture; developing infrastructure systems; and ensuring social security and gender equality. CRWIS implementation will contribute to realizing the NAP objectives.
- **Viet Nam's Nationally Determined Contribution to the United Nations Framework Convention on Climate Change (UNFCCC) (updated in 2022)**. The NDC builds on strategies addressing Viet Nam's mitigation and adaptation needs. Adaptation actions are based on strategic tasks having the potential to improve adaptive capacity, enhance resilience, and reduce climate change risks. In alignment with the strategic tasks, CRWIS will contribute to: raising awareness about climate change and adaptation measures; assisting in reducing climate change vulnerability and facilitating climate change adaptation in two of the six priority sectors (agriculture and water resources); supporting agricultural research and experimental production better suited to the new

climate conditions; assuring increased investments in efficiency of irrigation infrastructure, and improvement of water resources management; promoting efficient use of water by reducing water losses, improving irrigation techniques, water recycling and storage; developing good practice guides for agriculture sector, and building new infrastructure for transforming water resources into socio-economic ones (e.g. water reservoir).

- **The National Strategy on Green Growth for the period 2011- 2020, vision to 2050** (approved under Decision No 1658/QĐ-TTg released on 1st October 2021) aims to help promote economic restructuring in tandem with growth model reform, and achieve economic prosperity, environmental sustainability, and social equality in line with the commitments taken during the 26th United Nations Climate Change Conference of the Parties (COP26). The project is aligned to the Strategy with respect to the objectives to promote sustainable water consumption, and climate smart agriculture contributing to the development of green economy.
- **Sustainable agriculture and rural development strategy in 2021-2030, vision to 2050 (approved by Prime Minister Decision 150/QD-TTg dated January 28, 2022).** The main objectives of the Strategy include building a commodity-producing agricultural sector while developing specific agriculture plans based on local advantages, with high productivity, quality, efficiency, sustainability; increasing competitiveness to make Vietnam a leading country in the region and in the world; firmly ensuring national food security; making an important contribution to socioeconomic stability; preventing and controlling natural disasters and epidemics; protecting the environment; and responding to climate change, by efficiently implementing international commitments on reducing greenhouse gas emissions.
- **National Water Resource Strategy until 2030 with a view to 2045.** The goal of the strategy is to ensure water supply for household use, agricultural production and industrial production with a particular focus on regions facing chronic water shortage, such as the Central Coast, the Central Highlands and the Mekong Delta. The Strategy sets a target of monitoring over 90 per cent of water exploitation and use activities; improving the efficiency and capacity of water exploitation and minimising water loss in the system of irrigation works; reducing the rate of water loss in water supply activities to 10 per cent. The project is aligned to the Protocol through the promotion of sustainable water management, and the protection of water systems through increased water efficiency.
- **Vietnam's Hydraulic Work Strategy through 2030, with a vision toward 2045.** The strategy aims to ensure water security for various sectors, including agriculture, daily life, and socio-economic development, while also mitigating the impacts of natural disasters and climate change. This involves modernizing irrigation systems, improving water management, and enhancing the resilience of agricultural production. Ultimately, the goal is to contribute to sustainable socio-economic development, poverty reduction, and food security. The objectives and interventions of CRWIS are very much aligned with the guidelines of the Strategy. Investments in water infrastructure by CRWIS will promote water efficient and effective use hence contribute to water security. The designs of water infrastructure with associated elements such as early warning systems, alternate wet drying (AWD), and climate smart agriculture contribute to irrigation modernization, improved water management, and enhanced agriculture resilience.
- **National Target Programs (NTPs)** including the National Target Programme for New Rural Development (NTP NRD), the National Target Programme for Sustainable Poverty Reduction, and the National Target Programme for Ethnic Minority. Among the objectives, the NTPs aims to improve the delivery of, and access to, investments for increasing agricultural production and enhancing livelihood opportunities in rural areas, especially in mountainous and Ethnic Minority areas. CRWIS will be aligned with the NTPs through incorporating some of the NTP targets, supporting the development of market options to help realize a new rural area, creating the needed mindset change at the household level, and building capacity to carry out the envisaged commune planning activities.
- **National Strategy on Gender Equality for the 2021 - 2030 period**. The Strategy aims at continuously narrowing the gender gap, creating the condition, opportunity for women and men to participate and enjoy equally in the fields of social life and contribute to the national sustainable development**.** The CRWIS project is aligned with the Strategy through its focus on women, targeting 40 percent of women participating in project activities. This is designed to compensate

for the disadvantages women face in the workforce and the fact more women work in low value-added agricultural production sub sectors and also face discriminatory practices that include significant wage disparities, segregation into lower-paying occupations and unequal sharing of work and family responsibilities and limited access to childcare (see Annex 4). The project will contribute to Objective 2, Target 2 and Objective 3, Target 1 of the Strategy.

- **Masterplan for Natural disaster prevention and Irrigation for the period 2021-2030, with a vision towards 2050 (approved by Prime Minister Decision No. 847/QD-TTg dated July 14, 2023).** The objective of the master plan is to ensure water supply and drainage for daily activities, agricultural production, economic sectors and environmental protection; improve the national capacity to prevent, combat and mitigate damage caused by natural disasters, contribute to sustainable socio-economic development, ensure water security, adapt to climate change, and promote development in the upstream areas of inter-connected rivers across the country. The master plan outlines several objectives for supplying water by 2030, including: providing a sufficient supply of water for daily activities; supplying and creating water supply sources for rural, urban, industrial, economic zones, etc.; meeting the water demand for economic activities in coastal areas and densely populated islands. In addition, the master plan aims to provide active on-site water sources for daily activities in areas affected by drought, water shortage, and saltwater intrusion. The master plan also focuses on a number of areas challenged by water shortage, such as areas impacted by drought, saltwater intrusion, flood, and inundation. Furthermore, the master plan will actively control salinity and freshwater in estuaries and coastal areas. The CRWIS project is fully aligned with the Masterplan through its investments in preventing and/or reducing disaster risks (e.g. flood, drought), mitigating and adapting to climate change, and contributing to efficient and effective use of resources. Project infrastructure investments including irrigation and pumping stations will prevent/control flood and drought, at the same time help save water significantly. The early warning system invested by the project will provide early information regarding flood, salinity intrusion, insects that help farmers make effective and precision farming decision. The climate smart agriculture (CSA) invested by the project promotes the adaptation strategies to climate change.
- **The Masterplan on irrigation for the Mã River 2021-2030 with vision toward 2050** (**approved by Prime Minister Decision 20/QD-TTg dated January 8, 2024).** aims to ensure sustainable water resource management within the Mã River basin, covering Thanh Hoa, Nghe An and other provinces. Looking ahead to 2050, the plans envision effective prevention and control of river and stream bank erosion in the Mã River basin, regulated river bottom elevations, and monitored sand and gravel exploitation in the river bed. Measures will be taken to reallocate residential areas along the river, enhance riverside landscapes and control flooding through water storage structures in flooded and low-lying areas. Key objectives include providing sufficient water for daily needs, agriculture, and economic activities, while also addressing water pollution and drought. The plan envisions effective flood control, erosion prevention, and regulated riverbeds. It also focuses on optimizing water usage, promoting advanced irrigation techniques, and minimizing water loss in irrigation systems. CRWIS is fully aligned with the Masterplan. The guidance and standards in the Masterplan set the framework for investment of CRWIS. The irrigation infrastructure invested by CRWIS such as irrigation schemes and pumping stations will contribute to flood control, efficient water use, and sustainable agricultural development.
- **Masterplan of Thanh Hoa province for the 2021-2030 period, with a vision toward 2045 (approved by Prime Minister Decision 153/QD-TTg dated February 27, 2023**). The Masterplan aims to transform the province into a modern industrial center and a key tourist destination in Viet Nam. Key targets include significant GRDP growth, increased exports, improved healthcare, and expanded forest coverage. The plan also focuses on developing specific industries like petrochemicals, tourism, and agriculture, while also emphasizing infrastructure development and regional connectivity. The interventions of CRWIS are relevant and aligned with the targets of the Masterplan. Investments in water infrastructure by CRWIS will promote water efficient and effective use hence contribute to agricultural development. The designs of water infrastructure with associated elements such as early warning systems, and climate smart agriculture supports irrigation modernization, improved water management, and enhanced agriculture resilience, that contribute to sustainable agriculture development hence GRDP growth.
- **Masterplan for Nghe An province in the period 2021-2030 with a vision to 2050 (approved**

by Prime Minister Decision 1059/QD-TTg dated September 9, 2023). The Masterplan aims to build Nghe An into a developed province of the country, with rapid and sustainable economic development, imbued with the cultural identity of Viet Nam and Nghe An; a center of the North Central region in terms of trade, health, education and training, science and technology, industry and agriculture applying high technology; having synchronous and gradually modern infrastructure system, adapting to climate change; improved the people's material and spiritual lives; preserved cultural and historical values; well protected ecological environment, nature and biodiversity. CRWIS is fully aligned with the Masterplan with its objectives contributing to the development objectives of the Masterplan including sustainable economic development, climate change adaptation, and high-tech agricultural development. These will be achieved through the investments of the project including climate resilient and water use efficient infrastructure, early warning systems, and climate smart agriculture.

- **Masterplan for the North Central Coast and Central Coast Region for the Period 2021-2030, with a Vision Towards 2050 (approved by Prime Minister Decision 376/QD-TTg dated May 4, 2024).** The Master Plan envisions the North Central Coast and Central Coast region as a rapidly evolving, vibrant, and sustainable area by the year 2030. Central to this vision is the establishment of a robust marine economy, driving the region towards heightened prosperity. With a focus on enhancing livelihoods, the plan aims to elevate the average per capita income to exceptional levels, fostering a higher quality of life for residents. The Master Plan emphasizes the development of a comprehensive infrastructure network resilient to natural disasters and adaptable to climate change. This infrastructure backbone will support the emergence of major industrial and service hubs, along with coastal economic zones and urban systems that adhere to national and regional standards. Beyond economic considerations, the region is positioned to serve as a pivotal maritime gateway. Preservation and promotion of the region's rich cultural, historical, and ecological heritage are integral facets of the plan. By safeguarding marine, island, and forest ecosystems, the Master Plan not only ensures environmental sustainability but also underscores the importance of cultural and historical preservation.

E. Describe how the project/programme meets relevant national technical standards

117. The project will comply with Viet Nam's national technical standards (as outlined in its laws and regulations) as well as the Environmental and Social Policy (ESP) of the Adaptation Fund. Additionally, the CRWIS project must ensure that all activities implemented under the two components fully align with national legal and policy frameworks and the Adaptation Fund's Environmental and Social Policy; and specifically with respect to water extraction, usage and transportation as these are the only areas where the project may have some associated risks. The below forms part of the Environmental and Social Management Plan (ESMP) and describes how the project will be in compliance with the national Law. The ESMP that will be developed during the design to address the identified ESP risks will be integrated into the project's implementation manual (PIM) to ensure it is applied consistently throughout project implementation

118. **Law on Environmental Protection (No, 72/2020/QH14, dated 17 November 2020)** providing statutory provisions on environmental activities; measures and resources used for the purpose of environmental protection; rights, powers, duties and obligations of regulatory bodies, agencies, organizations, households, and individuals who are tasked with environmental protection. The project will ensure compliance with the Law as its main objective is to improve environmental management, improve soil fertility, reduce risks of erosion, land degradation and other negative effects of drought and torrential rain particularly in relation to expected future climatic changes. It will ensure the sustainable and efficient use of water for irrigation purposes and comply with all relevant legal and procedural processes.

119. **Law on Water Resource (No. 28/2023/QH15, dated 27/11/2023).** This Law provides for management, protection, regulation, distribution, restoration, development, exploitation and use of water resources; prevention of, response to and recovery from damage caused by water in the territory of the Socialist Republic of Vietnam. The core principle of the Law is that water supply must be managed in a comprehensive and integrated manner in terms of quantity and quality, surface and underground, upstream and downstream water. To improve water security, the Law defines clear responsibilities for State management in terms of water supply and resources, notably the planning, construction and operation of irrigation, hydropower, as well as urban and rural water supply structures. The Law sets out water resource strategies; principles of, and basis for elaboration of water resource master plans; contents of the plans; elaboration and approval of water resources master plans; etc. In particular, Article 12

regulates the operation of basic survey on water resources. Such a survey must also assess, warn, and forecast the impact of climate change over water resources. A planning on water resources must be made on the basis of the impacts of climate change for water resources. The Law also stipulates that the priority is urbanisation and professionalisation of water resources management, aiming to monitor the country's water resources on digital platforms through the national water resources information system and database. The project will fully comply with all legal requirements and particularly with those surrounding the development, construction, management, exploitation or utilization of irrigation works with AF co-financing.

120. **Law on Planning (No. 21/2017/QH14, dated 14/11/2017).** This Law establishes a national system of master plans and fundamental principles for planning work and defines the responsibility for state management of planning work. It regulates the formulation, appraisal, decision on, or approval, publicization, implementation, evaluation and adjustment of, master plans. The Law applies to organizations and individuals involved in the formulation, appraisal, decision or approval, announcement, implementation, assessment and adjustment of the planning under the national planning system and other relevant organizations and individuals. The project will fully comply with all legal requirements and particularly with those surrounding the regional planning, provincial planning, land-use planning, marine spatial planning, sectoral planning, and integrated planning with AF co-financing.

121. **Law on Construction (No. 50/2014/QH13, dated 18 June 2014).** The Law on Construction (No. 50/2014/QH13, dated 18 June 2014). This Law prescribes the rights, obligations and responsibilities of agencies, organizations and individuals and the state management in construction investment activities. This law will be possibly applicable for the construction of the tertiary irrigation infrastructure and/or water reservoir that CRWIS will be constructing with AF co-financing. The project will comply with this law through obtaining the permission to construct the infrastructure based on detailed technical drawings.

122. **Law on Irrigation (No. 08/2017/QH14 dated 19 June 2017**). This Law addresses irrigation water basic investigations, strategies and planning; investments in development and construction of irrigation works and facilities; management, exploitation or utilization of irrigation works and facilities, and operation of hydropower reservoirs for irrigation water uses; irrigation water utilities or services; protection and assurance of safety for irrigation works and facilities; small-scale and inter-field irrigation works or facilities; rights and responsibilities of organizations or individuals engaged in irrigation operations; responsibilities for state management of irrigation operations. The project will fully comply with all legal requirements and particularly with those surrounding the development, construction, management, exploitation or utilization of irrigation works with AF co-financing.

123. **Law on Hydro-meteorology (No. 90/2015/QH13, dated 04 December 2015).** This Law prescribes hydro-meteorological activities, including management and operation of the network of stations; forecast and warning; information and data; hydro-meteorological support and services; climate change monitoring; weather modification and state management; rights, responsibilities and obligations of agencies, organisations and individuals engaged in hydro-meteorological activities. This Law applies to Vietnamese agencies, organisations and individuals; foreign organisations and individuals; and international organisations participating in hydro-meteorological activities in the territory of the Socialist Republic of Vietnam.

124. **Law on Natural Disaster Prevention and Control (No. 33/2013/QH13 dated 19 June 2013)**. This law provides natural disaster prevention and control activities and specifies the rights and obligations of agencies, organisations, households and individuals engaged in natural disaster prevention and control activities. It also commits the government to managing and devoting financial resources to natural disaster prevention and control. The law specifies that natural disaster prevention and control activities must be based on scientific grounds, protect the environment, and recognise the importance of adapting to climate change. It requires the creation, every 10 years, of a National Strategy on Natural Disaster Prevention and Control which must include results of any climate change-related risks. Commune level and provincial natural disaster prevention and control plans must identify potential climate change-related impacts on socio-economic activities. The project will ensure compliance with the Law as its main objective is to contribute to the efforts to prevent and control natural disasters reflecting in flood, drought, and salinity intrusion.

125. **Land Law (No. 45/2013/QH13, dated 29 November 2013 – Amended in 18 Jan 2024**), which prescribes the regime of land ownership, powers and responsibilities of the State in representing the entire-people owner of land and uniformly managing land, the regime of land management and use, and the rights and obligations of land users involving land in the territory of the Socialist Republic of Vietnam. The project

will ensure compliance with the Land Law particularly in the environmental preservation and protection of land in the framework of sustainable agricultural development, preventing of land degradation, promotion of sustainable and modern water efficient technologies. The project will strive to ensure that the project will not pose any negative impacts on agriculture, forests and any other areas.

126. **Law on Gender Equality (No.73/2006/QH11, dated 29 November 2006)**. This law provides principles of gender equality in the political, economic, social, cultural, and other spheres of life, and measures ensuring gender equality, responsibilities of agencies, organizations, families, individuals in exercising gender equality. The project will be based on giving men and women equal opportunities and also will mainstream measures to address the disadvantages that women face in the work place by virtue of their gender and the patriarchal social structure.

127. **Code of Labor (No. 45/2019/QH14, dated 20 November 2019).** The Labour Code covers the basic principles of regulating labour relations and other relations related directly to them; non restriction of labour rights and freedoms; the prohibition of forced labour; the prohibition of discrimination in the field of labour; articulated the employees main rights and obligations; the normative contractual and labour relations; nullifies clauses from labour contracts that worsen the situation of employees; and establishes the priorities of treaties, conventions, agreements and other international documents. The project will be in full compliance with the Labour Code as well as international labour standards both as a responsible employer of the core project staff but also in the contracting of the service provider, consultants and anyone else otherwise employed for the implementation of the project.

128. The application of social and environmental assessment policies in Vietnam, as well as various efforts directed at policy harmonization between the Government of Vietnam and its donors, has gradually narrowed the gap between the national system and AF policies. According to AF, AF-funded projects must meet their environmental and social standards, which were designed to avoid, minimize, reduce or mitigate the adverse environmental and social risks and impacts of projects. The ESMP will be prepared at the design to comply with national standards and ESP principles.

F. Describe if there is duplication of project/programme with other funding sources, if any.

129. During project design, the design team reviewed all relevant documentation of previous programs and projects supported by international organizations, donors and NGOs in two provinces (e.g., project designs, project implementation and completion reports, and so on). The design team also held meetings – either virtually or in person - and interviews with local authorities and development partners on best practices and lessons learnt related to the projects and programmes in the North Central region to ensure CRWIS does not duplicate activities with other funding sources. The review for potential duplication has not highlighted any overlapping or duplication with other funding sources and CRWIS in technical, spatial, and/or temporal dimensions.

130. During project implementation, the PPCs and PMUs will continue to ensure coordination, integration of available resources and knowledge management among the National Target Programmes, donor-supported initiatives and the CRWIS activities in the provinces.

131. Table 9 summarizes recently completed, ongoing or upcoming projects in the project areas as well as the areas for potential complementarities and synergies with CRWIS.

Table 9. Summary of relevant projects/programmes

Donor/ Agency	Project Summary	Geographic overlap with proposed project area of intervention	Synergies and complementarities with the CRWIS
World Bank "Vietnam Dam Rehabilitation and Safety Improvement Project" (in both Nghe An and Thanh Hoa, 2016 – 2023, US$ 443 Million)	The objective of the Dam Rehabilitation and Safety Improvement Project for Vietnam is to improve the safety of targeted dams under the Government's Dam Safety Program to protect downstream communities and economic activities through priority investments and capacity enhancement. There are three components to the project: • Component 1: Dam safety rehabilitation. This component aims at improving the safety of irrigation dams through physical rehabilitation of existing infrastructure. • Component 2: is the dam safety management and planning aiming at improving the planning and operational framework for dam management to safeguard the downstream communities and socio-economic infrastructure. • Component 3: Project management support	Yes (in both Thanh Hoa and Nghe An provinces. Overlap at provincial and commune level)	• Status: completion by 2023 • The two projects share the Project Steering Committee (PSC). • The two projects share the PMUs for day-to-day project Management and implementation • Although implemented in the same area, the Vietnam Dam Rehabilitation and Safety Improvement Project focuses on large infrastructure, while CWRIS grant focus on small on-farm water infrastructure and provision of climate information and early warnings and capacity in climate smart agriculture for local smallholders. • The lessons learnt from the WB funded project would be very useful for the CRWIS infrastructure improvement activities

Donor/ Agency	Project Summary	Geographic overlap with proposed project area of intervention	Synergies and complementarities with the CRWIS
World Bank "Vietnam Forest Sector Modernization and Coastal Resilience Enhancement Project" (in both Nghe An and Thanh Hoa, 2019-2023, US$ 150 million)	The development objective of the Forest Sector Modernization and Coastal Resilience Enhancement Project for Vietnam is to improve coastal forest management in the Project Provinces. The project has three technical components in addition to a fourth component on project management, monitoring, and evaluation. • Component 1: modernization of the technical know how and approaches used for planning, supplying seedlings, and financing coastal protection forest management and planting. • Component 2: adoption of a holistic approach that links the biophysical, physical, and management interventions for managing and planting mangroves and sandy soil forests. • Component 3: Augmenting the economic benefits derived from well-protected coastal forests, with the aim of reducing pressure to convert these natural systems.	Yes (Thanh Hoa and Nghe An provinces. In Thanh Hoa target project communes are geographic overlapped. In Nghe An, there are Chau Khe commune overlapped)	• Status: Completion • The provinces have made significant progress in coastal forest planting and rehabilitation with the cumulative completion rate (area completed/proposed revised target) having surpassed 95 percent by Dember, 30, 2023. • The project will have synergies through the common approach of supporting smallholder farmers improve agricultural production through capacity building and provision of inputs (e.g. seedlings…)

Donor/ Agency	Project Summary	Geographic overlap with proposed project area of intervention	Synergies and complementarities with the CRWIS
World Bank "Sustainable Development of Fisheries Sector in Thanh Hoa Province" (2024 – 2028)	Overall objective: Build and upgrade infrastructure, reorganize production to develop Thanh Hoa province's fisheries sector towards enhancing value, international integration and adaptation to climate change. The project has one technical component in addition to a component on project management, monitoring, and evaluation • Component 1: Investment in developing seafood exploitation and aquaculture infrastructure, • Component 2: Project Management	Provincial and commune level in Thanh Hoa province	• Status: Approved for inclusion in ODA pipeline list, being processed by the PPC for approval of the Investment Policy Decision after receiving comments from MPI, MOF. The project has not yet started. • Although implemented in the same area, the WB focuses on infrastructure for aquaculture development, while CWRIS grant focus on small on-farm water infrastructure and provision of climate information and early warnings and capacity in climate smart agriculture for local smallholders. • During implementation, two projects will coordinate with each other ensuring no overlaps but complementarities.
ADB "Modernizing the Bai Thuong irrigation system to adapt to climate change in Thanh Hoa province" (pipeline)	Overall Objectives: Improve water use efficiency, enhance adaptation to climate change and ensure water security for (i) agricultural production towards increased added value and sustainability and (ii) other Socio-economic activities in the benefit area of the Bai Thuong irrigation system, Thanh Hoa province. The project has three technical components in addition to a component on project management, monitoring, and evaluation • Component 1: Capacity building and sustainability in irrigation project management • Component 2: Improving water supply infrastructure • Component 3: Enhance the ability to use water to adapt and mitigate climate change • Component 4: Project Management	Provincial level in Thanh Hoa province. This project has no geographic overlap at commune level,	• Status: at the same level of CRWIS with regard to the Government approval, the ADB project is proposed to MPI and MOF for inclusion in the ODA pipeline list • The ADB project is not overlap with CRWIS in terms of project areas (CRWIS supports for the Northern water resources systems while the ADB project works in the South of Thanh Hoa province • The two projects share the Project Steering Committee (PSC). • The two projects share the PMUs for day-to-day project Management and implementation

Donor/ Agency	Project Summary	Geographic overlap with proposed project area of intervention	Synergies and complementarities with the CRWIS
JICA "Project to restore and upgrade the Northern Nghe An irrigation system" (JICA2) (pipeline)	Objective is to restore and upgrade the Northern Nghe An irrigation system to ensure stable irrigation for 28,801 hectares of agricultural land; creating water supply for industry of 1.89m3/s and domestic use of 1.59m3/s (900,000 people) for Northern communes of Nghe An. Upgrading and expanding Dien Thanh culvert to ensure salinity prevention, fresh water retention, creating water supply for 15,000 hectares The project has one technical component in addition to a component on project management, monitoring, and evaluation • Component 1. Restore and upgrade the Northern Nghe An irrigation system • Component 2. Project management	Provincial and commune level in Nghe An province	• Phase I of the project completed in July 2023 and handed over to the management unit for use. All project items ensure quality and promote efficiency, meeting the general and specific goals of the project: Through investing in repairing and upgrading key works, canal systems and facilities to contribute to ensuring food security, eliminating hunger and poverty while strengthening the capacity of the management teams and beneficiaries in effectively exploiting and operating the irrigation system. • The project is still at the pipeline that was not yet approved by the Government of Vietnam. • The two projects, if implemented, will share the Project Steering Committee (PSC). • The two projects, if implemented, share the PMUs for day-to-day project Management and implementation
Upgrading the Len River and Hoang Mai River irrigation systems to improve the ability to control salinity, improve the ecological environment and cope with climate change (KEXIM)	The objective of the project is to improve the ability to control salinity, create fresh water sources for agricultural production, fisheries, daily life and industry. The project has four components including: • Component 1. Irrigation Infrastructure • Component 2. Adaptation to Climate Change • Component 3. Community based environmental improvement • Component 4. Capacity building and Project management	Provincial and commune level	• Status: final year • The KEXIM project is not overlap with CRWIS in terms of project areas and interventions (CRWIS supports on-farm small irrigation and CSA in the Northern water resources systems while the KEXIM project focuses on the large infrastructures in the Len and Hoang Mai rivers) • Lessons learnt from this project will be drawn at full proposal stage for the designing the component 2 of the CRWIS.

Donor/ Agency	Project Summary	Geographic overlap with proposed project area of intervention	Synergies and complementarities with the CRWIS
Climate Adaptive Integrated Flood Risk Management Project (ADB)	The project will support the government to achieve the outcome: effective and sustainable flood risk management systems made operational and well maintained. There are three outputs with an estimated investment of $275 million: (i) institutional and planning capacities for flood risk management improved; (ii) dike systems in Red-Thai Binh and Ma rivers rehabilitated and upgraded; and (iii) flood forecasting and early warning systems for Red-Thai Binh and Ma rivers modernized.	Provincial level	• Status: The Project proposal approved by the Prime Minister. The Feasibility Study is under preparation. • The ADB project is not overlap with CRWIS in terms of project areas (CRWIS supports for the Northern water resources systems while the ADB project works in the West of Thanh Hoa province • - During implementation, two projects will coordinate with each other ensuring no overlaps but complementarities.
Building an integrated irrigation information management system in the Ma river basin - Central Vietnam (Thanh Hoa province) (KOICA)	The project aims to apply scientific advances to increase the capacity of managing and using water resources in the Ma river basin.	Provincial level	• Status: 3rd year • The KOICA project is not overlap with CRWIS in terms of project areas and interventions (CRWIS supports on-farm small irrigation and CSA in the Northern water resources systems while the KOICA project focuses on the irrigation information management system in the Ma river basin.

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

132. Learning and Knowledge Management (KM) forms a core part of the CRWIS project. It will be carried out throughout execution and will be a central part of the project approach. The project will promote knowledge transfer to water users in operation and maintenance for irrigation and flood control, sustainable water use, water regulation, conflict management, group communication. The project will generate evidence and carry out extensive baseline assessments through feasibility and technical studies on integrated water management, gender norms assessment, climate information and early warning systems, agricultural value chains and production models mapping. Updated disaster risk maps (flood, drought, saline intrusion) and regular information from water monitoring systems will be generated, analysed, packaged, and disseminated to a wider audience in the target Provinces. Briefing notes, action plans and strategies will be generated through the multi-stakeholder platforms established for integrated water management and value chain development and will be feeding into the Socio-Economic Development Plans at Commune, District and Province levels and support institutional coordination and planning. To promote adoption of sustainable water management and climate smart agriculture technologies and practices, rooted in individual and community behavioural change, learning and KM will be strengthened through extension services, trainings, exchange visits, peer learning, awareness campaigns and trade fairs.

133. In each province, a Knowledge Management (KM) Officer will be recruited and responsible for the coordination of the AF KM programme. She / he will work closely with the project partners and

beneficiaries to set up a campaign of gathering project-related information on success stories in every aspect of the AF funded activities. The KM officer will be responsible for development and implementation of the comprehensive KM and Communication Strategy anchored in the M&E system and integrating elements from the Gender Action Plans. The strategy will include developing radio programmes, posters and leaflets as part of a community-wide awareness raising campaign that will highlight the benefits of EWS and CSA to better adapt to the challenges posed by climate change. The project will furthermore support capacity building for systematic learning and knowledge management in the communes, line agencies including Department of Agriculture and Environment (DAE), mass organizations including Farmer's Union (FU), Women's Union (WU), and other relevant stakeholder institutions.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation

134. During the development of CRWIS project proposal, a wide range of stakeholders have been consulted. The team has worked closely with the MONRE (now MAE) which has also provided guidance throughout the entire concept note and proposal development process. The team held detailed consultation sessions national think tanks (Vietnam Institute of Meteorology, Hydrology and Climate Change), international organisations (UNDP, UN-WOMEN, FAO), with the Provincial People's Committees (PPC) of Thanh Hoa and Nghe An provinces including all sectoral departments and units at provincial, district and commune levels to ensure that the national priorities, needs and local concerns of the provinces were integrated into the proposal.

135. The agencies and individuals from central to local levels involved in the consultation process included:

- Ministry of Natural Resources and Environment (MONRE) (now MAE)
- Vietnam Institute of Meteorology, Hydrology and Climate Change (IMHEN)
- United Nations Development Programme (UNDP)
- United Nations on Women (UNWOMEN)
- Food and Agriculture Organisation (FAO)
- Provincial People's Committee (PPC) of Thanh Hoa and Nghe An provinces
- Department of Finance of Thanh Hoa and Nghe An provinces
- Department of Agriculture and Environment (DAE) of Thanh Hoa and Nghe An provinces
- Department of Labour, War Invalids and Social Affairs of Thanh Hoa and Nghe An provinces
- Farmer's Union (FU); Women's Union (WU) of Thanh Hoa and Nghe An provinces
- Committee of Ethnic Minority in Nghe An province.
- Project Management Units (PMU) of Thanh Hoa and Nghe An provinces
- District People's Committee (DPC), District Planning and Infrastructure Division, District DAE, District Farmer's Unions, District Women's Union, and District EM Division of Thanh Hoa and Nghe An provinces (before merging process).
- Agriculture and Aquaculture enterprises, cooperatives and business households
- Local people living in CRWIS areas of 8 districts of two provinces including Ha Trung and Hoang Hoa districts – Thanh Hoa province; Con Cuong, Anh Son, Thanh Chuong, Do Luong, Nam Dan, and Hung Nguyen districts – Nghe An province (before merging process).

136. Consultations have been conducted in a gender-responsive fashion with beneficiaries of ten communes in six districts before merging process: Ha Trung and Hoang Hoa districts of Thanh Hoa province, Con Cuong, Anh Son, Thanh Chuong, and Hung Nguyen districts of Nghe An province. Consultations were had in gender disaggregated groups and Thai Ethnic Minorities at a time and location suitable both men and women groups. In each commune, two focus group discussions were conducted with men and women separately. Each focus group included 10-25 participants (see list of participants). Guiding questions were developed in line with the Environmental and Social Policy and Gender Policy of the Adaptation Fund and grouped into seven sections: (i) Socio-demographics; (ii) Ethnic minorities; (iii) Gender; (iv) Capacity of water-users; (v) Climate change and environment; (vi) Adaptive capacity of agricultural businesses; and (vii) General questions.

137. Gender-specific questions were used for discussions with women's groups, including issues related to gender equality, traditional and social norms, gender biases, women in agriculture, and exposure to climate change. Specifically, women were asked about their main concerns, migration of men and/or young people for work, challenges of women-headed households, working hours in the field and at home, labour division among family members, decision-making in agricultural production, water supply and

management, climate-resilient activities, access to market, and participation in planning and decision-making processes at their communes (e.g., socio-economic plans, responses to climate change and natural disasters, agricultural production, public investments). Results of focus group discussions with women in five communes have informed the full proposal design, particularly gender equality and women empowerment (see Annex 4 – Gender Assessment).

138. The consultation with Thai Ethnic Minority was conducted in Chau Khe commune, the only district of the targeted project area where they are present. The discussions explored the situation of Thai Ethnic Minority people, particularly social conditions and status, decision-making process, cultural traditions and religious practices, agriculture production and exposure to climate change (annex 5 provides further information on the Thai people).

139. The main concerns that emerged from the consultation process with stakeholders, both Kinh and Thai, included: lack of access to water for irrigation; reports of inability to connect to sources of water due to absence of tertiary irrigation canals; occurrence of destructive abnormal heavy rainfall; reports of increasing salinity intrusion; complaints of drought and flood and/due to lack of coordination mechanisms between water user entities; lack of climate information and early warning information (example of consulting the climate information from one meteorological station 300km away); lack of advice on climate change adaptative agricultural production; lack of models/demonstrations on climate smart agriculture; inability to sell produce to the markets; and a lack of advice on market trends and crop diversification. Gender specific concerns have included complaints about more household time and responsibilities, reduced access to water, and limited access to technologies and market. Women farmers have highlighted the challenge of their long working hours due to their farming and domestic responsibilities (see annex 6 Summary of Consultations).

140. These concerns have been integrated into the design of the project with a focus on the underlying challenges hampering the socio-economic development of water-insecure and climate vulnerable rural communities in Thanh Hoa and Nghe An provinces, with particular attention to transforming unequal social norms affecting women and youth. Inclusive rehabilitation of critical water infrastructure will strengthen smallholders' adaptive capacity to climate risks because it will result in improved water availability and control by protecting their productive assets, improving their mobility and physical access to markets and services, and providing them with opportunities to diversify production, and increase and stabilize yields. By improving the capacity and coordination mechanisms of local institutions in integrated water management and strengthening resilience of smallholders' agricultural businesses, the project will i) improve livelihoods resilience by enhancing the enabling environment for improved access to climate information, efficient water resources management, and increased engagement of rural women in decision making; ii) ensure the sustainability of the gains from the infrastructure investments, improve smallholder farmers' productivity and resilience through upscaling of CSA knowledge, and increase smallholder farmers' income from facilitated business linkages with the private sector supported by effective public-private-producer partnerships (4P)

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning

Table 10. Justification for funding requested

Baseline Scenario	Alternative benefits of Adaptation Fund Project
Climate and Environment risks. Vietnam has a high disaster risk and was ranked 91 out of 191 countries in the 2019 INFORM Risk Index[80]; it is the 58th most climate vulnerable country and 93rd most ready country in the ND-GAIN Rankings[81] . The country is vulnerable to floods, droughts, and typhoons as well as flash floods, landslides, salinity intrusion from sea-level rise and storm surges, heat waves, and cold spells. The Northern Central Region is considered among the most vulnerable regions to climate change impacts, notably in terms of sea level rise, droughts, extreme heat, severe storms and flooding, all	The CRWIS project will promote a multi-sectoral approach to adapt to the adverse impacts of climate change. The project will support the development of a multi-hazard Early Warning System (EWS) to benefit an estimated 10,000 households (5000 HHs in each province). Of these 40% will be women, and 800 Thai Ethnic Minority household in Chau Khe commune, Con Cuong district, Nghe An province. Flooding in the target areas have been aggravated by sea level-rise (SLR) during periods of hightide and tropical storms and further compounded by the release of dam water during periods of intense rain. The project will support the development of a multi-hazard EWS tailored to the geographical area and identified risks in the coastal and mountainous provinces to adapt to flooding, drought,

[80] https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Climate-Change
[81] https://gain-new.crc.nd.edu/country/viet-nam

Baseline Scenario	Alternative benefits of Adaptation Fund Project
of which are causing substantial economic and human losses. The compounded effects of global warming, the construction of hydro-power and other dams and sand mining upstream the main river systems of Thanh Hoa and Nghe An, and overexploitation of groundwater, exacerbate the environmental and climate change risk to life and production of local people. **Sea Level Rise (SLR).** Vietnam is one of the world's most vulnerable countries to sea-level rise. Mean sea level has increased in the East Sea, along Vietnam's eastern coastline, by around 2.8 mm per year, and saline water intrusion is already affecting the livelihoods of the farmers with 50cm of sea-level rise potentially inundating 6.9% of the surface area in the Red deltas alone. The impact of SLR rapid onset events such as river and coastal flooding, as well as saline intrusion reduce the productivity of aquaculture operations.	changes in water salinity and pests. Climate-vulnerable farmers will be notified through regular bulletins through mobile phones or other means of distributions including agro-meteorological forecasts, pests and disease, risk of flooding or drought, and salinity levels.
Water Governance. While farmers suffer from environmental and climate risks including the sea-level rise and the resulting increase in salinity as well as flooding and the increased unpredictability of rainfall, water management along the river plays a significant and aggravating role. The challenges facing the farmers require institutional coordination between the hydropower dam operators, the irrigation companies that deliver and maintain the irrigation canals as well as farmer cooperatives. Farmers complained that during times of drought dams tend not to release sufficient water leading to the lowering of the river and the aggravation of the dry season's drought. During the rainy season the dams release excess water resulting in the flooding of agricultural land and the destruction of agricultural activities including crops, fish / prawn ponds and small ruminants with reportedly only livestock remaining standing.	The project will aim to improve the awareness and capacity for integrated water management (~ 40,000 people). Leveraging the multi-hazard EWS awareness management of the water supply will be enhanced by all stakeholders along the river. The project will aim to strengthen the flow of information between stakeholders regarding water use planning and management, land use, and weather data and climate information for improved planning and programming. This will be achieved through a platform to facilitate dialogue and to address concerns of all stakeholders with a view to find a mutually acceptable solution to water management. The water user platform will facilitate dialogue and the development of watershed-level water use plan as well as develop a strategy paper on communal water use and agreed actions. Based on the agreed actions agreed in a planned strategy paper, the project will support the development of an operational plan for an inclusive institutional coordination mechanism on integrated water management.
Poverty. Thanh Hoa has the rate of poor and near-poor households accounting for 15.47%[82] of the total households in the province. Nghe An has the poverty rate drops from 17.7% in 2016 to 6.41% in 2022[83]. Nghe An is in the top 15 of the provinces with the highest poverty rate in the country. Vulnerability to external shocks is prevalent among households with a strong dependence on agricultural and non-wage and wage incomes. **Crop failure.** Farmers are increasingly	To address this the project will identify and introduce the most suitable climate-resilient crops and technologies (climate smart agriculture – CSA) and train the DAE extension services to subsequently train the farmers. The project will supply climate-resilient seeds, train farmers through farmer field schools, teach best practices in CSA to address higher frequency of droughts and water shortages, sea-level rise and salt intrusion, rising temperatures, rainfall intensity. The project will support at least 8000 farmers and 1500 Thai EMs in CSA and on-farm water management and ensuring that 4000 ha of land is made climate-resilient through the provision of climate adaptive crops and the

[82] May 2022 poverty review with the new criteria, following MOLISA circular 02/2022/TT-BLDDTBXH, dated March 30 2022
[83] From 2016, poverty rate is based on the new national poverty line set by the GoV for period 2016- 2020 (multi-dimension poverty criteria). And from 2021, poverty rate is based on the multi-dimensional poverty regulation for the period of 2021-2025

Baseline Scenario	Alternative benefits of Adaptation Fund Project
suffering crop failure from increasing heat stress and lack of water, as well as changing water salinity and flooding. Consultations have shown that farmers are attempting to adapt with various crops adapt through trial and error and word of mouth between farmers with little success and high rates of crop failure.	supply of water saving irrigation technology such as drip or sprinkler irrigation, implementing moisture-preserving practices such as mulching, alternate wetting and drying (AWD) systems in rice production and the Three Reductions, Three Gains" (3R3G) technique to reduce production costs, improve farmers' health, and protect the environment in irrigated rice production. The project will support farmers to adapt to climate change through supporting CSA farmer field schools to teach optimized agricultural techniques that will help them adapt to the changing climate and environmental conditions and cope with associated risks (changes in water levels, salinity intrusion, drought, emergence or resurgence of pests and disease); Provide farmers with climate-resilient inputs in crops, and on-farm water-saving irrigation technologies; Integrate with commune-level agricultural plans to reduce farmer risk; Promote climate-resilient value chains for seven selected value chains including *rice, potato, Solanum procumbens, cucumber, squash, Eunice viridis (clam worm), and Pila conica (snail)*. The project will also support Public Private Producer Partnership (4P) platforms where buyers meet producers to discuss which crops to produce and lock-in longer term contracts and prices.

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project/programme

141. CRWIS's exit strategy is built into the design approach, domestic funding mobilization and institutional setting. Provincial People's Committees (PPC) of two provinces are the project owners and delegate tasks to the line agencies in each province. The PPCs are co-responsible for the delivery on national target programmes (NTPs) through CRWIS and other national and international programmes.

142. The project investments in sustainable and climate resilient rural infrastructure and early warning systems (EWS) are part of the commune, district and provincial investment plans, as registered in the district and provincial socio economic development plans. The PPCs will ensure funding of infrastructure O&M including repair. The prior establishment of and capacity building to local water user entities is mandatory under Vietnam's law for small in-field irrigation canals and embankments. The project will develop adequate hand-over procedures during its implementation and will ensure a smooth asset management transfer and handing over to beneficiaries and will empower communities and strengthen farmer level institutions such as cooperatives, Water Users' entities for sustainable management, operation and maintenance of water related infrastructure. The performance of water user entities will be monitored regularly during implementation.

143. The continuation of the 4P platform is critical as it builds on the provincial and commune One Commune One Product (OCOP)[84] programmes. Private sector companies will be key for long-term sustainability and must be engaged at the earliest stage possible in the value chain development, in order to ensure the relevance, ownership and sustainability of the 4P platform. Its funding will be a combination of public and private sector sponsors during and beyond CRWIS's implementation.

144. The exit strategy will be finalized at project start-up outlining financial resources required, institutional responsibilities, timelines and milestones. The exit strategy will be checked by the first project supervision mission, and will be monitored during the project implementation first three years and adjusted during MTR. The PPC's formal endorsement of the exit strategy is a good practice to secure commitment to post-project follow-up.

[84] https://openknowledge.fao.org/server/api/core/bitstreams/25126ed4-c525-4d9b-b6cf-b36049d9f4fa/content#:~:text=Activities%20undertaken%20under%20the%20One,478%20products%20throughout%20the%20country.

K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project/programme

145. The environmental and social screening presented in the table below provides a brief overview of the risk assessments and is further detailed in the ESMP in Anex 3. It shows that there are low to negligible risks related to the CRWIS project. All water usage and extraction activities have been designed to be in full compliance with national laws, the requirements of which are fully integrated into the government approved and overseen project screening processes as detailed in section 'II-E Technical Standards' as well as the ESMP in annex 3 section III. There are some minor risks, but mitigation measures have been integrated into the project, which has therefore been categorised as a category B project.

146. The project aims to address the most important adaptation measures that have been proposed by the Government of Vietnam in the national strategies. The investments to be undertaken within the project will promote climate resilience and take into consideration the vulnerability of the target areas in terms of climate-risks such as drought, flood, increased water shortage, salinity intrusion, and poverty.

147. The project has identified activities and a narrow window of eligible value chains (rice, maize, potato, peach blossom, Solanum Procumbens, tuberose, sugarcane, cucumber, Eunice viridis, squash, Pila Conica, ground peanut, beans, sesame, fish and shrimp). However, the exact locations of the project activities have not been identified, consequently the project presents Partially Unidentified Sub-Projects (USPs) where the specific activities have been identified but the location is yet to be determined.

148. The proposed investments and capacity development plan aim to help farmers shift to sustainable production systems and technologies that will help adapt to the concrete environmental and climatic risks.

Table 11. Overview of the ESP risk assessment

Checklist of environ-mental and social principles	No further assess-ment re-quired for com-pliance	Potential impacts and risks – further assessment and management required for compliance
ESP 1. Comp-liance with the Law	X	**No risk** • No further assessment of potential impacts and risks is required. As detailed in section II-E the proposed project will be in compliance with relevant laws. The project will be executed and coordinated by the People's Committees of Nghe An and Thanh Hoa provinces which further ensure compliance with applicable national laws.
ESP 2. Access and Equity	X	**Low risk** • The project will not reduce or prevent communities in the targeted areas from accessing basic services. The project will take several transparent steps that will help ensure that the benefits of the project are being distributed fairly with no discrimination nor favouritism. Project targeting will comprise targeting criteria based on gender and Ethnic Minority quotas. The project will advertise broadly through radio, posters, leaflets town hall and village meetings and workshops. • There is a low risk that women and ethnic minorities may not have access to information about the project. The project will ensure that i) the benefits of the project are being distributed fairly with no discrimination nor favouritism; ii) project targeting will comprise targeting criteria based on gender, youth and Ethnic Minority quotas. • There is a low risk that percentage of women, youth and ethnic minorities participating in consultation activities on the design of water infrastructure may not reach the required gender representation (40% women) because females are often not invited for consultation due to stereotype that women know less than men. The project will publicize the list of beneficiaries at public places and ensure that women account for at least 40% of participants in consultations about the project. To ensure

		gender equality, the project will i) select a list of beneficiary households with both husband and wife's names; ii) write full names of the women in the invitation for design consultation; iii) invite community facilitators to be involved in disseminating project information.
ESP 3. Margin-alized and Vulne-rable Groups	X	**Low risk** • Marginalised and vulnerable groups (MVGs) face with various constrains such as floods and droughts, poverty, environmental degradation, lack of adaptation capacity. • CRWIS will (i) improve irrigation water availability and management for approximately 4,000 ha of agricultural land in Ma river and Lam river watersheds, and strengthen flood control and prevention for approximately 2000 ha of agricultural and residential land in two provinces; (ii) assist MVGs to build climate resilience through adaptation activities (e.g., raising awareness, upgrading pumping stations, establishing EWS and developing CSA through a participatory and gender sensitive approach. • There is low risk that people from MVGs may not participate in project meetings and events because of different reasons (e.g., (i) lack of confidence; (ii) being discouraged from joining the discussion by others due to discrimination; (iii) lack of labor in the family; and (iv) lack of motivation to participate. CRWIS will i) ensure MVGs be invited to project's consultation meetings and incorporate their feedback; ii) maintain regular contacts with the groups during project design and implementation; iii) empower MVGs to make decisions on concrete adaptation actions, valuing their local knowledge and respecting their land, property and customary rights; iv) apply the Household Methodology with the targeting MVGs being monitored through regular household visits during the project implementation.
ESP 4. Human Rights	X	**No risk** • No further assessment of potential impacts and risks is required for compliance with human rights since the project is designed to respect and adhere to the requirements of all relevant conventions on human rights in compliance with the ESP. CRWIS adheres to the principle "support borrowers in achieving good international practices by supporting the realisation of United Nations principles expressed in the Universal Declaration of Human Rights and the toolkits for mainstreaming employment and decent work". CRWIS promotes women's human rights based on the United Nations Convention on Elimination of ALL Forms of Discrimination Against Women (CEDAW). • The project will further diversify agricultural production including but beyond rice production with climate-resilient crops and access to market and value chain development. To enhance adaptation and resilience for women and other MVGs, the project will also support the mainstreaming of gender, using GALS, a change approach based on underlying principles of social and gender justice, inclusion and mutual respect. • According to Vietnamese laws, the community has the right and responsibility to routinely monitor environmental performance during construction to ensure that their rights and safety are adequately protected and that the mitigation measures are effectively implemented by contractors and the PMU.
ESP 5. Gender Equality and Women's Empowerment	X	**Low risk** • There is a low risk that there will be little participation of women in some program activities. The project will conduct a baseline survey on the gender gaps (social norms, access to resources, decision making, representation, benefits), climate impact, adaptation needs and capacity. Based on the baselines, the Gender Action Plan will be updated and

		monitored during the project implementation. CRWIS will guarantee the promotion of gender equality and allow women to participate fully and equally without suffering any adverse effect from doing so. • Different stages and functions of any value chain under Component 2 will be associated with gender-specific knowledge, assets, decision-making powers and responsibilities. CRWIS will promote gender sensitive approaches to agri extension, vocational training, business skills development, small-cale processing infrastructure, contract development and other value chain innovations (such CSR and youth inclusion in STEM/technologies). • There is a risk that GEWE (Gender Equality and Women's Empowerment) is considered as an 'add on' topic among many cadres whose capacity of gender mainstreaming is limited. During the project life, women machinery will be consulted at different levels, and a full Gender Assessment will be conducted enabling the appropriate risk screening of the ESP 5 on GEWE. CRWIS will apply two main gender frameworks: i) Gender Action Learning System (GALS), a community-led empowerment methodology that can be adapted to different cultural and organisational contexts; ii) Women Economic Empowerment (WEE), a UNWOMEN's framework.
ESP 6. Core Labour Rights	X	**Low risk** • Viet Nam has rejoined the ILO in 1992 and has ratified 9 fundamental Conventions. The project will at all times ensure workers' rights are respected and upheld to international standards. • It is likely a lack of contracts for vulnerable workers, particularly EMs hired for seasonal works. The project will ensure these seasonal workers do not take any risks, particularly risks related to OHS, working condition and payment. • The personnel hired by project agencies have the right to a competitive salary and adequate working hours (no more than 48 hours per week). The same applies to the workforce involved in the project through organizations / contractors. However, it is possible that these provisions are disregarded by a contractor or third-party organizations The project will ensure that clauses of working conditions be included in all legally binding instruments/contracts during the project execution. • There is some risk that children between 15 and 18 years of age might provide labour. The project will require all contracts be complied with the minimum age requirements and all contractors maintain a labour registry for all contracted workers with supporting documents confirming the age of workers. • There may be environmental risks to labourers involved in water infrastructure activities owing to historical pollution (air, water) in Thanh Hoa province. CRWIS will pay attention to social dimensions such as community health, safety, labour, MVGs, and historical factors, particularly in relation to natural resource management. The project will minimize adverse social impacts and incorporate externalities. It will avoid and mitigate any potential adverse impacts on health and safety, labour and working conditions and well-being of workers and local communities. • In some situations, during the project life, Gender based violence-- GBV (e.g. verbal and physical abuse, sexual harassment, violence against children…) may occur due to influx of labourers at the project area. The project will mainstream the requirement to prevent GBV into the bidding documents and all contracts to be awarded by PMU to all project contractors; ii) require all contractors to prepare a Code of Conduct to prevent GBV using the national guideline for GBV prevention; iii) require all workers of project contractors to sign code of conduct, including provisions to prevent GBV.

ESP 7. Indigenous Peoples	X	**Low risk** • The design identifies that the proposed project area is inhabited by the Thai Ethnic Minority Group. In compliance with AF requirements section II-H describes the Consultative Process and how EMs have been consulted, annex 4 demonstrates the lists of those consulted including EMs as well as annex 3 describing the Thai EM community in the project area. • EMs have limited knowledge about climate adaption and resilience, and they often have own ways of learning, information sharing and application of knowledge. CRWIS will i) consider to provide support and ToT training to the respected people in ethnic groups ii) facilitate peer-learning groups through exchange and learning visits among EMs; iii) Prioritise training to extension workers from EM groups for broader knowledge/techniques transfer; iv) Enhance EM knowledge about value chains; v) Introduce incentive for private sector partnership to improve market access for EM products. • Some potential negative impacts relating to the project activities were also identified by Thai EM people during this consultation process. These related to transient impacts during construction, related to just, noise, waste generation and potential temporary disruption to farming activities. CRWIS will update the EMP, based on EMs' reflections. PMUs will ensure that the EMP requirements are incorporated into the civil works bidding and contractual documents for all construction works under Component 1,and conduct monitoring of compliance with the EMP during the implementation of construction activities.
ESP 8. Involuntary Resettlement	X	**No risk** • As designed at full proposal stage, the proposal does not foresee involuntary resettlement. CRWIS will rehabilitate the existing small scale water infrastructures, hence no land acquisition and/or involuntary resettlement is required.
ESP 9. Protection of Natural Habitats	X	**No risk** • There are not any critical habitats, protected areas, or areas of ecological significance in the project area. The project is not expected to have any negative impact on critical natural habitats including those that are (a) legally protected; (b) officially proposed for protection; (c) recognised by authoritative sources for their high conservation value, including as critical habitat; or (d) recognised as protected by traditional or indigenous local communities.
ESP 10. Conservation of Biological Diversity	X	**No risk** • The project is not foreseen to have adverse impacts on biodiversity. There are not any critical habitats, protected areas, areas of ecological significance, RAMSAR sites or UNESCO Biosphere reserves in the project area. There is no risk given there are no elements of known biological diversity importance in the project area as per IUCN red list of threatened species, UNESCO Man and Biosphere programme reserve, Ramsar site etc.
ESP 11. Climate Change	X	**Low risk** • The project will not have any negative impact on climate change. The project does not promote any drivers of climate change (energy, transport, heavy industry, building materials, large-scale agriculture, large-scale forest products, and waste management), it will therefore not contribute to climate change as it is based on the premise of assisting smallholders to adapt in a climate neutral fashion. • Primarily, CRWIS will promote CSA practices prioritized in the Targeted Adaptation Assessment including AWD; reclamation of manure to produce organic fertilizers; integrated fertilizer and pesticide management; climate-informed advisories to farmers with a focus on water-use efficiency. All these measures possibly have mitigation co-

		benefits.
ESP 12. Pollution Preven-tion and Resour-ce Effici-ency	X	**Low risk** • The project will be implemented in a way that meets applicable international standards for maximizing energy efficiency and minimizing material resource use, the production of wastes, and the release of pollutants through the planning process, among others. Impacts related to potential use of fertilizers and pesticides will be further assessed during implementation and related mitigation plans will be developed. • The proposed project activities will not pose any significant pollution risks, and no further assessments will be required. The project will bring environmental benefits in improved water management and climate change adaptation, and generally improved access to water and reduced inefficiencies in water management.
ESP 13. Public Health	X	**No risk** • It is not foreseen that the project will adversely affect public health as all proposed project activities as presented in this full proposal aim to improve access to water, improve livelihoods and adapt to climate change. It is foreseen that CRWIS will have an overall beneficial impact on the public health with improved access to water, climate-proofed yields and increase quality of produce that will also provide improved food security and nutritional benefits.
ESP 14. Physical and Cultural Heritage	X	**No risk** • Viet Nam ratified the World Heritage Convention in 2005. The project area does not contain UNESCO World Heritage Sites. • The project will ensure whether there are any national cultural heritage sites in the project areas and propose measures to avoid any alteration, damage, or removal of physical cultural resources, cultural sites, and sites with unique natural values.
ESP 15. Lands and Soil Conser-vation	X	**No risk** • The project is designed to have positive impact on lands through various techniques in soil conservation under the CSA approach. • The training will help improve soil water storage, control erosion, improve soil structure, and boost nutrient management and will include understanding the impact increased drought stress can have on their crops, provide simple solutions to reduce water stress during droughts; using mulch to prevent soil evapotranspiration; and learn about the benefits of drip irrigation etc. • Farmers will learn that they can adopt to minimise damage to soils and crops from increasingly frequent torrential rain including drainage options, laying of gravel to increase soil water uptake and reduce erosion. Farmers will also learn about the benefits of organic agriculture and composting to improve soil structure and boost nutrient management etc.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project/programme implementation

149. The project management and coordination follow the proven structure of IFAD funded projects in Vietnam. It takes on board a number of additional functions in order to respond to new requirements including risk management, policy engagement, facilitating private sector linkages, and partnerships.

150. **Lead Project Implementing Agency**. The Ministry of Finance (MOF), and Ministry of Agriculture and Environment (MAE) provide oversight at national level. The National Government of Vietnam appoints the Provincial People Committees (PPC) of Thanh Hoa and Nghe An provinces, respectively, as Lead Project Implementing Agencies who become accountable for the project execution. The PPC will establish a Project Steering Committee (PSC) in each province, to be led by the PPC Chairperson or the Deputy Chairman. PSCs are mandated to lead the project implementation, and ensure coordination and integration of the project with all the national target programmes and donor-funded projects. The PSC is composed of Provincial People's Committee, Department of Finance (DOF), Department of Agriculture and Environment (DAE), Women's Union (WU), Farmer's Union (FU), Youth Union (YU), Committee of Ethnic Minority (CEM), and Commune People's Committees. The PSC provides the strategic direction to the implementation of CRWIS, oversights project planning, financing and procurement processes, mobilises adequate and timely finance for the AWPB, reviews the progress and reporting on results. The PSC in Nghe An would hold joint meetings for the NTP-EMD, NTP-SPR, NTP- NRD, and CRWIS and likewise, the PSC in Thanh Hoa would cover both CRWIS and the NTP-NRD. This arrangement streamlines current parallel processes into one and coordinates the various financing sources destined for a similar purpose and thus creating higher efficiencies and better impact.

151. **Project Management Units**. Each of the two provincial PPCs establishes a dedicated Project Management Unit (PMU) for CRWIS. The provincial PMUs led by a project director, a project deputy director and composed of three technical sections: (i) Strategic Management including dedicated staff for component 2, social inclusion activities (gender, youth, EM) and environmental safeguards and climate adaptation activities, (ii) Infrastructure Management including a Climate Resilient Engineer to ensure adherence to social and environmental safeguards, procurement officers, and M&E and KM officer and (iii) Financial Management.

152. The PMU will be responsible for the day-to-day management of the CRWIS implementation and functions as the secretary for the PSC meetings. The key tasks of the PMU are to: (i) ensure the coherence of the implementation strategy towards the expected outputs, outcomes and impacts; (ii) draft the AWPB and procurement plan; (iii) mobilise and manage project finance from the various sources; (iv) ensure adherence to procurement IFAD and national procedures; (v) set up, consolidate and validate the Management Information System database, the baseline/midterm/endline surveys, all M&E and reporting structures (vii) set up a of co-ordination structure and strategy with the co-implementing agencies, district and commune level agencies; (viii) facilitate the networking with banking sector, private sector, 4P platform (ix) set up an effective knowledge management system ; (x) identify relevant policy topics and support the PSC on policy engagement activities and (xi) ensure environmental and social safeguards requirements are met for project activities implementation based on the national regulations on environmental management.

153. **Project coordination at Commune Level**. The commune people's committees, as members of PSC, coordinate the project implementation. The actual implementation is the responsibility of commune line agencies and mass organizations (i.e Fatherland Front). The PMU staff provides technical backstopping. The project implementation integrates itself into existing institutions at the local levels to ensure ownership, direct link to higher level policy makers, sustainability, local capacity building and reduced management cost.

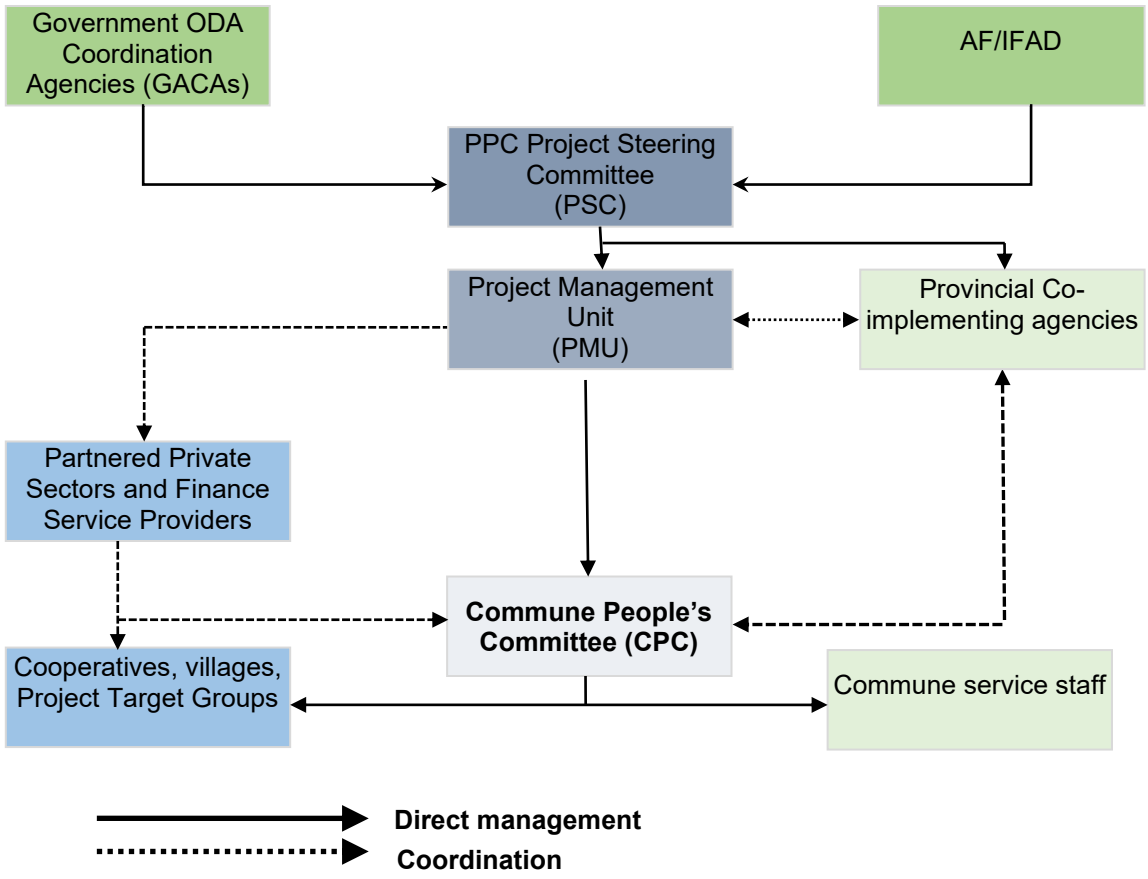


Figure 14. Project Management Structure

B. Describe the measures for financial and project/programme risk management

Table 12. Measures for financial and project risk management.

Risk	Inherent risk rating (H: High, M: Moderate, L: Low)	Residual risk rating (H: High, M: Moderate, L: Low)	Proposed Mitigating measures
Low interest and capacity of smallholder to adopt new climate smart approaches and technologies.	M	L	▪ CRWIS will pay attention to technical and environmental capacity building and training as a key factor in the upgrading process. It will carry out demonstrations and raise general environmental and climate change awareness and train farmers on the economic and environmental benefits for the adoption climate smart agriculture (CSA) ▪ The project will also be demand-driven so as to focus on the needs of the farmers to generate interest. This will mean that the project activities in outcome 2 will need to be reviewed and possibly updated within the detailed review framework so as to ensure farmer interest.
Climatic shock: the main effect of climate change on weather patterns is the increased occurrence of	M	M	▪ The project will introduce on-farm climate smart water infrastructure and will ensure that climate adaptation measures are implemented. It will in particular ensure that farmers have the technical capacity and

extreme weather events: droughts and flooding, and salinity intrusion, in particular. These climatic shocks can have a direct impact on crop production			knowledge to apply techniques that have proven to help farmers adapt to climate change hereby reducing risks to livelihoods and increased land degradation. This will improve resilience to increased drought and torrential rain.
Insufficient capacities to appropriately manage the day-to-day implementation of the project	L	L	▪ The PMUs have the proven administrative and financial management capacity to implement projects and has the necessary autonomy and assumes the fiduciary management functions of the project. ▪ IFAD will participate as an observer in all stages of the recruitment process. The staff of the PMU will be linked to the project by renewable annual contracts based on a performance evaluation.
Delays in annual plan and budget review/submission process due to complex project management structure. Budgets developed not accurately reflecting actual needs of implementing entities, hampering implementation process and progress.	M	L	▪ Relevant project documentation (FA, FMFCL, PIM) will clearly outline both the process and respective timelines for project budgeting, to: (i) ensure timely consolidation of input from lower level entities, and (ii) to allow sufficient time for internal review process before submission to IFAD. ▪ Budgeted vs actual expenditures incurred will be tracked on a regular basis (minimum quarterly) and any significant deviations will be promptly followed-up on by the PMUs and adjustments made, in alignment with formalized procedures. ▪ Meetings between PMUs will be convened on a quarterly basis to ensure coherence on implementation progress and an informed budget development/tracking. Planning will be started and discussed tentatively in June in the previous year between PMUs to allow sufficient time for consolidation and submission.
Deficiencies in internal control structure, negatively impacting project implementation and enhancing the risk of e.g., (i) inaccuracies in project financial reporting; (ii) improper use of project resources; and (iii) lack of oversight and tracking of financial progress.	M	L	▪ An internal audit function is to be set up and management will establish procedures for close follow-up and tracking of implementation of audit recommendations, in alignment with a time bound action plan. Detailed control activities to be implemented for the project include e.g., (i) having relevant policies and procedures well documented, detailing staff responsibilities; (ii) project staff with required qualifications are assigned to the project; (iii) segregation of duties is ensured for all financial management related tasks; (iv) physical protection of assets. ▪ Supervision and monitoring during project implementation will be undertaken by the IE to ensure that prescribed guidelines and requirements are being followed, and to ensure that provisions of the Financing Agreement are adhered to. Additionally, the project will be subject to periodical reviews thorough, e.g., quarterly submission of interim financial reporting and yearly audited financial statements. Internal procedures and guidelines will be regularly reviewed and updated as required by the PMUs respectively.
Limited capacity of accounting software, not allowing for automatic generation of financial reports, leading to parallel	M	L	▪ The internal accounting system to be used for the project will be customized to enable an integrated environment from which reporting by component and expenditure category can be automatically generated, and to ensure that a structure for proper segregation

manual compilation of project financial documentation. Proper segregation of duties not integrated in the system.			of duties is integrated into the system.
Frequent changes in project staffing leading to a negative impact on business continuity and knowledge retention.	L	L	▪ A fulltime accountant undertaking the daily financial management related tasks will support the Chief Accountant at each PMU. Staff are foreseen to be contracted for the full project duration and will not be subject to regular departmental transfers.

C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy and Gender Policy of the Adaptation Fund

154. All IFAD-funded projects and programmes are designed in a participatory manner, taking into account the concerns of all stakeholders in compliance with the Fund's policies, standards and safeguards. Moreover, IFAD's Strategic Framework calls for ensuring that projects and programmes promote the sustainable use of natural resources, build resilience to climate change and are based upon ownership by rural women and men themselves to achieve sustainability. The project design is compliant with AF Environmental and Social Policy and Principles as well IFAD social, environmental and climate assessment procedures (SECAP).

155. The expected impact of the project on the environment will be positive given its orientation towards the promotion of improved access to water; water use efficiency through the adoption of water saving irrigation systems; and the promotion of climate-resilient agronomic systems and technologies such as AWD, SRI, drip irrigation; climate change awareness capacity building; training on the importance and necessity of sustainably utilising the limited water resources in two provinces; and composting and organic agriculture; understanding the stress impact of drought on specific crops and how to adapt; to check for leaks (if using drip irrigation); irrigate during the cooler hours of the day; avoid irrigating during windy conditions; ensure water used in irrigation is not more than the soil is able to absorb; tree thinning to benefit fruit growth in times of drought; summer pruning can reduce water stress; correct fertiliser application as foliar nutrients can damage leaves.

156. To cope with periods of too much moisture, farmers will be taught techniques to minimise negative impacts. These will include appropriate drainage options; the importance of land preparation such as gravel on heavier soil to improve drainage; allow for drainage before using heavy machinery to minimise soil compaction. Planting of cover crops or orchard sod row middles to absorb moisture throughout the growing season and may help trees prepare for winter and prevent leaching losses by tying up nutrients in organic form over winter, and releasing them in the spring; and monitor soil moisture to avoid excessive irrigation.

157. The project will minimize environmental and social risks by integrating a safeguarding system in:

- **Institutional processes**: Staff and partners will be guided by the IFAD Project Management Team to identify, assess, manage and/or mitigate environmental and social risks. Processes are in place for the Environmental and Social Risks to be assessed and respective ESMPs designed and applied for the mitigation of risks related the 15 ESPs.
- Implementation of 'hard' interventions/sub-projects: Proposed on farm water-related infrastructure investments under component 1 will fully integrate national water and environmental laws through the full integration of the national structures that are responsible for their management. The project has detailed processes explaining all steps involved in securing water permits that are designed to ensure the sustainability of all the sources of water that are going to be used. This is further strengthened with the condition that any Adaptation Fund money that will be spent on water-related infrastructure will be conditional on the utilisation of water-efficient irrigation technologies.
- Execution of 'soft' project activities: Proposed 'soft' project activities have been screened for environmental and social risks during project preparation and their design and implementation by an experienced national Service Provider will help ensure that the environmental and social risks are adapted to and context specific to the environmental and social conditions in the region.

158. The ESMP (Annex 3) will include mitigation and monitoring actions and the institutional responsibilities for implementing them clearly. The ESMP integrates a project level grievance mechanism that aims to ensure

that appropriate mechanisms are in place to allow individuals and communities file a complaint if they believe they are or might be adversely affected by an IFAD-funded project/programme not complying with IFAD's SECAP. Affected individuals can also contact IFAD directly via its complaint procedure or if their grievance was not resolved at the project level. Additionally, concerns may also be brought to the attention of IFAD in cases where the persons raising the issue feel that they might be subject to retaliation if they were to approach the Lead Agency or other government agency directly. Complaints must concern environmental, social and climate issues and should not be accusations of fraudulent or corrupt activities in relation to project implementation – these are dealt with by IFAD's Office of Audit and Oversight.

D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan, in compliance with the ESP and the Gender Policy of the Adaptation Fund

159. Project Monitoring and Evaluation (M&E) will be under the oversight of the provincial PMUs and led by the M&E officer who will work closely with the Adaptation Fund expert and implementing partners. The project M&E system will be designed to track and verify the levels of achievement of project outputs, the associated outcomes, and the success in achieving the project objective and its development goal. These levels are all causally connected as set out in the project Logical Framework. Monitoring will focus on activities/inputs, outputs, outcomes, performance and risks while evaluation will assess the relevance, efficiency, effectiveness and impact on poverty reduction, business growth and environment, empowerment and partnership, sustainability, replicability, lessons learned, and knowledge up-take, all within the context of the requirements for successful climate change adaptation. In specific, the M&E system will: (i) produce, organize and disseminate the information needed for the strategic management of the project; (ii) document the results and lessons learned for internal use and for public dissemination on the achievements; and (iii) respond to the information needs of the Adaptation Fund, IFAD and the Government on the activities, immediate outcomes and impact of the project. An M&E manual that will describe a simple and effective system for collecting, processing, analyzing and disseminating data will be prepared in the first year of project implementation.

160. The project's MIS will be established to provide a comprehensive system of data collection, analysis and exchange. It will bring together physical and financial records with the main purpose of informing management decisions on project matters. Quantitative measures of progress will be supplemented with qualitative information related to the acquisition of personal and shared skills, group behavior changes, target groups' perception, awareness and attitudes. The MIS will be the sole channel of project monitoring material and form the basis of six-monthly and annual reports. A guidance document (i.e., M&E Manual or M&E section within the Project Implementation Manual) will be designed to assist the project to define and measure all indicators to assess progress at the project level. For AF core impact indicators, reference will be made to the AF Guidelines "Methodologies for Reporting Adaptation Fund Core Impact Indicators" (March 2014).

161. To ensure that a single and compatible system is implemented, an MIS will be set up for both provinces at project start-up and refinements will be introduced in the light of experience during the first project year. It will be based on the Logical Framework, which, together with the MIS, may be modified at Mid-term Review (MTR) to adjust the project to changing circumstances. The preparation of reporting formats for use by implementing agencies, particularly the participating communes, and other partners will be part of the overall design of the MIS.

162. **Baseline**. The project baseline will be implemented in year one of the project. Adaptation Fund indicators have already been specified in the PIM and will include climate change related indicators on the extent of climate vulnerability.

163. **Quarterly Progress Reports** will be also prepared by project implementing partners in the field, and submitted to the PMU to ensure continuous monitoring of project activities and identify challenges to adopt necessary corrective measures in due time.

164. **Thematic studies**: The PMUs will contract or carry out thematic impact studies that will look at the impact of activities under project outcomes. Such impact assessment will include an analysis of the effectiveness of: the impacts of water efficient infrastructure to livelihoods of people, the effectiveness of the CIEWS, and the effectiveness and sustainability of the CSA. The topics for these thematic studies will be identified in consultation with relevant government departments and other stakeholders during project implementation, considering the forest policies. The Monitoring Framework provides the indicators, collection methods and the usage of the processed data.

165. **Annual Project Report (APR):** The PMU will prepare an APR to reflect progress achieved in meeting the project's Annual Work Plan and assess performance of the project in contributing to intended outcomes through outputs and partnership work. The format of the APR will include but not limit to the following: (i) an analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome; (ii) the constraints experienced in the progress towards results and the reasons for these; (iii) the major constraints to achievement of results; (iv) AWP and other expenditure reports; (v) lessons learned; and (vi) recommendations for future orientation in addressing key problems in lack of progress.

166. **Annual Project Performance Report (PPR):** The project will submit a PPR each year to chart progress achieved in meeting the project's Annual Work Plan objectives and assess performance of the project in contributing to intended outcomes through outputs and partnership work, using the Adaptation Fund template. The PPR includes among others, (i) an analysis of project performance over the reporting period (tracking project indicators), including outputs produced and, where possible, information on the status of the outcome; (ii) lessons learned and constraints experienced in the progress towards results and the reasons for these; (iii) risk assessment; (iv) information related to financial data and procurement (expenditure reports, bids and contracts list); (v) ratings on implementation progress (Highly Satisfactory to Highly Unsatisfactory); (vi) clear recommendations for future orientation in addressing key problems in lack of progress; (vii) review of compliance with Environmental and Social Policy and Gender Policy. In addition, it includes a results tracker that needs to be filled i) at inception where baseline-related information will be submitted, and planned targets at project completion indicated; ii) at mid-term; and iii) at project completion when the final PPR will serve as a project completion report; but also include the final evaluation report and final audited financial statements.

167. Supervision will be by IFAD, with a supervision mission conducted at least once per year. Additional implementation support from IFAD on specific identified issues will be mobilized if considered necessary by the Government and IFAD or recommended by the supervision mission. The composition of the supervision missions will be based on an annual supervision plan. The supervision plan will highlight, in addition to the routine supervision tasks (fiduciary, compliance and programme implementation), the main thematic or performance areas that require strengthening and would imply deployment of additional inputs for capacity building, in-depth analytical studies or review of existing policies.

168. **Mid-term Review and Completion Review**: IFAD and the Government will be responsible for carrying out two full reviews of the project achievements: the MTR during project year 3 and the completion review after project completion. Key questions to be addressed during the reviews on the basis of the indicators contained in the Logical Framework will include: (i) have project investments enabled coherent planning for mangrove co-management and poverty reduction; (ii) has project targeting been successful; (iii) has the project assisted the underemployed in getting jobs and have innovative financial incentives for adaptation in wetland livelihoods been forged effectively; (iv) does the project have the expected financial service outreach; (v) has the market linked for value chains been promoted; (vi) has the project contributed good examples to the national policies related to mangrove; and (vii) how have changes in the external environment including climate change related challenges impacted on project beneficiaries.

169. **Project Completion Report (PCR):** At the end of the implementation period, a single, comprehensive PCR will be compiled by the PMU. The PCR will follow the AF guidelines and format for project completion reports. The assessment criteria will include: participation of the target groups, the project's strategies and approaches, relevance, finance management, efficiency, outputs delivery, effectiveness, impacts, sustainability, Innovation, scalability and replicability.

Table 13. Budgeted M&E plan

Category	Responsibility	Timeframe	Budget (US$)
Kick-off workshop	PMUs	Y1	30,000
Baseline, Midterm, and final surveys	PMUs	Y1, Y3, Y5	40,000
Annual Supervision mission	IFAD/PMUs	Once a year	Co-financed by IFAD
Midterm Review	IFAD/PMUs	Y3	15,000
Thematic studies	PMUs/external consultants	~ 8 studies	80,000

Final evaluation	IFAD/PMUs	Y5	20,000
Project Completion Report	PMUs	End of project	25,000

E. Include a results framework for the project proposal, including milestones, targets and indicators, including one or more core outcome indicators of the Adaptation Fund Results Framework, and in compliance with the Gender Policy of the Adaptation Fund.

Table 14. Project Result Framework

Project objective(s)	Project Objective Indicators	Base line	Target	Means of Verification and monitoring responsible	Assumptions
AF core impact indicator					
Number of Beneficiaries	Direct beneficiaries supported by the project - Female - Youth - Ethnic Minorities (EM)	0	40,000 persons 16,000 women 8000 youth 5,000 EM	• Survey data estimates based on population data in target areas • Project M&E reports • Progress reports • Baseline, mid-term, and final project evaluations **Responsible for monitoring:** Provincial PMUs/ M&E officers supported by: • PMUs targeting and social inclusion (gender, youth, EM, PwD) specialists or focal points • Local authorities providing community-related data (village->commune->province) • Consultant hired for the Baseline, mid-term, and final project evaluations	
	Indirect beneficiaries supported by the project - Female indirect beneficiaries - Youth indirect beneficiaries	0	10,000 persons 4,000 women 3000 youth		
Assets Produced, Developed, Improved, or Strengthened	Land under irrigation systems to withstand impacts of climate change *(ha)*	0	2,186 ha (342 ha in Nghe An, 1,844 ha in Thanh Hoa)		
Early Warning Systems (EWS)	Number of people adopted early warning systems - Risk knowledge - Monitoring and warning service	0	25,000 persons (10,000 women, 5,000 EM) 10,000 persons (4,000 women, 800 EM)		
	Number of hazard measured	0	3		
	Number of municipalities/communes benefited	0	32		
Development Objectives					
Increased adaptive capacity at provincial, district, and community	Percentage of target households reporting they can influence decision-making of local authorities and project-supported service providers	0	At least 60% (of total 10,000 households)	• Project M&E reports • Progress reports • Baseline, mid-term, and final project evaluations	▪ No extreme climate events, natural disasters or economic shocks affecting agricultural production; ▪ Local Governments are committed to implement their National Target Programs and socio-economic development plans;

levels to respond to the climate vulnerability and change				**Responsible for monitoring:** Provincial PMUs/ M&E officers supported by: • PMUs targeting and social inclusion (gender, youth, EM, PwD) specialists or focal points • Local authorities providing community-related data (village->commune->province) • Consultant hired for the Baseline, mid-term, and final project evaluations	▪ Farmers benefit from improved water availability and control are able to access improved technologies, timely climate information and early warning system, adequate extension and advisory services; ▪ Farm households are able to continue financing their part or all of the investments; ▪ Private investors are interested in investing in business opportunities in smallholders agriculture along conditions promoted by the project; ▪ Producer groups are interested in inclusive value chain, and willing to invest in CSA; financial service providers remain interested to invest in project-targeted value chains.
	Percentage of target households reporting an increase in production	0	At least 60% (of total 10,000 households)		
	Percentage of target households satisfied with project-supported services	0	75% (of total 10,000 households)		
Component 1. Improved water availability and control through climate-resilient infrastructure development					
Outcome 1 Improved water availability and control through climate-resilient infrastructure development	Households reporting reduced water shortage vis-à-vis production needs	0	7,000	• M&E reports • Progress reports • Outcome survey **Responsible for monitoring:** Provincial PMUs/ M&E officers supported by: • PMUs targeting and social inclusion (gender, youth, EM, PwD) specialists or focal points PMU technical experts	▪ Surface water remain sufficient to ensure water supply for all targeted irrigation schemes; ▪ Farmers are able to access more water-efficient species or varieties (crops, livestock, aquaculture) and technologies; ▪ Institutional framework is allowing water user entities to implement community-led water management. ▪ No significant inflation or external shocks affecting the timely completion of all planned infrastructure schemes; ▪ Local Governments are committed to implement their National Target Programs
	Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	0	60% (of total 40,000 beneficiaries)		
Output 1.1. Improved access to and efficiency of irrigation for smallholders	Farmland under water-related infrastructure constructed/rehabilitated (irrigation schemes)	0	2,186 ha (342 ha in Nghe An, 1,844 ha in Thanh Hoa)	• M&E reports • Progress reports **Responsible for monitoring:** Provincial PMUs/ M&E officers supported by: • PMUs targeting and social inclusion (gender,	
	Irrigation and/or drainage canals rehabilitated or upgraded to withstand conditions resulting from climate variability and change	0	13.7 km (10km in Thanh Hoa, 3.75 in Nghe An)		
Output 1.2.	No. of early warning	0	93 stations (60		

Improved flood control and livelihoods protection	systems (by scale) developed		in Nghe An, 33 in Thanh Hoa)	youth, EM, PwD) specialists or focal points PMU technical experts	
	Number of beneficiaries covered by the EWS	0	40,000 persons (16,000 women, 5000 EM)		
Component 2. Integrated water management and climate resilient agriculture					
Outcome 2. Integrated water management and climate resilient agriculture	Existing/new laws, regulations, policies or strategies proposed to policy makers for approval, ratification or amendment	0	4 (2 in Nghe An, 2 in Thanh Hoa)	• M&E reports • Progress reports • Outcome survey **Responsible for monitoring:** Provincial PMUs/ M&E officers supported by: PMUs targeting and social inclusion (gender, youth, EM, PwD) specialists or focal points PMU technical experts	▪ Institutional framework is allowing communities to be fully engaged in value chain action planning and water user entities to implement community-led water management; ▪ Local Governments are committed to implement their socio-economic development plans; policy dialogues will result in effective and actionable outputs for value chain development; ▪ Market demand for the targeted value chains remains stable or increases to ensure profitability of smallholders' business models; ▪ Capacity building on CSA technologies and practices combined with an enabling an enabling environment and market opportunities will translate into adoption and replication of profitable business models by smallholders; ▪ Farm households are able to continue financing their part or all of the investments; private investors are interested in investing in business opportunities in smallholders agriculture along conditions promoted by the project; ▪ Producer groups are interested in inclusive value chain, and willing to invest in CSA; financial service providers remain interested to invest in project-targeted value chains.
	Percentage of targeted population with sustained climate-resilient alternative livelihoods	0	70% (of total 10,000 target households)		
Output 2.1. Improved capacity and coordination for integrated water management	Persons provided with climate information services	0	25,000 persons (10,000 women, 1800 EM)	• M&E reports • Progress reports **Responsible for monitoring:** Provincial PMUs/ M&E officers supported by: • PMUs targeting and social inclusion (gender, youth, EM, PwD) specialists or focal points PMU technical experts	
	Groups and institutions supported to sustainably manage natural resources and climate-related risks	0	120		
Output 2.2. Increased smallholder farmers' income from facilitated business linkages with the private sector	Households reporting adoption of environmentally sustainable and climate-resilient technologies and practices	0	2,200	• M&E reports • Progress reports **Responsible for monitoring:** Provincial PMUs/ M&E officers supported by: • PMUs targeting and social inclusion (gender, youth, EM, PwD) specialists or focal points PMU technical experts	
	Persons trained in production practices and/or technologies	0	20,000 (8000 women, 1800 EM)		
	Functioning multi-stakeholder platforms supported	0	10		

F. Demonstrate how the project/programme aligns with the Results Framework of the Adaptation Fund

Table 15. Alignment of the project framework with the Adaptation Fund framework

Project Objective (s)[1]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Outcome 1 Improved water availability and control through climate-resilient infrastructure development	Households reporting reduced water shortage vis-à-vis production needs	**Outcome 4:** Increased adaptive capacity within relevant development sector services and infrastructure assets **Outcome 5:** Increased ecosystem resilience in response to climate change and variability-induced stress	**4.2.** Physical infrastructure improved to withstand climate change and variability-induced stress **5.** Ecosystem services and natural resource assets maintained or improved under climate change and variability-induced stress	
	Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	**Outcome 1:** Reduced exposure to climate-related hazards and threats	**1.** Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	
Outcome 2. Integrated water management and climate resilient agriculture	Existing/new laws, regulations, policies or strategies proposed to policy makers for approval, ratification or amendment	**Outcome 2**: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses **Outcome 3:** Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	**2.1.** Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased 3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	
	Percentage of targeted population with sustained climate-resilient alternative livelihoods	**Outcome 6:** Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas **Outcome 8**: Support the development and diffusion of innovative adaptation practices, tools and technologies	**6.2**. Percentage of targeted population with sustained climate-resilient alternative livelihoods **8.** Innovative adaptation practices are rolled out, scaled up, encouraged and/or accelerated at regional, national and/or subnational level	
Component 1. Improved water availability and control through climate-resilient infrastructure development				
Output 1.1. Improved access to and efficiency of irrigation for smallholders				1,901,900
	Farmland under water-related infrastructure constructed/rehabilitated (irrigation schemes)	***Output 5:*** Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts, including variability	5.1. No. of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type and scale)	
	Irrigation and/or drainage canals rehabilitated or	***Output 4:*** Vulnerable development sector	4.1.2. No. of physical assets strengthened or constructed to	

	upgraded to withstand conditions resulting from climate variability and change	services and infrastructure assets strengthened in response to climate change impacts, including variability	withstand conditions resulting from climate variability and change (by sector and scale)	
Output 1.2. Improved flood control and livelihoods protection				2,000,000
	No. of early warning systems (by scale) developed	***Output 1.1:*** Risk and vulnerability assessments conducted and updated	1.2 No. of early warning systems (by scale) and no. of beneficiaries covered	
	Number of beneficiaries covered by the EWS	***Output 1.1:*** Risk and vulnerability assessments conducted and updated	1.2 No. of early warning systems (by scale) and no. of beneficiaries covered	
Component 2. Integrated water management and climate resilient agriculture				
Output 2.1. Improved capacity and coordination for integrated water management				500,000
	Persons provided with climate information services	**Output 3.1:** Targeted population groups participating in adaptation and risk reduction awareness activities	**3.1.** No. of news outlets in the local press and media that have covered the topic	
	Groups and institutions supported to sustainably manage natural resources and climate-related risks	***Output 2.1***: Strengthened capacity of national and sub-national centres and networks to respond rapidly to extreme weather events	2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	
Output 2.2. Increased smallholder farmers' income from facilitated business linkages with the private sector				4,014,100
	Households reporting adoption of environmentally sustainable and climate-resilient technologies and practices	***Output 8:*** Viable innovations are rolled out, scaled up, encouraged and/or accelerated.	8.1. No. of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated	
	Persons trained in production practices and/or technologies	***Output 6:*** Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	6.1.1. No. and type of adaptation assets (tangible and intangible) created or strengthened in support of individual or community livelihood strategies	
	Functioning multi-stakeholder platforms supported	***Output 3.2:*** Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	3.2.1 No. of technical committees/associations formed to ensure transfer of knowledge	

[1] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

G. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs

Table 16. Project detailed budget

Outputs/ activities by components	AF			Government of Viet Nam			Beneficiaries			Total budget
	Total	Thanh Hoa	Nghe An	Total	Thanh Hoa	Nghe An	Total	Thanh Hoa	Nghe An	
1. Component 1: Improved water availability and control through climate-resilient infrastructure development	**3,901,900**	**1,701,900**	**2,200,000**	**356,000**	**248,000**	**308,000**	**95,095**	**35,095**	**60,000**	**4,352,995**
Subcomponent 1.1: Improved access to and efficiency of irrigation for smallholders	**1,901,900**	**701,900**	**1,200,000**	**356,000**	**148,000**	**208,000**	**95,095**	**35,095**	**60,000**	**2,352,995**
a. Detailed design /a										
Detailed technical design of the water infrastructure, including the options for AWD /b				100,000	50,000	50,000				
Technical assistance/Quality assurance for design studies /c				20,000	10,000	10,000				
Capacity building for community based on-farm irrigation development /d				40,000	20,000	20,000				
b. Water infrastructure Development										
Construction/Rehabilitation of small scale on-farm irrigation and drainage systems /e	1,901,900	701,900	1,200,000	140,000	40,000	100,000	95,095	35,095	60,000	2,136,995
c. Supervision and Capacity building										
Construction/Rehabilitation works supervision /f				28,000	14,000	14,000				
Technical Assistance (for Capacity Building, ESMP Compliance…)				28,000	14,000	14,000				
Subcomponent 1.2: Improved flood control and livelihoods protection	**2,000,000**	**1,000,000**	**1,000,000**		**100,000**	**100,000**				**2,000,000**

a. Detailed design /a										
Detailed technical design of the EWS /g					50,000	50,000				
Technical assistance/Quality assurance for design studies					30,000	30,000				
b. EWS construction/installation /h										
EWS equipment procurement (including the server) and construction/installation /i	1,752,472	876,236	876,236							1,752,472
Development of digital tools for large-scale and timely dissemination early warnings and climate information /j	164,234	82,117	82,117							164,234
Testing, finalization and transfer of digital tools to government partners (Districts)	83,294	41,647	41,647							83,294
c. Supervision and Capacity building										
Technical Assistance and capacity building for operating the EWS					20,000	20,000				
2. Component 2: Integrated water management and climate resilient agriculture	**4,514,100**	**2,478,000**	**2,036,100**	**10,000.00**		**5,000**	**554,000**	**322,000**	**232,000**	**5,078,100**
Sub-component 2.1: Improved capacity and coordination for integrated water management	**500,000**	**250,000**	**250,000**	**10,000**	**5,000**	**5,000**	**-**			**510,000.00**
a. Development of hazard risk maps (drought, flood, saline intrusion)										
Technical assistance to develop interactive hazard risk maps	60,000	30,000	30,000							
Capacity building to operate the software and package the produced maps	30,000	15,000	15,000							
Production and dissemination of printout hazard risk maps at District and Commune levels	40,000	20,000	20,000							
b. Improve local and institutional capacity and										

coordination mechanism in integrated water management										
Technical studies and mapping of actors in water management along the Len, Cung, Lach Truong, Lam/Ca rivers	60,000	30,000	30,000							
Establishment of a Task Force				10,000	5,000	5,000				10,000
Operational plan for an inclusive institutional coordination mechanism	40,000	20,000	20,000							
Facilitation of dialogue between related water user actors	40,000	20,000	20,000							
Capacity building of water users on governance and conflict resolution /k	35,000	15,000	20,000							
c. Improve capacity of water users for inclusive irrigation management										
Capacity building of water users on O&M /k	40,000	20,000	20,000							
Development of rules and regulation on water use	30,000	15,000	15,000							
Facilitation of dialogues	25,000	15,000	10,000							
Setup of accounting system for O&M costs	20,000	10,000	10,000							
d. Gender mainstreaming and youth empowerment for increased climate adaptive capacity										
Province specific gender social norms assessment	40,000	20,000	20,000							
Gender equality and social inclusion training for project implementers	40,000	20,000	20,000							
Subcomponent 2.2: Strengthened resilience of smallholders' agricultural businesses	**4,014,100**	**2,228,000**	**1,786,100**	**-**		**-**	**554,000**	**322,000**	**232,000**	**4,568,100.00**
a. Mapping and assessment of existing agricultural										

models in the target communes										
Conduct a mapping and assessment of agricultural models in the target communes, assess their feasibility and identify relevant stakeholders /l	70,000	20,000	50,000							
Organize workshops to validate findings at commune level /m	30,000	10,000	20,000							
Develop, print, and disseminate CSA documentation (manuals, brochures, etc.)	20,000	10,000	10,000							
b. Participatory selection of CSA models										
Provide technical assistance to support the process	20,000	10,000	10,000							
Organize meetings to select CSA models at commune level /n	20,000	10,000	10,000							
Organize study tours and cross visits on CSA models at commune level /o	20,000	10,000	10,000							
Develop and disseminate documentation of the CSA selection process	20,000	10,000	10,000							
c. Mainstream CSA into rural extension and advisory services										
Provide technical assistance to develop tailored materials on CSA models and a capacity building plan for rural extension and advisory services	55,000	30,000	25,000							
Print out and disseminate documentations	20,000	10,000	10,000							
Implement capacity building of rural extension and advisory services providers /p	100,000	50,000	50,000							
d. Capacity building of farmers and POs in CSA										

Implement CSA trainings of farmers and producer organisations /q	174,100	83,000	91,100							
Organize awareness and communication events on adaptation to climate change and disaster risk management at all levels /r	20,000	10,000	10,000							
Organize study tours and cross visits on CSA implementation at province level /s	80,000	40,000	40,000							
e. Upscale CSA models through community-based technologies and investments for vulnerable communities										
Provision of small-scale CSA technologies to communities (net houses, compost turners, drip irrigation, etc.) /t	1,260,000	680,000	580,000				252,000	136,000	116,000	1,512,000
Provision of CSA starter inputs to vulnerable households (seeds and seedlings, fertilisers, animal feed, etc.) /t	800,000	500,000	300,000				160,000	100,000	60,000	960,000
Community-owned equipment to facilitate CSA practices (direct seeders, laser land levelers, etc.) /t	650,000	400,000	250,000				130,000	80,000	50,000	780,000
Nature-based solutions for environmental protection (plantation of acacias, ecological embankments, etc.) /t	60,000	30,000	30,000				12,000	6,000	6,000	72,000
Capacity building of beneficiary communities on operation and maintenance /t	140,000	80,000	60,000							
f. Enhanced capacity of women, youth, ethnic minorities										
Community sensitization on GEWE	40,000	20,000	20,000							
Women and youth forums on climate change	40,000	20,000	20,000							

g. Establishment of 4P platforms for faciliation of business linkages										
Value Chain, market and climate studies	100,000	50,000	50,000							
Technical assistance and Capacity building for value chain action planning	60,000	30,000	30,000							
Value Chain Action Planning (VCAP) Process	70,000	40,000	30,000							
Business Development Services (BDS) coaching	55,000	30,000	25,000							
Facilitation of 4Ps platforms	30,000	15,000	15,000							
Facilitation of market linkages/matching events	60,000	30,000	30,000							
Project/Programme Execution cost	**800,600**	**397,100**	**403,500**		**1,300,141**	**1,460,957**				**800,600.00**
Thanh Hoa /u										
Provincial Project Director*				90,818	90,818					90,818
Provincial Project Vice Director*				83,250	83,250					83,250
Chief Accountant*				83,250	83,250					83,250
Accountant /v	12,109	12,109		49,546	49,546					61,655
Procurement Officers (2 Officers in each province) /v	27,245	27,245		108,981	108,981					136,226
Infrastructure Officers (2 Officers in each province) /v	27,245	27,245		108,981	108,981					136,226
Livelihood and Value Chain Coordinator /v	24,000	24,000		80,082	80,082					104,082
Livelihood and Value Chain Officers (2 Officers in each province) /v	27,245	27,245		108,981	108,981					136,226
Environmental and Climate Officer	26,400	26,400		26,400	26,400					52,800
Gender and Social Inclusion Officer	26,400	26,400		26,400	26,400					52,800
M&E Officer	33,600	33,600		33,600	33,600					67,200
Knowledge Management Officer	26,400	26,400		26,400	26,400					52,800
Administrative staff				60,545	60,545					60,545

Equipment and management support	10,001	10,001								
Technical assistance and capacity building for staff	20,000	20,000								
Operating costs (office costs, travel, communication, allowance, etc)	56,455	56,455		412,908	412,908					469,363
Audit in four years	20,000	20,000								
Kick-off workshop, Baseline, Midterm, final surveys, completion report, and closing workshop	60,000	60,000								
Nghe An /u										
Provincial Project Director*				90,818		90,818				90,818
Provincial Project Vice Director*				83,250		83,250				83,250
Chief Accountant*				83,250		83,250				83,250
Accountant /v	12,109		12,109	49,546		49,546				61,655
Procurement Officers (2 Officers in each province) /v	27,245		27,245	108,981		108,981				136,226
Infrastructure Officers (2 Officers in each province) /v	27,245		27,245	108,981		108,981				136,226
Livelihood and Value Chain Coordinator /v	24,000		24,000	80,082		80,082				104,082
Livelihood and Value Chain Officers (2 Officers in each province) /v	27,245		27,245	108,981		108,981				136,226
Environmental and Climate Officer	26,400		26,400	26,400		26,400				52,800
Gender and Social Inclusion Officer	26,400		26,400	26,400		26,400				52,800
M&E Officer	33,600		33,600	33,600		33,600				67,200
Knowledge Management Officer	26,400		26,400	26,400		26,400				52,800
Administrative staff				60,545		60,545				60,545
Equipment and management support	10,001		10,001							
Technical assistance and capacity building for staff	20,000		20,000							

Operating costs (office costs, travel, communication, allowance, etc)	62,855		62,855	573,724		573,724				636,579
Audit in four years	20,000		20,000							
Kick-off workshop, Baseline, Midterm, final surveys, completion report, and closing workshop	60,000		60,000				-			
3. Total Project/Programme Cost	**9,216,600**	**4,577,000**	**4,639,600**	**366,000**		**1,773,957**	**649,095**			**10,231,695**
4. Project Cycle Management Fee charged by the Implementing Entity (if applicable) /e	**783,400**			**-**		**-**	**-**			**783,400**
Financial management and control, legal and other administrative services	192,000			-		-	-			192,000
Project Development, Technical and Implementation Support, supervision and monitoring	591,400			-		-	-			591,400
GRAND TOTAL	**10,000,000**			**366,000**		**1,773,957**	**649,095**			**12,789,052**

Note:

* This is a secondment position paid by the Government of Viet Nam
/a PMU, consultant, DAE, communes/cooperatives/ICs and communities
/b Series of typical models of Water Resources Research Institute - WRRI adapting CCs and supporting Smart Cropping including AWD
/c A technical expert should be mobilized to support the PMU
d A practical manual should be prepared to support beneficiary communities in partnership with the GoV Nationally Targeted Programs and the New Rural Development Programme
e 08 on-farm irrigation schemes in two provinces, 4 in each province
/f 8 beneficiary communes have been identified to date
/g Series of EWS including salinity intrusion, water level and quality, flood, rain, tidal, pest monitor.
/h 192 EWS stations/points installed in each province
/i Reliable providers such as RYNAN company should be consider
/j The provider (e.g. RYNAN) should also support with the digital tool
/k 1 day training with around 50 participants per training.
/l In two provinces

/m 200 participants per 2-3 communes, For each commune, representatives of CPC, producer organisations, water user entities, DAE, WU, FU, CA, private sector to participate
\n 30 participants per commune, For each commune, representatives of CPC, producer organisations, water user entities, DAE, WU, FU, CA, private sector to participate
/o 48 participants per tour, For each study tour, 2 representatives of each commune to participate
/p 240 participants, for each commune, 10 representatives of rural extension and advisory service providers to participate
/q In each province, estimated 10,000 farmers to receive CSA trainings (30 farmers per session)
/r 10000 households in each province, all population of target communes to receive information
/s 48 participants per tour, for each study tour, 2 representatives of each commune to participate
/t CSA models will be replicated through the National Target Program (NTP) on New Rural Development (NRD), Sustainable Poverty Reduction (SPR) and Ethnic Minority (EM)
/u Salaries of all positions include social contributions

/v Cost shared between AF and Government

H. Include a disbursement schedule with time-bound milestones.

Table 17: Project Disbursement Schedule in US$

	Upon signature of Agreement	One Year after Project Start	Year 2	Year 3	Year 4	TOTAL (US$)
Scheduled date (tentative)	October 2026	October 2027	October 2028	October 2029	October 2030	
Project costs	500,000	1,450,000	3,780,600	2,970,000	516,000	9,216,600
Implementing Entity fee (8.5%)	160,000	145,000	170,000	158,000	150,400	783,400
Total	**660,000**	**1,595,000**	**3,950,600**	**3,128,000**	**666,400**	**10,000,000**
Total AF grant funds						**10,000,000**

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government[2]

Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:

(Enter Name, Position, Ministry) ***Mr Tang The Cuong,*** *Director General, Department of Climate Change, Ministry of Agriculture and Climate Change*	Date*: (Month, day, year)* *August, 19, 2025*

B. Implementing Entity certification

Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy and the Gender Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
Implementing Entity coordinator:  Pierre-Yves GUEDEZ Lead Multilateral Climate & Environmental Funds (AF, GCF, GEF)	email: p.guedez@ifad.org
Mr Juan Carlos Mendoza Casadiegos, Director, Environment, Climate, Gender and Social Inclusion Division	
Date: November 26, 2025	e-mail: ecgmailbox@ifad.org
Project contact person: Ms Anupa Rimal Lamichhane, Lead Regional Tech. Specialist	e-mail: a.rimallamichhane@ifad.org
Mr Ambrosio Barros, Country Director for Vietnam	e-mail: a.barros@ifad.org

MINISTRY OF AGRICULTURE AND ENVIROMENT OF VIETNAM
DEPARTMENT OF CLIMATE CHANGE

Ha Noi, 19 August 2025

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Endorsement for the national project's proposal titled "Climate Resilient and Inclusive Water Infrastructure for Rural Smallholders in Thanh Hoa and Nghe An provinces" (CRWIS)

Regarding the national project's titled "Climate Resilient and Inclusive Water Infrastructure for Rural Smallholders in Thanh Hoa and Nghe An provinces", the designated authority for the Adaptation Fund of the Socialist Republic of Viet Nam has delivered the endorsement letter for this project's concept note proposal to the Adaptation Fund Board on 3rd April 2025. After this, the Provincial People's Committee of Thanh Hoa and the Provincial People's Committee of Nghe An have collaborated with the International Fund for Agricultural Development (IFAD) to complete the project's proposal.

On behalf of Department of Climate Change, Ministry of Agriculture and Environment, as Viet Nam's designated authority for the Adaptation Fund, I hereby confirm that the national project's proposal titled *"Climate Resilient and Inclusive Water Infrastructure for Rural Smallholders in Thanh Hoa and Nghe An provinces"* aligns fully with the priorities of the Government of Viet Nam in climate change adaptation. The proposed national project aims to enhance climate resilience and promote social inclusion of water-insecure rural communities, contributing significantly to sustainable socioeconomic development in Viet Nam.

Therefore, I am pleased to endorse the above proposal and support its submission to the Adaptation Fund. If approved, the project will be implemented by the International Fund for Agricultural Development, executed by the Provincial People's Committee of Thanh Hoa and the Provincial People's Committee of Nghe An.

Sincerely,

CỤC BIẾN ĐỔI KHÍ HẬU

Dang The Cuong
Director General
Department of Climate Change
Ministry of Agriculture and Environment of Viet Nam

Cc:
- Provincial People's Committee of Nghe An;
- Provincial People's Committee of Thanh Hoa;
- IFAD Office in Viet Nam.

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Annex 1. Feasibility Study of the CRWIS Water Infrastructure and Early Warning System

Note: The Feasibility Study was conducted before the merging process taking place in July 2027. Therefore, database and information collected were based on the existing institutional arrangement (districts still existed). After the merging process, the target communes under the previous target districts are no change. Therefore, all the database and information are still valid.

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The **Project Goal** is to strengthen climate resilience and social inclusion of water-insecure rural communities for sustainable socioeconomic development in Thanh Hoa and Nghe An provinces.
The Project **Development Objective** is Increased adaptive capacity of communities to respond to the impacts of climate change
The **Project outcomes/components**:

1) Improved water availability and control through climate-resilient infrastructure development;
2) Integrated water management and climate resilient agriculture (Improved capacity of and coordination between local institutions and water user groups for climate-informed and inclusive water management)

Sub-component 1.1 Improved water availability and control through climate-resilient infrastructure development

1.1.1 Selection of the sub-projects

Step 1: Shortlisting the subprojects by FA' criteria for selection subprojects
To select for subprojects/component proposing for AF funding, the Design Team studied and consulted with provincial stakeholders on AF Criteria outlined in the "Strategic Priorities, Policies and Guidelines of the Adaptation Fund", specifically:

(a) Level of vulnerability;
(b) Level of urgency and risks arising from delay;
(c) Lessons learned in project and program design and implementation to be captured;
(d) Securing regional co-benefits to the extent possible, where applicable;
(e) Maximizing multi-sectoral or cross-sectoral benefits;
(f) Adaptive capacity to the adverse effects of climate change.

Level of vulnerability: Vietnam is one of the countries assessed to be severely affected by climate change. The main impacts include a) rising sea levels; b) extreme weather, including tropical storms, unusual heat, causing flooding in low-lying areas, flash floods, landslides in mountainous areas, and prolonged drought. All of these negative impacts mostly occur in coastal areas (Hoang Hoa District of Thanh Hoa Province; Huong Nguyen, Nam Dan of Nghe An Province), mountainous areas (Con Cuong, Anh Son of Nghe An Province), semi-mountainous areas combining mountains and low-lying plains (Ha Trung of Thanh Hoa Province; Do Luong, Thanh Chuong of Nghe An Province).
The whole society is affected by climate change, but farmers who produce agriculture and aquaculture on those lands are the ones who suffer the most negative impacts of climate change. They may lose their shrimp ponds and fishponds after a flood or saltwater intrusion; The entire ripe rice field that is about to be harvested is also at risk of being lost if unusual storms cause flooding of both the fields and villages; People and houses may be buried by landslides in the mountainous areas after prolonged rains, etc.
Thus, the level of vulnerability is very high, directly affecting the lives, properties, farming methods, and agricultural production of people in the project area in both Nghe An and Thanh Hoa provinces.
Level of urgency and risks arising from delay:
The negative impacts of climate change mentioned above are real and farmers have to face them every day. For example, in the dry season, the water level of Lam River did not drop as low as it is now, the pumping stations could still draw water to irrigate the fields, so people could produce two rice crops and one vegetable crop a year. But now in the dry season, the pumping stations cannot draw water from Lam River in dry season (because the water level drops too low), farmers can only produce one rice crop in the rainy season, which directly affects their income. Therefore, many people, especially young people, have left their homes and villages to find jobs in big cities, causing many social problems.
Therefore, it is necessary to invest in renovating irrigation works, lowering irrigation pumping stations to match the water level of Lam River (Nghe An), Hoat and Cung Rivers (Thanh Hoa) in the context of current climate change, helping farmers adapt to the negative impacts of climate change.
Another investment is also urgently needed, is investing in an early warning system, helping farmers to be notified as early as possible, at least one or two days before the unusual developments in weather, rains, floods, flash floods, landslides so that they have enough time to take necessary actions, reducing the loss of people, property, and crops.
Lessons learned in project and program design and implementation to be captured
During the design of this project, the Project Design Team carefully studied the project design, and implementation organization as well as all lessons learned from Innovative Financial Incentives for Adaptation

in wetland livelihoods (IFIA) project in the Mekong Delta. The satisfaction and excitement of the beneficiaries of the IFIA project is an encouragement and motivation for the design team of this project.
The proposal for TRTP-Adapt project was also made available for the Design Team to take as reference.

Maximizing multi-sectoral or cross-sectoral benefits

In addition to activities to improve irrigation infrastructure, provide early warning to people about drought, floods, flash floods, landslides, and pests and diseases for crops and livestock, the project also includes activities to help farmers learn about and apply rice varieties, crops, and aquatic products that are adaptable to climate change, or in other words, apply climate-smart agriculture (CSA). In addition to increasing the ability to adapt to climate change for people in the fields of agricultural production and aquaculture, through training and education programs, the project also helps farmers improve their skills in using smart tools at work, strengthen community and village relationships, understand and apply gender skills in daily work, help cooperatives and small-scale producers link with businesses to create value chains from production to circulation of goods and consumers, help farmers have better incomes on their homeland, help the government solve the problem of reducing migration to big cities and abandonment of agricultural land.

Adaptive capacity to the adverse effects of climate change.

This is a climate change adaptation project for farmers in 06 districts along the Lam River of Nghe An (Con Cuong, Anh Son, Do Luong, Thanh Chương, Nam Dàn and Huong Nguyen) and two districts of Hoang Hoa, coastal areas and Ha Trung, along the Hoat, Cung and Len Rivers, which are low-lying areas interspersed with hills and mountains of Thanh Hoa province. Form the development goal to all activities of the project, all aim to improve the ability to adapt to climate change of these target groups. The project components, investment activities and capacity building activities are all aimed at that goal. In addition, the project also helps farmers to become rich through climate-smart agricultural production activities in the context of climate change.

This process was conducted to have a “long-list” of water irrigation schemes in full consultation with beneficiary communities. The feasibility study Team discussed with provincial partners (DAE, district unit responsible for Agriculture and Rural Development, Commune People Committees, Cooperatives, Farmers, Women, Youth, Project Preparation Board) on opportunity to have funding from AF, and its selection criteria and request them to propose the subprojects under each component, as a “long list”;

Step 2: Assessing the viability of the shortlisted water infrastructure schemes

The long-list of water irrigation schemes that passed all the FA’ criteria were shortlisted for investment under CRWIS. The feasibility study Team visited the proposed subprojects and assessed their existing physical conditions and the needs for improvement. The feasibility study Team assessed the viability of the water irrigation schemes. This includes (i) hydrological analysis to support the viability of water infrastructure supporting the irrigation schemes in addition to topographic analysis; (ii) soil and agronomic assessments; (iii) climate change scenarios and risks, and estimation of crop water requirements. This includes a) analysis of the targeted watersheds (Lam and Ma), collection and analysis of rainfall and river flow time series, b) estimation of river flow and sediment transport in current and future conditions especially during the most critical periods of the year corresponding mainly to the lowest and highest water levels/flows under different assumptions of return periods and climate change scenarios (the target provinces focus on RCP8.5, 2040-59); and iv) assessment of multi-reservoir regulations, particularly on Lam River in Nghe An province.

Key elements of the feasibility analysis includes considerations regarding existing and planned water abstractions upstream and downstream of the targeted irrigation infrastructure and assessment of water balance and adequacy of water flow to satisfy irrigation water requirements at least on monthly basis.

At district level, the feasibility study Team again discussed with partners and came up with the “short list” of subprojects and further make some more details analysis with the stakeholders for outline design.

1.1.2 Selected irrigation schemes for improving access to and efficiency of irrigation for smallholders

As results, in Nghe An, four irrigation systems in the two mountainous districts of Con Cuong and Anh Son have been selected for upgrading 6.1 km of main irrigation canal, 4.9 km of on-farm canal and 3.4 km of management roads (see table 3 below). Currently, these irrigation systems are providing irrigation services to 342 hectares of agricultural land, mainly rice fields and other crops, such as maize, sugarcane, and vegetable. These irrigation schemes serve 550 households, including 143 ethnic minority households - "Thai" of Chau Khe commune, Con Cuong district.

In Thanh Hoa, the Da Vet pumping station together with the related inlet and outlet canals in Hoat Giang commune, Ha Trung district has been selected for upgrading. Currently, the pumping station supplies water to 300 ha of rice fields and drains rainwater for 350 ha, including 50 ha of rural residential villages with 1,350 households during the rainy season. In Hoang Hoa district, 2.7 km of two on-farm irrigation systems in Hoang

Phu and Hoang Dong communes and a water regulation gate - Cong Gom have been selected for upgrading. Currently, the two on-farm irrigation systems supply water to about 44 ha of rice fields of 1,085 households. Cong Gom water regulation gate is regulating water irrigation services for 1,500 ha of rice fields of 3,240 households (see table 1 below)

Table 1: Selected water irrigation schemes for upgrading under component 1.1

	Subproject	Location	Investment items	Irrigation area [Ha]	No. of Benefited Households [HH]
Nghe An province				**342**	**550**
1	Irrigation system 2/9	Châu Khê Commune	Upgrade 4.6km of branch canal, 0.1km of management road	114	143
2	Vĩnh Sơn irrigation system	Vĩnh Sơn commune	Upgrade 2.5km of branch canal	50	92
3	Lạng Sơn irrigation system	Lạng Sơn commune	Upgrade 1.4km branch canal, 1.3km management road	40	130
4	Tào Sơn irrigation system	Tào Sơn commune	Upgrade 1.5km of main irrigation canal, 1.0km of branch canal, upgrade 2.0km of management road	138	185
Thanh Hoa province				**1,844**	**5,675**
1	Da Vet irrigation system	Hoat Giang commune	Construction of new pumping station with bigger capacity, meeting the required irrigation and drainage capacity with house for operator; rehabilitate 0.3 km of main canal and 0.7 branch canal	300	1,350
2	Branch irrigation canal	Hoằng Đông commune	Upgrade L=1,250 m, BxH (50x70) cm branch canal,	22	745
3	Branch irrigation canal	Hoằng Phụ commune	Upgrade L=1,500 m, BxH (50x70) cm branch canal,	20	340
4	Gom regulation gate	Hoằng Phụ commune	Upgrade Gom regulation gate	1500	3240

1.1.3 Existing condition of the selected irrigation infrastructures and technical specifications for outline design

Table 2: Existing condition of the selected irrigation infrastructures and technical specifications for outline design

	Sub-project	Location	Irrigation area	No of HHs Benefited	Investment items	
			[Ha]	[HH]	Existing situation	Technical specifications for upgrading
Component 1.1: Improve water supply capacity, control irrigation water through building climate change adaptive infrastructures						
Nghe An province			**342**	**550**		
I	**CON CUÔNG district**		**114**	**143**		
1	Irrigation system 2/9	Châu Khê Commune			• 4.6 km of on-farm irrigation canals were built more than 20 years ago through a socialized program[85]. The canals were built with bricks on a stone foundation, now degraded, cracked, causing water leakage and loss; households farming at the end of the canals often lack water, and have to wait until households farming upstream have enough water before they can get water for their fields. • 0.1 km of road to the pumping station is still a dirt road, causing difficulties in transporting machinery and equipment to repair and replace pumps.	• The on-farm irrigation ditches are assembled from factory-made U-shaped reinforced concrete ditches, with widths ranging from 0.4 to 0.8 meters; Valve chambers are built on site to install flat valves to regulate water; • The road to the pumping station is made of concrete grade 150 with 20 cm thick.
II	**ANH SƠN district**					
2	Vĩnh Sơn irrigation system	Vĩnh Sơn commune	50	92	• 2.5km of on-farm irrigation canals were built more than 20 years ago through a socialized program. The canals were built with bricks on a stone foundation, now degraded, cracked, causing water leakage and loss; households farming at the end of the canals often lack water, and have to wait until households farming upstream have enough water before they can get water for their fields.	• The on-farm irrigation ditches are assembled from factory-made U-shaped reinforced concrete ditches, with widths ranging from 0.4 to 0.8 meters; Valve chambers are built on site to install flat valves to regulate water;

[85] The state and farmers jointly invested, the state provided cement, farmers bought local materials and built.

3	Lạng Sơn irrigation system	Lạng Sơn commune	40	130	• 1.4 km of on-farm irrigation canals were built more than 20 years ago through a socialized program. The canals were built with bricks on a stone foundation, now degraded, cracked, causing water leakage and loss; households farming at the end of the canals often lack water, and have to wait until households farming upstream have enough water before they can get water for their fields. branch canal, • The current 1.3 km management road is a dirt road, making it very difficult to transport equipment and materials for repair and replacement, especially on rainy days.	• The on-farm irrigation ditches are assembled from factory-made U-shaped reinforced concrete ditches, with widths ranging from 0.4 to 0.8 meters; Valve chambers are built on site to install flat valves to regulate water; • The management road is made of concrete grade 150 with 20 cm thick.
4	Tào Sơn irrigation system	Tào Sơn commune	138	185	• 1.5km of main irrigation canal and 1.0km of on-farm canal were built more than 20 years ago through a socialized program. The canals were built with bricks on a stone foundation, now degraded, cracked, causing water leakage and loss; • 2.0 km of management road is a dirt road, making it very difficult to transport equipment and materials for repair and replacement, especially on rainy days.	• The main and on-farm irrigation ditches are assembled from factory-made U-shaped reinforced concrete ditches, with widths ranging from 0.4 to 1.0 meters; Valve chambers are built on site to install flat valves to regulate water; • The management road is made of concrete grade 150 with 20 cm thick.
Thanh Hoa province			**1,844**	**5,675**		
I	**Ha Trung dítrict**		**1500**	**3240**		
1	Da Vet irrigation system	Hoat Giang commune	300	1,350	• The pumping station currently has 4 pumping units with a capacity of 2,400 m3/h each, which is not enough to irrigate 300 hectares of rice fields and especially drain 350 hectares (including residential areas) to protect flooding; • During the rainy season, the water level of the Hoat River is higher than the pump's pressure head, so flood water cannot be pumped into the Hoat River; • There is no control room for workers to operate; • The capacity of 150 meters of water pipes from the Hoat River to the pump's suction compartment are not enough for irrigation water requirements;	• Replace 4 new pump units with higher capacity and head to meet irrigation and drainage needs in the context of climate change (Q= 2800 m3/h, H= 8m); Research on the use of renewable energy (solar) to operate pumps in parallel with the grid; • Build an operating house for workers and install operating electrical cabinets; • Install a new water pipeline from Hoat River to the suction compartment of the pumping station, ensuring sufficient capacity for irrigation needs (D = 800-1000 mm);

					• 300 meters of the main irrigation canal and 700 meters of the on-farm canal have also degraded, causing water leakage and loss.	• Renovate and repair 300 m of main canals after the pumping station; • Replace 700 m of on-farm canals by 04-08 m wide, U-shaped ditches, reinforced concrete manufactured at the factory, build valve chambers to install flat valves to regulate water.
II	**Hoang Hoa district**					
1	Branch irrigation canal	Hoằng Đông commune	22	745	• 1,250 m, BxH (50x70) cm of on-farm canal were built more than 20 years ago. The canals were built with bricks on a stone foundation, now degraded, cracked, causing water leakage and loss;	• The on-farm irrigation ditches are assembled from factory-made U-shaped reinforced concrete ditches, with widths ranging from 0.5 to 0.8 meters;
2	Branch irrigation canal	Hoằng Phụ commune:	20	340	• 1,500 m, BxH (50x70) cm of on-farm canal were built more than 20 years ago. The canals were built with bricks on a stone foundation, now degraded, cracked, causing water leakage and loss;	• The on-farm irrigation ditches are assembled from factory-made U-shaped reinforced concrete ditches, with widths ranging from 0.5 to 0.8 meters;
3	Gom regulation gate	Hoằng Phụ commune:	1500	3240	• Gồm regulation gate with 3 gates of 3x4 m flat valves, constructed more than 20 years ago. Currently, due to fluctuation of water levels it cannot be effectively regulate the irrigation water for 1500 ha of rice fields	• Lower the flat water regulating valves to match the lowest water level during the dry season; Replace the flats valves and the valve opening and closing operating devices.

1.1.4 Cost estimation

Table 3: Irrigation area, benefited households and cost estimate for component 1.1

	Subproject	Location	Investment items	Irrigation area [Ha]	No of Households Benefited [Household]	Total cost	
						Mil. VND	USD
Component 1.1: Improve water supply capacity, control irrigation water through building climate change adaptive infrastructures							
Nghe An province				**342**	**550**	**28,814**	**1,200,000**
I	CON CUÔNG district						
1	Irrigation system 2/9	Châu Khê Commune	Upgrade 4.6km of branch canal, 0.1km of management road	114	143	6,905	287,560
II	ANH SƠN district						
2	Vĩnh Sơn irrigation system	Vĩnh Sơn commune	Upgrade 2.5km of branch canal	50	92	4,303	179,186
3	Lạng Sơn irrigation system	Lạng Sơn commune	upgrade 1.4km branch canal, 1.3km management road	40	130	6,423	267,486
4	Tào Sơn irrigation system	Tào Sơn commune	upgrade 1.5km of main irrigation canal, 1.0km of branch canal, upgrade 2.0km of management road	138	185	11,184	465,767
Thanh Hoa province				**1,844**	**5,675**	**16,853.59**	**701,901**
I	Ha Trung district						
1	Da Vet irrigation system	Hoat Giang commune	Construction of new pumping station with bigger capacity, meeting the required irrigation and drainage capacity with house for operator; rehabilitate 0.3 km of main canal and 0.7 branch canal	300	1,350	8,884	369,992
II	Hoang Hoa district						
1	Branch irrigation canal	Hoằng Đông commune	Upgrade L=1,250 m, BxH (50x70) cm branch canal,	22	745	2,250	93,706
2	Branch irrigation canal	Hoằng Phụ commune:	Upgrade L=1,500 m, BxH (50x70) cm branch canal,	20	340	2,700	112,447
3	Gom regulation gate	Hoằng Phụ commune:	Upgrade Gồm regulation gate	1500	3240	3,020	125,757

Exchange rate 1 USD = 24,011.34 VND

1.1.5 Implementation arrangements

The development and implementation of this output will follow a phased approach. Phasing principles will be around two axes: i) the first axis consists of development activities' phasing for each subproject. In this regard, the following activities have been identified and will be sequentially developed under this subcomponent i.e. Detailed Design, Construction/Rehabilitation works, and infrastructure works supervision and handing over; ii) the second axis consists of phasing the development of all the water infrastructure and irrigation schemes in 4 years in such a way that the first year will observe the pilot phase consisting of implementing a relatively a small batch of schemes. This will allow careful monitoring of the procurement, implementation and technologies' performance (e.g. capacity to regulate the inflow and outflow the water, the adoption of AWD) and adequacy, gathering feedback from beneficiaries, and addressing any unexpected issues. Once lessons are learnt from the pilot phase, CRWIS will proceed with the full-scale development phase observing an incremental implementation during the second and third years.

Detailed Engineering Design: Based on feasibility study outline design and recommendations, with a focus on modernization of farm-level tertiary irrigation canals with the capacity to regulate the inflow and outflow of water depending on the needs of the farmers, the project will prepare necessary bidding documents for the procurement of services to conduct a detailed engineering design. The detailed design will be carried out by specialized consulting firms competitively recruited and will have a particular focus on identifying appropriate technical options for sustainable water management and adequate irrigation systems (from head works up to farm level, as required by each specific site/sub-project). The design of water infrastructure should optimize a sustainable balance between investment costs, robustness to the impacts of climate change and extreme events, in addition to simplicity and affordability of operation and maintenance. The project management unit (PMU) will be responsible for Quality Assurance and adequate technical assistance will be mobilized to ensure that designs meet quality standards and support the review and validation processes. The output of this activity will consist of the elaboration of bidding documents inclusive of engineering drawings, Bill of Quantities (BoQ) and cost estimation. The design will ensure capturing innovative and practical water resources and rural infrastructure (WRRI) models resilient to climate change and supporting smart cropping patterns (e.g. AWD, SRI) with suitable designs adapting to the specific conditions of each sub-project area.

Additional analysis related to ESMP will be needed before carrying out the rehabilitation works and during the preparatory phase, including the elaboration of resettlement and rehabilitation action plans to review the compensation for any potential acquisition of public/private land, and/or impacts on farming activities and to mitigate any risk that may arise during site clearance.

The development critical water infrastructure (across both provinces) will be planned in such a way that all works should be achieved within the mandated 4 years, ideally one year before CRWIS completion. The project will procure water infrastructure construction or rehabilitation works from qualified bidders/contractors. Construction or rehabilitation works will be conducted according to the technical specifications provided by the detailed engineering designs and will be supervised by the PMU and/or the design consulting firm. The construction/rehabilitation process will be flexible to align with ongoing socio-economic and technical requirements, after discussion with the work supervisor, the PMU and community consultations (FPIC). The PMU will play an important role in ensuring Value Analysis and Value Engineering (VA/VE), in controlling the costs of infrastructure through advanced procurement activities, front loading long lead items, avoiding underbidding and subsequent excessive cost variations. The monitoring and supervision system will be developed at all levels, i.e. province, district and commune/community level to ensure high quality of construction works and timely solving of unforeseen issues through the Grievance Redress Mechanism.

In beneficiary communes, youth (working age, above-18 years) represent the main human resources for the workforce; interested women farmers, women-headed households, Ethnic Minority households, and poor and near-poor households will be prioritized for participation in construction works. Cooperatives, commune technical staff and district engineers will be technical human resources to support beneficiary communities during the construction process.

Works Supervision and Handing over: The PMU and the design consulting firm will be in charge of the work supervision. Beneficiary communities would also be involved in supervising works at farm level and external technical assistance will be mobilized as needed to deliver practical training on site, for beneficiary communities on basic technical supervision of construction works. Collaboration with the Provincial Women's Unions and Youth Unions will be sought to organize skills training in construction for interested women, youth and other vulnerable groups to ensure they are trained and skilled adequately to garner optimal benefit for their labor.

Once construction works are achieved, the contractor will be legally responsible for any defect which can appear in the work during the defects liability period indicated in the contract. A joint inspection of the

completed works shall be planned. The final inspection team will consist of the scheme managing entity (cooperative or villages), PMU, contractor, work supervisor, and beneficiaries' representatives. If the final inspection reveals that all construction works have been completed properly (in accordance with the technical specifications, detailed designs and the signed contract), the contractor will preliminarily hand over the scheme/water infrastructure back to the PMU. The infrastructure/scheme must be tested during the defects liability period. If the test run reveals that the infrastructure/scheme is fully functional, the final handing over from the contractor to PMU will take place at the end of the defects liability period, and an asset management transfer agreement will then be signed between the PMU and the scheme managing entity. This entails the transfer of all responsibilities for the sustainable operation, maintenance and management of the infrastructure to the irrigation cooperative/village.

1.1.6 Institutional arrangement for post-construction phase

Currently, all those water infrastructures are owned by the commune people's committee and managed by cooperatives. It is expected that after the upgrade, the institutional arrangements will remain the same, meaning that the assets still belong to respective Commune People' Committees and cooperatives will be responsible for operation and maintenance of these assets.
It is hoped that after the upgrade, farmers will have access to more reliable irrigation services, giving them more confidence in investing and applying Climate Smart Agriculture (CSA) to improve agricultural productivity on their homeland.

Sub-Component 1.2 Improved flood control and livelihoods protection

Activities will include:

a) The development of a multi-hazard Early Warning System (EWS), tailored to the geographical area and identified risks in the coastal and mountainous provinces to adapt to flooding, drought, changes in water salinity and pests.
b) The provision of regular bulletins through mobile phones or other means of distributions including agro-meteorological forecasts, pests and disease, risk of flooding or drought, and salinity levels.
c) Sharing of possible adaptation techniques to adapt or mitigate identified risks.

Multi-hazard early warning systems (EWS)are important to anticipate and mitigate the interconnected, cascading and mutually aggravating nature of risks and their impacts across sectors and systems including agri-food systems. Effective multi-hazard early warning systems, which are inclusive and people-centered, inform communities, including the most vulnerable, of upcoming risks and crises, and enable them to take the most appropriate early/anticipatory actions to prevent and mitigate losses in lives, livelihoods, properties, and infrastructure. Successful multi-hazard early warning systems leverage the knowledge, and expertise of a diverse pool of sources, including local, traditional, and Ethnic Minority (EM) communities, hydro-meteorological services, sectoral agencies and other scientific institutions to effectively monitor, identify, and communicate alerts ahead of disasters, within and across sectors. With the development of adequate multi-hazard EWS, local and national authorities will be informed in their decision and policy-making and can adopt early measures, including scaling social protection measures, which mitigate the immediate impact of disasters on the population's livelihoods and food security, while setting up the foundations for increased resilience to future shocks. The timely dissemination of understandable and actionable alerts through a variety of means of communication also empowers communities to ensure their continuous access to food and minimize disruptions in agricultural activities before and after disasters strike. That is why timely, actionable, impact-oriented early warning systems are a key prerequisite for food crises prevention.

1.2.1 National and Regional Hydro Meteorological Monitoring System

The national hydro meteorological monitoring system belongs to the General Department of Hydrometeorology, Ministry of Natural Resources and Environment. The hydro meteorological monitoring system is divided into regions. Nghe An and Thanh Hoa belong to the North Central Hydro meteorological Station, headquartered in Vinh city, Nghe An. However, each province also has a hydro meteorological station located in that province to manage and monitor hydro meteorological developments through monitoring stations located in districts and communes across the province. However, due to limited funding, the number of monitoring stations is not enough to meet the requirements and annual equipment maintenance is also limited, so most stations can only monitor very basic information, such as rainfall, river flow, river water level, tide level, temperature, air humidity and some other basic indicators. Specific information needed for daily agricultural activities, such as water levels on main rivers, tidal levels and water quality such as salinity and pH, dissolved oxygen, etc… are not monitored by the hydro meteorological monitoring system of the Ministry

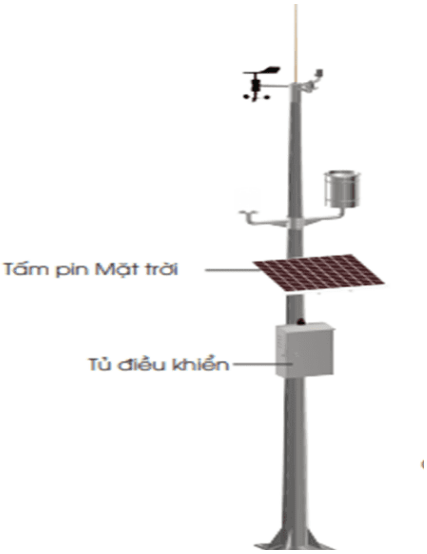
of Natural Resources and Environment.
Currently, Nghe An has 53 monitoring points for surface water and will add 5 new ones by 2030. Similarly, Thanh Hoa identified monitoring and early warning systems as a priority area under protection of environment, use of natural resources, disaster prevention and control and climate change response. The province has 47 river monitoring points and plans to add 7 new ones by 2030 in watershed and pollution-prone areas.
On the other hand, vertically all provincial hydro meteorological stations monitor and observe meteorology and hydrology and report to regional hydro meteorological stations and regional hydro meteorological stations report to the General Department of Hydrometeorology at the Ministry of Natural Resources and Environment. Localities have little access to information that provincial and regional hydro meteorological stations monitor. However, information on weather, drought, rain, storms, typhoons and floods is announced daily by the General Department of Hydrometeorology on mass media such as Voice of Vietnam, National Television, Local Television, etc.
Besides the information provides by General Department of Hydrometeorology on mass media, the localities, especially those working in the agricultural sector, need information about the possibility of flooding as early as possible to protect their homes and crops, fish and shrimp farms. They also need information about water quality before pumping into fish and shrimp ponds. Pump operators need to know the water level in rivers before starting the pumps to provide irrigation water to farmers.
The feasibility study and consultations during the concept note development and the design have highlighted the need for a multi-hazard Early Warning Systems (EWS) to help farmers adapt to multiple risks. Nghe An province identified building monitoring systems and creating warning maps in areas at risk of floods, flash floods, drought and saline intrusion as priority interventions for environmental protection in the provincial Master Plan for the period 2021-2030. Additionally, climate change and sea level rise are also making the estuarine water increasingly more brackish, while when it floods, followed by heavy rains, the water turns fresh. The uncertainty about the quality of the water is difficult for farmers to manage as crops and fish/prawn production are sensitive to sudden changes in water quality and levels. Currently farmers do not have access to information relating to the quality of water (e.g. salinity, PH, dissolved oxygen) that would help them in deciding in the selection of types of fish and prawns either more or less saline or fresh water tolerant. The multi-hazard EWS will therefore also include automatic water pollution and salinity (brackish) warning systems that would help communes particularly those along the coastline with low-intensity fish and prawn production, adapt and mitigate some of the associated risks.
Livelihoods of farmers in the project areas are further increasingly affected by pests resulting from climate change. To help farmers adapt to this phenomenon that is expected to increase in the future, the design mission proposes the development and implementation of an insect monitoring system as part of the multi-hazard EWS, as this would help improve the pest response mechanism.

1.2.2 Selection the Early Warning equipment tailored to the geographical area

CRWIS will support the existing monitoring network in both provinces by the upgrade and expansion of the EWS. The EWS will integrate various elements and be tailored to the different conditions in each province of Thanh Hoa and Nghe An. The feasibility study under taken during the design has identified the monitoring sites, water quality parameters, monitoring frequencies, and adequate monitoring equipment (rainfall gauge, water levels, multi-parameter water quality sensors (salinity, PH, dissolved oxygen, etc.) according to the specific context of watersheds and rivers, and tailored to the monitoring goals and capacities of the Districts and Communes (monitoring flash floods and floods, saline intrusion, nutrient pollution, sediments, insect, AWD etc.). Analyzing the needs of localities, the Design Team discussed with local partners, especially the agriculture and rural development unit at district and commune levels and come up with below groups of early warning equipment. The selected infrastructure and/or equipment to be installed will be owned by the DPCs/CPCs and managed by relevant departments and divisions under DAE (Smart rainfall monitoring station; Floating water level and water quality monitoring; Water level and water quality monitoring station fixed to the existing structure) or cooperatives (Smart insect monitoring stations, Smart sensor measures water level in rice fields). Figures below present types of EWS proposed for CRWIS investment.

a. **Smart rainfall monitoring station**

Collect rainfall data, synchronize data via application to help users monitor data in real time.



Technical specifications:

- Range: 0 ~ 4 mm/min
- Rain collector diameter: 110 mm
- Accuracy: ± 3 %
- Output: RS485
- Operating temperature: 0~60oC
- Operating humidity: 0~100 %RH
- Self-power supply by solar panel
- Mobile application software and server provided by supplier
- Internet connection and information sent to the mobile phones of those in need.

b. **Smart river, tidal levels monitoring in combination with water quality indicators station**

b.1 Floating water level and water quality monitoring

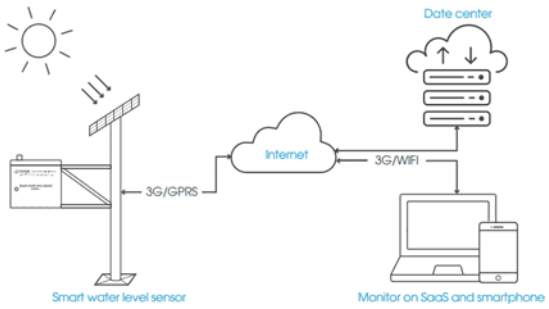
Technical specifications:

- Measure criteria Salinity and pH (Extend more criteria)
- Measure method Water floor
- Salinity range 0.05 - 10 g/l (or 0.05 - 50 g/l)
- pH ranges 0 - 14
- Feature: Measure and update continuity salinity, pH on the internet
- Connect method 3G
- Extend: To combine software, build network smart water monitor
- Watch results: Export data salinity and pH on mobile application
- Power Accumulator battery 12 V - 20 Ah
- Charge method Solar
- Waterway warning Integrated lights warning auto on lights at night
- Operating Temperature 0 - 70^{o}C; Humidify: 0 - 95

b.2 Water level and water quality monitoring station fixed to the existing structure

Technical specifications

- Dimension (W x L x H) 25 x 35 x 50 cm
- Weight 17.5 kg
- Material Steel powder coating
- Range 0 - 800 cm
- Measure method Not touching, Radar waves
- High definition sensor 1 cm
- Measure tolerance 1 cm
- Power Accumulator battery 12 V - 20 Ah
- Charge method: solar
- Connect method GPRS/3G (or RF)
- Operating Temperature 0 - 70 ^{o}C. Humidify: 0 - 95 %

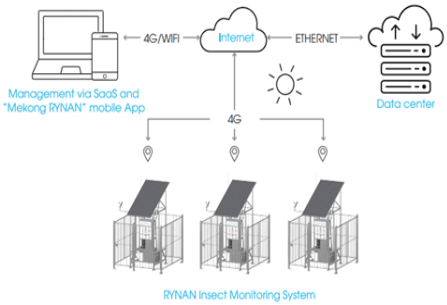


- Feature: Monitor water level real - time mobile application, operating system Android, iOS or interface SaaS, manage center
- Warning of water level fluctuations in rivers and tanks quick to users

c. **Smart insect monitoring stations**

Technical specifications:

- Dimension: 1.83 x 1.61 x 4.0 m
- Power supply: Battery 12 V - 100 Ah (Up to 400 Ah); Integrated solar charger.
- Insect attractant: Use LED lights (UV, RGBW) to attract winged insects that are easily attracted to light. Use Pheromones to attract other insects.
- Environmental sensors: Air temperature and humidity, wind direction, wind speed, rain intensity sensor.
- Cleaning system: Integrated automatic insect screen cleaning system, using air compressor and water cleaning system
- Working principle: Using industrial cameras to capture images of insects, integrating edge computing and machine learning technology to analyze, identify and classify insects in real time.
- Features: Monitor insect information anytime, anywhere. Statistics, classification, and graphing of insect density.
- The system automatically sends warnings and predictions about insect status and situation.
- Manage information through central management software.
- The machine learning system can be customized for each type of insect for many different types of crops.
- Easily monitor insects through a free mobile application on the App Store and Google Play.
- Connection method: 4G
- Operating conditions Temperature 0 - 70 ^{0} C, humidity 0 - 95



d. **Smart sensor measures water level in rice fields**

Technical specifications:

- Measuring range -30cm to 30cm
- Accuracy ± 1 cm
- Connection method Radio frequency or 3G
- Features: Measure and control water level in the field, serve Alternate Wetting and Drying (AWD agriculture), rice cultivation, reduce greenhouse gas emissions
- Extend: integration remote pump control
- Power source 3.7 V - 3400 m Ah li-ion battery
- Solar Charging Method
- Working environment Temperature: 0 - 70 ^{o}C. Humidity: 0 - 95 %

All the above selected devices will be equipped with 12 V - 100 Ah Battery (Up to 400 Ah); Integrated solar charger and will manage information through central management software with the supplier's central server and connection method by radio frequency or 3G directly to the designated smartphone of those in need. Therefore, the district or commune people's committee does not need to purchase and manage the server. However, after the free promotion period, they have to pay maintenance fees to the suppliers and pay for internet connection.

1.2.3 Estimation of quantity of the Early Warning equipment to be purchased and installed for EWS

Table 4: Types, quantities of the early warning equipment to be purchased and installed for the project sites.

Early warning system		Quantity	Unit price	Total	
		set	VND	VND	USD
Nghe An province				**24,011,340,000**	**1,000,000**
1	Equipment			**21,039,612,000**	**876,236**
	Smart rainfall monitoring station	6	44,242,000	265,452,000	11,055
	Smart insect monitoring stations	48	313,920,000	15,068,160,000	627,543
	Smart water level and water quality monitoring station (water level, PH, salinity or dissolved oxygen) fixed to the existing structures	12	199,000,000	2,388,000,000	99,453
	Smart floating water level and water quality (PH, salinity or dissolved oxygen) monitoring stations	6	363,000,000	2,178,000,000	90,707
	Smart sensor measures water level in rice fields	120	9,500,000	1,140,000,000	47,478
2	Transportation to the sites and Installation			1,000,000,000	41,647
3	Contingency			1,971,728,000	82,117
Thanh Hoa province				**24,011,340,000**	**1,000,000**
1	Equipment			**21,039,612,000**	**876,236**
	Smart rainfall monitoring station	6	44,242,000	265,452,000	11055.28
	Smart insect monitoring stations	48	313,920,000	15,068,160,000	627543.49
	Smart water level and water quality monitoring station (water level, PH, salinity or dissolved oxygen) fixed to the existing structures	12	199,000,000	2,388,000,000	99453.01
	Smart floating water level and water quality (PH, salinity or dissolved oxygen) monitoring stations	6	363,000,000	2,178,000,000	90707.14
	Smart sensor measures water level in rice fields	120	9,500,000	1,140,000,000	47477.57
2	Transportation to the sites and Installation			1,000,000,000	41646.99

3	Contingency			1,971,728,000	82116.53

1.2.4 Proposed location for installation of the Early Warning equipment

The division of the "Smart sensor measures water level in rice fields" and "Smart insect monitoring stations" were calculated based on the proportion of cultivation areas, while the other equipment is divided based on the needs of each district.

Table 5: Location for installation of early warning equipment in Nghe An province

	Irrigation systems	Irrigation area [ha]	Location	Irrigation area per locality [ha]	Early Warning System				
					Smart rainfall monitoring station	Floating water level and water quality monitoring	Water level and water quality monitoring station fixed to the existing structure	Smart insect monitoring stations	Smart sensor measures water level in rice fields
Nghe An province					**6**	**6**	**12**	**48**	**120**
I	**Con Cuong district**			**7631**	**1**		**1**	**1**	**2**
1	Irrigation system 2/9	114	Châu Khê Commune	114				1	2
II	**Anh Son district**				**1**		**1**	**3**	**7**
2	Vĩnh Sơn irrigation system	50	Vĩnh Sơn commune	50				1	1
3	Lạng Sơn irrigation system	40	Lạng Sơn commune	40					1
4	Tào Sơn irrigation system	185	Tào Sơn commune	185				1	3
5	Khai Sơn irrigation system	130	Khai Sơn commune	130				1	2
III	**Do Luong district**				**1**		**1**	**9**	**31**
6	Ngọc Sơn irigation system	145	Ngọc Sơn commune	145				1	3
7	Chùa irrigation system	300	Lam Sơn commune	300				1	6
8	Động Đỏ irigation system	84	Bồi Sơn commune	84				1	1
9	Hói Quai (Tràng thành) irrigation system	160	Tràng Sơn commune	160				1	3
10	Rú Già irrigation system	170	Đà Sơn commune	170				1	3
11	Thuận Sơn 1 irigation system	210	Thuận Sơn commune	210				1	5
12	Lưu Sơn irrigation system	260	Lưu Sơn commune	260				1	6

13	Irrigation system No. 1	109	Đặng Sơn coomune	109				1	2
14	Khả Phong 1 irigation system	117	Nam Sơn commune	117				1	2
IV	**Thanh Chuong district**				**1**	**1**	**3**	**17**	**35**
15	Cát Văn irrigation system	200	Cát Văn commune	200				1	4
16	Thanh Hưng 1 irrigation system	99	Đại Đồng commune	630				3	6
17	Thanh Hưng 2 irrigation system	129							
23	Văn Long irrigation system	58							
18	Rạng irrigation system	344							
19	Đồng Văn irrigation system	289	Dùng town	295				2	5
24	Thị Trấn irrigation system	6							
20	Rú Nguộc irrigation system	267	Thanh Ngọc commune	267				2	5
21	Rú Đừng irrigation system	161	Thanh Yên commune	161				1	3
22	Thanh Minh irrigation system	120	Võ Liệt Commune	120				1	2
25	No 1 irrigation system	120	Thanh Lĩnh commune	186				2	3
26	No. 2 irrigation system	40							
27	Gia Hội irrigation system	11							
28	Thôn Thượng irrigation system	15							
29	Lâm Sơn irrigation system	45	Thanh Lâm commune	125				1	2
30	Cầu Kho irrigation system	40							
31	Đồng Cừa irrigation system	40							
32	Ba bến irrigation system	60	Thanh Thịnh commune	60				1	1
33	No 2 (Thanh Hà) irrigation system	95	Thanh Hà commune	95				1	1
34	No. 3 irrigation system	55	Xuân Tường commune	110				1	2
35	No. 5 irrigation system	55							
36	Trùa Bè irrigation system	60	Ngọc Sơn commune	60				1	1
V	**Nam Dan district**				**1**	**2**	**3**	**12**	**33**

37	Du Du irrigation system	70	Khánh Sơn commune	643				3	6
38	3-2 village 8 irrigation system	50							
39	Cầu Treo irrigation system	13							
40	Bến Mưng irrigation system	30							
41	Nam Đông irrigation system	480							
42	Chính Irrigation system	372	Xuân Lâm commune	372				2	5
43	Hồng Long 2 irigation system	181	Hồng Long commune	181				1	3
44	Rú Gành irrigation system	500	Hùng tiến commune	500				2	6
45	Núi Đụn irrigation system	90	Nam Dan town	170				1	3
46	Hùng Sơn 1 irrigation system	45							
47	Hùng Sơn 2 irrigation system	35							
48	Đại Đồng irrigation system	100	Thượng Tân Lộc commune	350				2	5
49	Rú Tuần irrigation system	250							
50	Nam Trung irrigation system	330	Trung Phúc Cường commune	330				1	5
VI	**Huong Nguyen District**				**1**	**3**	**3**	**6**	**12**
51	Chợ Mí irrigation system	80	Châu Nhân commune	215				2	4
52	Xóm 9 irrigation system	35							
53	Hồng Lạc irrigation system	15							
54	Phú Xuân irrigation system	15							
56	Hưng Khánh irrigation system	70							
55	Hưng Phú irrigation system	135	Hưng Thành commune	135				1	2
57	Hưng Lam irrigation system	85	Xuân Lam commune	85				1	1
58	Chợ Vực irrigation system	92	Long Xá commune	267				2	5
59	Hồ Dài irrigation system	160							
60	Thành Sơn irrigation system	15							

Table 6: Location for installation of early warning equipment in Thanh Hoa province

	Location	Irrigation area per locality [ha]	Early Warning System				
			Smart rainfall monitoring station	Floating water level and water quality monitoring	Water level and water quality monitoring station fixed to the existing structure	Smart insect monitoring stations	Smart sensor measures water level in rice fields
Thanh Hoa province		**8139**	**6**	**6**	**12**	**48**	**120**
I	**Ha Trung ditrict**	3956	**3**	**2**	**7**	**24**	**58**
	Hà Tiến commune	870				5	14
	Hà Tân commune						
	Ha Yen coomune						
	Hà Sơn Commune	150				1	2
	Hà Thái Commune	947				6	14
	Lĩnh Toại Commune						
	Lĩnh Toại Commune	61				1	1
	Hà Bắc Commune	898				6	14
	Hà Giang Commune						
	Hoạt Giang Commune	350				2	5
	Hà Châu Commune	400				2	5
	Yến Sơn Commune	280				1	3
II	**Hoang Hoa district**	**4183**	**3**	**4**	**5**	**24**	**62**
	Hoằng Hà commune	1386				8	20
	Hoằng Đạt commune						
	Hoằng Thắng commune						
	Hoằng Lưu commune						
	Hoang Dao commune						
	Hoang Yen Coomune	706				6	10
	Hoằng Đông commune						

	Hoằng Ngọc commune						
	Hoang Thang commune	1821				8	27
	Hoằng Ngọc commune						
	Hoang Dao commune						
	Hoang Luu Commune						
	Hoằng Hà commune						
	Hoằng Yến commune						
	Hoằng Đông commune						
	Hoằng Yến commune	**270**				2	4
	Hoằng Hải commune						
	Hoằng Thành commune						
	Hoằng Phụ commune						
	Hoằng Ngọc commune						
	Hoangf Tien commune						

1.2.5 EWS Implementation arrangement

The development of the early warning system will follow the same process including the two axes as identified for the water infrastructure works under output 1.1 (feasibility study and detailed technical design, procurement, construction and supervision of works). CRWIS will ensure that specialized technical assistance (hands-on support by specialized EWS development company such as RYNAN ….) and capacity building on EWS operation and maintenance will be provided to specialized agencies including the regional and provincial Centre for Hydro - Meteorological Forecasting, DAE, district level DAE. The EWS developed by the CRWIS will be integrated into the existing EWS networks and handed-over to the respective owners for management. This will amplify the impact and ensure the sustainability of the EWS.

The early warning systems once in place will provide significant benefits to farmers by offering timely and accurate information about potential weather hazards, pest outbreaks, and other environmental threats. These systems enable farmers in project areas to take timely decisions on crop production as well as proactive measures to protect their crops and livestock, reducing the risk of damage and loss. As for the case of Ha Son commune, Ha Trung district, Thanh Hoa province, by receiving early information about an impending flood, farmers can implement measures to prevent flood (e.g. operating pumping station, drainage canals...) or adapt to the situation. Similarly, warnings about severe storms or pest infestations allow farmers to take preventive actions, such as securing equipment or applying appropriate treatments. However, early warning systems alone are unable to sufficiently transform information into action. Decision-making, based on an analysis of this information, is key in leading to action and making a concrete and positive impact for vulnerable populations. To this extent, CRWIS will ensure sufficient capacity building for farmers (see output 2.1) in

transforming EWS information into action.

Not only farmers will benefit, the early warning systems also greatly benefit management agencies by enhancing their ability to coordinate and make informed decisions. These systems provide real-time data and predictive analytics on potential threats such as natural disasters, disease outbreaks, or environmental changes. With this information, agencies can develop and implement timely response strategies, allocate resources more efficiently, and communicate effectively with stakeholders. For example, during a flood warning in Lam river of Nghe An province, PPC, DAE can coordinate evacuation plans, deploy emergency services, and inform the public promptly. This proactive approach not only mitigates the impact of disasters but also ensures a more organized and effective response, ultimately safeguarding communities and infrastructure. Again, the transformation of information into action will require efforts to build both institutional and individual capacity which will be addressed under output 2.1 below.

1.2.6 Ownership of EWS, O&M responsibility and designated people to receive information from EWS

Table 6: Institutional arrangements for the EWS

#	Institutional arrangement	Early Warning System				
		Smart rainfall monitoring station	Floating water level and water quality monitoring	Water level and water quality monitoring station fixed to the existing structure	Smart insect monitoring stations	Smart sensor measures water level in rice fields
1	Ownership	CommunePeople' Committees			Commune People' Committees	
2	O&M responsibilities	Will be Assigned by the chairmen of DPC, however it is suggested that the commune Agriculture and Rural Development Units would be assigned to be responsible for O&M these system			Cooperatives	
3	Information from the early warning system will be sent to the smartphones of the following people:					
	Primary	CPC, Village heads, heads of irrigation companies, heads of cooperatives, heads of farmer union, women union, youth union, owners of fish/prawn farms; pumping station operators			Village heads, Head of cooperatives, farmer union, women union, youth union, Farmers (as required)	
	Secondary	Commune Agriculture and Rural Development units, Commune Natural Resource and Environment units.				

Annex 2. Climate Risks, Climate Smart Agriculture and Value Chains of Agricultural Products - CRWIS Project

Note: The Report was conducted before the merging process taking place in July 2027. Therefore, database and information collected were based on the existing institutional arrangement (districts still existed). After the merging process, the target communes under the previous target districts are no change. Therefore, all the database and information are still valid.

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1. Water infrastructure system providing for agricultural production

Nghe An

Lam River, also known as Ca River, originates from Laos and flows along the Northwest - Southeast direction into Vietnam, starting from Ky Son district, passing through Tuong Duong, Con Cuong, Anh Son, Do Luong, Thanh Chuong, Nam Dan, Hung Nguyen districts, Vinh city and Nghi Loc district. The Lam River system provides an important source of domestic water for the downstream community and irrigation water for the downstream districts' agricultural, forestry and aquaculture production sectors.

On the Lam River system, a system of up to 74 pumping stations, pumps irrigation water for irrigation canals and domestic water for residential communities in six districts from Con Cuong, Anh Son, Do Luong, Thanh Chuong, Nam Dan, to Hung Nguyen district. These pumping stations provide irrigation water for an area of 9,896.6 hectares of agricultural land in Nghe An province.

In particular, the water infrastructure project using IFAD loan capital (CRWIS) will be used to upgrade and renovate 60 pumping stations in 6 downstream districts of Lam River. This system of 60 pumping stations will serve the irrigation area of 7,678 hectares of agricultural land of residential communities in 38 communes.

However, in addition to the system of pumping stations, the irrigation canals that have been invested in have degraded and there are also frequent climate risks that lead to the depletion of irrigation water sources or floods that cannot drain water, greatly affecting the agricultural production of the residents in the downstream areas. The dry season water level is depleted, the lack of water in the river system leads to the pumping stations no longer being able to exploit and pump water for the irrigation canal system.

Thanh Hoa

The Ma River system in the downstream area with the branches of Hoat River flowing through Ha Trung district and the Cung River from Lach Truong River to Ma River is considered a canal system providing domestic water for the densely populated communities in the two districts and irrigating large areas of agricultural land in the downstream region. The pumping station system pumps water from these rivers to irrigate an area of 6,057 hectares of cultivated land and 284 hectares of aquaculture land of 24 communes in the area.

The irrigation pumping station system has degraded and is affected by climate change. Water levels drop sharply in the dry season but cause floods in the rainy season, making the water infrastructure system unable to meet the needs of the area to be served.

Thanh Hoa province’s goal in accessing IFAD loans to invest in water infrastructure includes building pumping stations to serve the irrigation system for 3,347 hectares of agricultural land and aquaculture. In addition, these systems will meet flood control for 6,337 hectares of agricultural land along the downstream of Hoat and Cung rivers.

Objective of the sub-components

The objective of this assessment is to understand agricultural and forestry production activities and agricultural product value chains associated with the water infrastructure upgrading project in Thanh Hoa and Nghe An provinces (CRWIS).

Based on assessments of agricultural and forestry production activities and product value chains that benefit from water infrastructure investment, we identify types of climate risks in local agricultural and forestry production as well as existing climate smart agriculture (CSA) models in the locality.

Based on the types of agricultural and forestry production and local product value chains, we recommend replicating or designing CSA models according to value chains in localities that benefit from water infrastructure.

Specific objectives of the sub-components

Assess the suitability and role of agricultural and forestry products and agricultural value chains that benefit from water infrastructure within the framework of the SRWIS project on food security, job creation and income generation (consider the rice, vegetable, medicinal plant and aquaculture chains).

Assessing agricultural climate risks related to agricultural production and local value chains.

Sources of market information and prices of agricultural and forestry products in localities benefit from water infrastructure.

Review the types of public-private investment in the locality as well as the programs and projects being implemented in the SRWIS project implementation area (funding sources of national target programs, OCOP, NGO projects).

Mechanisms and policies to promote agricultural production development and investment in local product value chains.

Provide agricultural climate risk reduction interventions and climate-smart agriculture (CSA) models to generate income and enhance climate resilience for agricultural and forestry product value chains in project areas.

2. Climate risks in agricultural production in the project design areas

In agricultural production in the two provinces where the project is designed, the types of climate risks that often occur are quite similar and at different levels due to the characteristics of the geographical sub-regions such as the hilly areas with high slopes (districts in Nghe An) and the downstream areas with low elevations (communes in Thanh Hoa). In particular, the common climate risks are drought in the Winter-Spring crop and starting in the Summer-Autumn crop and heavy rain, risks of storms and floods during the rainy season. In addition, both provinces begin to have risks of saltwater intrusion in the late dry season.

In addition, there are several other climate risks related to hail, thunderstorms, and tornadoes that often occur during the transition between spring and summer.

Some other risks are related to flooding due to hydroelectric plants releasing water during the rainy season and risks of pests and diseases in agricultural production that frequently occur.

2.1. Drought risks in agricultural production

Drought risk usually occurs in the dry season, from December of the previous year to April of the following year, but in some years it can last until June. Drought risk causes river water levels to drop down, and the pumping system cannot pump water to irrigate the fields, especially the newly planted rice areas in the Summer-Autumn crop from May to June.

Winter-Spring rice cultivation takes place from December of the previous year to May of the following year. This is the beginning of the dry season, so pumping stations can easily pump water and supply water to rice fields. Winter-spring rice is not affected by drought, so rice productivity is high and brings the highest economic performance.

The drought lasted until April, leading to low water levels in river systems. Pumping stations could not pump water to the farming system. Meanwhile, the Summer-Autumn rice crop, which is sown in April and transplanted from May to June, will be most affected. During the sowing period, if there is no water, the rice will die, causing crop failure or affecting rice yield.

The survey results also show that rice farmers often face risks due to drought, leading to very low rice yields or a slight decrease of 20% to 50% compared to crops with adequate irrigation water.

The results of group discussions with farming households showed that droughts have occurred continuously in the past 10 years. The majority of surveyed households said that rice cultivation often suffers from drought, depending on the severity every year.

In addition, drought periods are also prone to saline intrusion risks. Residents do not have a saline intrusion warning system, so they will continue taking water from the river to supply rice fields, causing rice to die and complete crop failure. The case of the 2024 winter-spring crop is a typical example, the newly planted winter-spring rice area died 100% in the surveyed communes in Hung Nguyen district, Nghe An province and Hoang Phu commune, Hoang Hoa district, Thanh Hoa province.

2.2. Risk of heavy rain, storms, floods

In addition to the risk of drought at the beginning of the summer-autumn crop season, farmers often face the risk of heavy rain, causing flooding during the rice growing period until harvest. Heavy rains causing flooding led to broken rice plants affecting the yield or not being able to harvest during the period from August to September.

Heavy rain occurs from July to November every year. Continuous rains can last up to 2 weeks. Heavy rains during this period cause the rice in bloom to become empty or the rice that is about to be harvested to collapse, leading to a decrease in rice quality or a decrease in yield of up to 50%.

The results of group discussions with rice-growing households in both provinces showed that 70% to 100% of households participating in the survey regularly encountered risks due to heavy rain. The frequency of heavy rain is very high, heavy rain accompanied by thunderstorms causing rice to fall almost every year. Recent years have had risks with a high level of impact on rice crops such as 2017, 2022 and 2023. Normally, water pumping systems can handle the amount of rainwater in 3 days, but rain lasting longer than 3 days will be difficult to handle and cause flooding for rice crops.

In addition, due to heavy rains and steep mountainous conditions in Nghe An and Thanh Hoa's low-lying districts (Hoang Hoa and Ha Trung), flooding is common. The risk of flooding is more serious when hydroelectric plants release floodwaters. This leads to a decrease in summer-autumn rice yields and possible total loss due to flooding.

The rate of rice-growing households facing risks due to storms is quite high among rice-growing households in Nghe An and Thanh Hoa, accounting for over 50% of the surveyed households. Risks due to storms and floods put rice-growing households at high risk, which can lead to crop failure during the period from July to October, so some households often reduce the area of cultivated crops or leave agricultural land vacant during the crop season.

2.3. Risks of saline intrusion in agricultural production

The risk of saline intrusion was recorded in rice-growing households surveyed in both Nghe An and Thanh Hoa provinces. The rate of households at risk of saline intrusion accounted for 40% of the surveyed households. Currently, farmers do not have tools or methods to monitor salinity. In some cases, farmers consider the salinity of irrigation water based on personal experiences, such as when buffaloes and cows do not drink water or when rice plants do not grow, they know that salinity has increased.

However, a provincial survey in Thanh Hoa shows that the locality has begun to invest in better infrastructure, with large saltwater prevention sluices and better saline intrusion forecasts, so rice cultivation in this sub-region can reduce risks in the coming years.

The risk of saline intrusion usually occurs from March to June every year, when the water level of the rivers drops and combined with rising water levels, the risk of saline intrusion increases. The risk of saline intrusion is becoming larger and longer. Therefore, the risk of saline intrusion is assessed as a major risk in agricultural production in both provinces participating in the project.

2.4. Risks from pests and diseases in agricultural production

In addition to risks caused by natural disasters in rice cultivation, risks related to diseases causing great damage are assessed quite highly by all rice-growing households in the surveyed provinces. Risks caused by pests and diseases often occur in certain rice fields. The results of the household survey show that the number of households facing risks of pests and diseases accounts for 25% of the households participating in the discussion in Thanh Hoa and up to 28% of the households participating in the survey in Nghe An province. Notably, in the 2023 crop, the number of rice-growing households in these provinces facing risks of pests and diseases is higher, causing great damage to rice productivity. Climate risks in particular and risks in agricultural production in general occur frequently and the risk level is getting higher and higher, but depending on each season, time of year and locality. Due to high climate and pest risks, some rice farmers in Nghe An have abandoned the second rice crop which takes place during the rainy season with many storms and floods.

2.5. Risk due to large price fluctuations

Although rice production is self-sufficient in food for households and other agricultural products provide cash income for farmers, surveyed households face difficulties in forecasting the market, market trends and price fluctuations in the market.

In particular, large fluctuations in product prices or unsold products such as solanum procumbens, ground peanuts, and potatoes are specific examples that affect household income.

2.6. Practices of adaptation to climate risks in agricultural production

Small-scale, self-sufficient farming households lack linkages in production, leading to climate risks being assessed as high in the production process. Climate risk adaptation practices are mainly supported by project programs guiding cooperatives and households participating in cooperatives in the community. In which, cooperatives play the role of a linkage between programs/projects, policies of the government or projects with local agricultural production households.

Programs/projects supporting climate risk adaptation practices are often implemented through cooperatives to farmers or mass organizations such as the Women's Union and Farmers' Association. Climate risk adaptation practices have been implemented such as shifting rice planting time (arranging planting time earlier, avoiding storms and floods), shifting crop structure (converting to raising *Eunice viridis* or after 2 rice crops), switching to more economically performance vegetables (growing cucumbers, growing squash), switching to flower growing (growing peach blossoms, lilies), switching to fish farming, and raising Pila conina.

Some organizations such as the Women's Union and the Farmers' Association have piloted models of collecting and classifying organic waste, applying the 3 reductions 3 increases (3G3T) and 1 must 5 reductions (1P5G) rice cultivation models, a water-saving irrigation model for potatoes in Thanh Hoa, and a model of using drones to spray pesticides to prevent pests and diseases on rice plants.

Many other climate risk adaptation models have not been known and applied by farmers, such as ecological agricultural farming models with little impact on the soil to contribute to soil improvement; irrigation models using alternating flooding and drying techniques to help reduce greenhouse gas emissions and save irrigation water; composting models, treating straw after harvest with microorganisms to increase soil fertility, improve soil and reduce greenhouse gas emissions caused by straw; models using slow-release fertilizers in rice cultivation; greenhouse models and water-saving irrigation technology in vegetable and flower cultivation; greenhouse models in drying agricultural products; cold storage models for storing agricultural products; water level warning models on river

systems, salinity warning systems or disease monitoring and warning systems in rice cultivation.
The survey results in the communes show that the common climate change adaptation practices in the communes in the project area design of Nghe An and Thanh Hoa provinces are similar. In the section on implementing the CSA model, we will specifically mention the models and the level of implementation of each model in the case of project implementation.

3. Investment programs and projects in the agricultural and rural sectors in communes in the project design area

3.1. Programs and projects related to water infrastructure

Thanh Hoa province is implementing a number of national-level projects to upgrade the irrigation systems of Len and Hoang Mai rivers to improve control of saline intrusion, improve the ecological environment and respond to climate change. The capital used is a loan from the Korean Government. Some other major projects include the WB8 project on repairing and upgrading the safety of water storage dams; the project on modernizing the forestry sector and enhancing coastal resilience (GCF funded by UNDP); the project on sustainable aquaculture development in Thanh Hoa province (WB loan); the project on enhancing flood drainage capacity in the North of Thanh Hoa funded by the central budget. In addition, the Thanh Hoa Provincial People's Committee is considering accessing loans from the IFAD Fund for climate-resilient water infrastructure.
Nghe An province is implementing a number of infrastructure-related projects including the Central Provinces Integrated Rural Development Project (ADB loan); WB4, WB5, WB8 disaster management projects (WB loan) on mitigating the negative impacts of natural disasters; the project to restore, upgrade and modernize the irrigation system in Northern Nghe An province; and the Ban Mong reservoir project. In addition, Nghe An province is also considering accessing IFAD funding for climate-resilient water infrastructure.

3.2. National target programs

Both Thanh Hoa and Nghe An provinces are implementing national target programs including the new rural program and the national target program for sustainable poverty reduction. Thanh Hoa province is the province with the largest number of OCOP products in the country at present.

3.3. Other programs and projects

Project programs of international and domestic NGOs are not reported. In some cases, some groups such as Farmers' Association and Women's Union cooperate with some small-scale capital programs such as pilot organic waste collection and compost treatment.

4. Identifying the value chains of agricultural products

4.1. Agricultural land and household livelihoods

The cultivated land area of households in the project area is relatively low in both Thanh Hoa and Nghe An provinces. The total agricultural and forestry land area of households is on average 0.51 ha/ household. Of which, the rice land of each household is equivalent, 0.18 ha/household, accounting for 34.8% of the total land area of the household.
Households in the project area live along the Lam and Ma river basins, so in addition to rice cultivation land, there is also sandy soil. Fertile soil is suitable for growing vegetables, maize, ground peanuts, and beans. However, the area of fertile land of households in the project area is also limited. On average, each household has 0.13 ha/ household, accounting for 25.3% of the household's land area.
Rice is grown twice a year in households in both provinces in the project intervention area, including the Winter-Spring crop and the Summer-autumn crop. The Winter-Spring crop is grown from January to May. The Summer-Autumn crop is grown from June to September.
After two rice crops, rice cultivation areas are often left empty or used for fish farming in the low-lying fields of Thanh Hoa province. However, due to the effects of drought, lack of irrigation water and poor drainage during the rainy season, the Winter-Spring crop is considered the main rice crop with high production effectiveness. The Summer-Autumn crop is often short of water, drought or flooding, so rice yields are low or may not be harvested.
In addition, households in Nghe An have forestry land, but households in Thanh Hoa mainly live in the downstream area, so the forestry land area is small or insignificant. On the contrary, due to living in the lowlands, surveyed households in Thanh Hoa have ponds, lakes and brackish water areas for aquaculture (**Table 1**).

Table 1. Scale of agricultural and forestry land in households (1000 VND)

Type of	**Nghe An**	**Thanh Hoa**	**All two provinces**

agricultural land	*Area (ha)*	*Structure (%)*	*Area (ha)*	*Structure (%)*	*Area (ha)*	*Structure (%)*
Rice land	0.18	32.2	0.17	40.2	0.18	34.8
Cropland (maize, ground peanuts, vegetables)	0.15	25.5	0.10	24.6	0.13	25.3
Silviculture land	0.24	42.3	0	0	0.14	28.3
Aquaculture land	0	0	0.13	30.0	0.05	9.9
Garden (near house)	0	0	0.06	13.2	0.00	1.7
Total land	**0.57**	**100**	**0.42**	**100**	**0.51**	**100**

Source: Survey results at households in Nghe An and Thanh Hoa, 10/ 2024.

The main livelihood of households participating in the survey in the communes in the project design area is from agricultural and forestry production. In addition, some households have income from aquaculture, shifting from simple rice cultivation to vegetables, flowers, and pila conica farming, which brings higher economic effectiveness. In addition to agricultural and forestry production activities, non-agricultural activities bring relatively high income to households.

However, the average income of households is relatively low compared to the national average. In which, the average income per household is 52,552,600 VND / household/ year, equivalent to the average income per capita of 15,823,200 VND / person/year. With an average income of 1.7 USD/ person/day, it is considered a low-income area at the near-poor household level (below 2 USD/ person/day).

Of which, income from crop production activities accounts for a small proportion in Thanh Hoa (12.2%) and is higher in Nghe An (accounting for 34.8%). Non-agricultural activities of households in Thanh Hoa account for 74.5% (**Table 2**).

Table 2. Household income

Source of income	**Nghe An**		**Thanh Hoa**		**General**	
	Income (1,000 VND)	*Structure (%)*	*Income (1,000 VND)*	*Structure (%)*	*Income (1,000 VND)*	*Structure (%)*
Crop	18,209.7	34.8	6,428.2	12.2	13,455.8	25.6
Animal husbandry, aquaculture	13,432.3	25.6	7,035.7	13.3	10,851.2	20.6
Non-agricultural	20,705.0	39.6	39,391.3	74.5	28,245.6	53.8
Total income	**52,348.0**	**100**	**52,855.2**	**100**	**52,552.6**	**100**
Average income per capita	**15,844.3**	**-**	**15,801.1**	**-**	**15,823.2**	**-**

Source: Survey results at the rice farming groups in the project communes, 10/ 2024.

4.2. Rice value chains

4.2.1. Rice value chain

Rice acreage in both Thanh Hoa and Nghe An provinces is considered the main crop benefiting from the CRWIS project's water infrastructure. Rice production plays an important role in stabilizing food security for the community and serving livestock and poultry farming. In addition, rice cultivation at Thanh Hoa households also meets local market demand.

The rice cultivation area of each household is relatively limited, and the rice products sold on the market are insignificant.

The rice value chain is considered a short chain, from production to consumption at the local scale. In addition, there are some specialty rice products with limited quantity supplied to the market in the district and province.

Rice yield in the 2023-2024 crop year in communes of Nghe An province is low due to drought in Chau Khe commune of Con Cuong district and saline intrusion in Chau Nhan commune of Hung Nguyen district. Many households lost the entire 2024 winter-spring crop in Chau Nhan commune. On average, the winter-spring rice yield reached 5.6 tons/ha, but the winter-spring rice yield was only 2.6 tons/ha

(down 52.7% compared to the winter-spring crop). The economic performance in winter-spring rice production reached 22,280,600 VND/ha and the winter-spring rice yield reached 1,157,200 VND/ha (**Table 3**).

The productivity and performance of rice production in the project communes in Nghe An province show that climate risks such as drought and saline intrusion to the winter-spring rice crop are high. Impact measures including investment in irrigation infrastructure and monitoring of irrigation water quality are important for rice.

To cope with climate risks associated with saline intrusion, some communes have tested high-quality rice varieties that are resistant to high salinity, such as ST25. The results have been better cultivation effectiveness, creating higher-quality rice products.

Rice productivity in the communes participating in the project area of Thanh Hoa province is higher than that of Nghe An province. In particular, the average rice yield in the winter-spring crop is 7.4 tons/ha and the yield in the summer-autumn crop is 5.4 tons/ha. The summer-autumn crop yield is only 26% lower than that in the winter-spring crop. This explains that the communes participating in the project of Thanh Hoa province are in the downstream, low-lying areas, so the risk of drought in summer-autumn rice cultivation is lower than that of the communes participating in the project area of Nghe An province.

However, the investment cost in rice production of Thanh Hoa province's farmers is higher than that of Nghe An province's farmers, so the economic performance in rice production of Thanh Hoa province is lower. The economic performance in winter-spring rice cultivation of Thanh Hoa province is 19,878,800 VND/ha and in the summer-autumn crop is 8,611,300 VND/ha (**Table 4**).

Table 3. Economic performance of rice farming at farm-gate in Nghe An

Comparative effectiveness	**Winter-spring rice crop:** first crop, small-scale rice farming (main rice crop)			**Summer-autumn rice crop:** second crop at small-scale rice farming		
	Quantity	Unit price (1000 VND)	Amount (1000 VND)	Quantity	Unit price (1000 VND)	Amount (1000 VND)
Gross Product (GP)			**9,418.8**			**4,454.7**
Rice area (ha/farm)	0.18			0.18		
Yield (kg/harvest)	1,002	9.4	9,418.8	474	9.4	4,454.7
Consumption Intermediate (CI)			**3,347.6**			**2,326.2**
Seed cost (1,000 VND)			862.5			797.7
Fertilizer (1,000 VND			2,128.2			1.303.4
Pesticide products (1,000 VND)			356.9			225.1
Value added (VA=GP-CI)			**6,135.6**			**2,128.5**
Distribution Cost (dist.)			**2,166.8**			**2,127.7**
Plumbing service (1,000 VND)			1,413.9			1,342.0
Harvesting service (1,000 VND)			578.6			611.5
Irrigated protection service (1,000 VND)			174.2			174.2
Value added net (VAN=VA-dist)			**3,968.8**			**0.8**
Profit (Pr=VAN-Amt)			**3,968.8**			**0.8**
Profit /farm (1,000 VND)			3,968.8			0.8
Profit / ha (1,000 VND)			22,280.6			1,157.2
Comparative effectiveness	**1 ha**			**1 ha**		
ROI (%)			**81.4**			**10.7**

Source: Survey results at the rice farming groups in the project communes, October 2024.

Table 4. Economic performance of rice farming at farm-gate in Thanh Hoa

Comparative effectiveness	**Winter-spring rice crop:** first crop, small-scale rice farming (main rice crop)			**Summer-autumn rice crop:** second crop at small-scale rice farming		
	Quantity	Unit price (1000	Amount (1000 VND)	Quantity	Unit price (1000	Amount (1000 VND)

		VND)			VND)	
Gross Product (GP)			**11,914.1**			**8,775.6**
Rice area (ha/farm)	0.17			0.17		
Yield (kg/harvest)	1,254	9.5	11,914.1	924	9.5	8,775.6
Consumption Intermediate (CI)			**4,577.1**			**4,234.3**
Seed cost (1,000 VND)			1,324.1			1,369.4
Fertilizer (1,000 VND)			2,538.8			2.124.9
Pesticide products (1,000 VND)			714.1			740.0
Value added (VA=GP-CI)			**7,337.0**			**4,541.3**
Distribution Cost (dist.)			**2,241.0**			**2,214.6**
Plumbing service (1,000 VND)			1,079.4			1,011.3
Harvesting service (1,000 VND)			975.3			1,011.3
Irrigated protecting service (1,000 VND)			186.3			192.0
Value added net (VAN=VA-dist)			**5,096.0**			**2,326.7**
Depreciation (Amt)			**0**			**0**
Profit (Pr=VAN-Amt)			**5,096.0**			**2,326.7**
Profit /farm (1,000 VND)			5,096.0			2,326.7
Profit / ha (1,000 VND)			19,878.8			8,611.3
Comparative effectiveness	**1 ha**			**1 ha**		
ROI (%)			**66.1**			**31.3**

Source: Survey results at the rice farming groups in the project communes, 10/ 2024.

4.2.2. Proposed CSA model intervention in the rice chain

Based on the analysis of climate risks in agriculture and some climate smart agriculture (CSA) practices, we suggest some climate smart agriculture practices that can be implemented in the table below.

Table 5. Proposed climate-smart agriculture (CSA) practice model with rice value chain in the project intervention area

CSA Model	Description and impact of the model	Imple-menting unit	Scale of implement ation	Support for the model	Model cost (USD)
a. Improving agricultural knowledge to adapt to climate change	Training and workshops on climate change risks and knowledge of agricultural production adapting to climate change help households have higher awareness of climate risks and have community solutions in the process of livelihood transformation.	DAE	62 communes of 2 project provinces	1 training class/com mune (62 project commune s)	2,000 USD/ training class
b. Pilot the ecological agricultural farming model with rice	Apply low-impact farming techniques, use microbial products to improve straw after harvest. Improve cultivated land with microbial compost. Training on ecological farming models in rice cultivation for farming households. The impact model reduces production costs, reduces labor by up to 30% and reduces greenhouse gas emissions in rice cultivation due to straw burning.	Consult ants and DAE	Select 10 pilot communes from 62 project communes; Training for all 62 communes of 2 provinces.	Organize the constructi on of agricultur al models, straw treatment; support probiotics; training.	5,000 USD/ model; 2,000 USD/ training class.
c. Building	Treating straw with	Consult	Implement	Support	140

a straw treatment model	microorganisms right in the rice field after harvest will help reduce environmental pollution by burning and increase nutrients for cultivated land. Training and coaching households on straw treatment knowledge. The model impacts reduce production costs by up to 15% and reduces greenhouse gas emissions from straw burning.	ants and DAE	to all communes (estimated at about 7,000 ha of rice in 62 communes). Training for farmers in 62 project communes.	probiotics and training in 62 project communes.	USD/ha for probiotics support; 2,000 USD/training class.
d. Communication and training on microbial models for compost treatment and environmental treatment	The problem of rural organic waste causing pollution. The Farmers' Association and the Women's Union have applied some techniques to collect, classify organic waste and treat it with microorganisms to solve the problem of environmental pollution and provide fertilizer for crops. Support microorganisms in composting, organic waste treatment in rural areas	Women's Union, Farmer Association	Implement in all 62 communes or select 15 communes to participate with 1,000 beneficiary households.	Support probiotics, waste classification and composting tanks at home.	50 USD/household; training 2,000 USD/commune.
e. Alternate watering and drying technique	Alternate wetting and drying techniques help save water for rice cultivation and reduce greenhouse gas emissions in rice cultivation. Support effective training and monitoring to compare the pilot model with conventional farming. Pilot use of water level monitoring sensors in test fields.	Consultants and DAE	Pilot selected 15 communes with an area of 150 hectares to participate in the model.	Support water level sensors and technical training for participating households.	100 USD/ha to buy sensor; 2,000 USD/training class.
f. Expanding the use of new rice varieties in areas of salinity and drought	Using new rice varieties in rice cultivation to have better adaptability to drought and salinity intrusion. Training on rice cultivation techniques with rice varieties adapted to saline intrusion and drought.	DAE	Implement in 62 project communes with an area of about 7,000 hectares.	Support rice seeds; training for participating farmers.	300 USD/ha for rice seeds; 2,000 USD/training class.
g. Testing slow-release fertilizers	Using slow-release fertilizers in rice cultivation helps reduce greenhouse gas emissions and enhance the ability of rice plants to absorb nutrients. Rice yield increased, reducing production costs by about 15%.	DAE	Pilot project implementation in 15 project communes with an area of 150 hectares.	Support slow-release fertilizer for households participating in the model.	450 USD/ha to buy fertilizer.

Source: Survey results at the rice farming groups in the project communes, 10/ 2024.

4.3. Maize value chains

4.3.1. Analysis of maize production value chain

Maize is cultivated on fertile land and riverside alluvial land in both provinces participating in the project

design. In addition, a part of the maize area is grown on double-crop rice land. Although maize requires less irrigation water than rice, the maize area can be expanded when there is enough irrigation water from pumping stations to serve the double-crop rice area in the localities. The maize area that can be expanded after 2 rice crops can account for up to 30% of the double-crop rice land area.
Maize is grown twice a year on fertile soil and alluvial soil. The main maize crop on fertile soil and alluvial soil along the river takes place from January to May. The next maize crop is grown from July to November. On the double rice fields, maize is grown in the winter season, from September to December. Maize is produced on a small scale, averaging 0.15 ha/household and mainly meets the needs of livestock feed in households. Maize production is not a commodity and is not sold on the market. Therefore, the maize value chain only considers improving productivity and farming performance at the household level.
Due to the impact of drought, maize productivity is relatively low in communes in both project provinces. Maize productivity in the winter-spring crop in Thanh Hoa reached 4.0 tons/ha, bringing economic performance of 12,700,000 VND/ha. Meanwhile, maize productivity in communes in Nghe An reached 1.8 tons/ha, with an economic performance of 9,710,700 VND/ha, 30% lower than maize productivity in Thanh Hoa province (**Table 6**).

Table 6. Economic performance of maize farming at farm-gate

Comparative effectiveness	**Spring season maize in Nghe An :** main crop of maize farming on sandy cropland			**Spring season maize in Thanh Hoa:** main crop of maize farming on sandy cropland		
	Quantity	Unit price (1000 VND)	Amount (1000 VND)	Quantity	Unit price (1000 VND)	Amount (1000 VND)
Gross Product (GP)			**3,229.0**			**4,200.0**
Maize area (ha/farm)	0.15			0.15		
Yield (kg/harvest)	421	7	3,229.0	600	7	4,200.0
Consumption Intermediate (CI)			**1,554.5**			**2,068.8**
Seed cost (1,000 VND)			463.1			506.3
Fertilizer (1,000 VND			939.9			1,262.5
Pesticide products (1,000 VND)			151.5			300.0
Value added (VA=GP-CI)			**1,674.6**			**2,131.2**
Distribution Cost (dist.)			**474.0**			**500.0**
Plumbing service (1,000 VND)			474.0			500.0
Value added net (VAN=VA-dist)			**1,674.6**			**1,631.2**
Profit (Pr=VAN-Amt)			**1,674.6**			**1,631.2**
Profit /farm (1,000 VND)			1,674.6			1,631.2
Profit / ha (1,000 VND)			9,710.7			12,700.0
Comparative effectiveness	**1 ha**			**1 ha**		
ROI (%)			**49.7**			**61.8**

Source: Survey results at the rice farming groups in the project communes, 10/ 2024.

4.3.2. Proposed CSA model intervention in the maize chain

Maize production is mainly affected by water shortages during the dry season. Improvements in pumping stations and irrigation canals will create an incentive to expand maize cultivation areas on the double-rice cropping areas. In addition, adequate irrigation water on fertile land can help increase maize yields beyond current levels.
In addition, it is possible to organize training courses on crop conversion to bring higher economic performance such as converting from maize growing area on fertile land, alluvial land to growing cucumbers, squash, and vegetables which can bring higher economic effectiveness.
Based on the analysis of climate risks in agriculture and some climate smart agriculture (CSA) practices, we suggest some climate smart agriculture practices that can be implemented in the table below.

Table 7. Proposed climate-smart agriculture (CSA) practice model with maize value chain in the project intervention area

CSA Model	**Description and impact of the model**	**Imple-menting**	**Scale of implementation**	**Support for the**	**Model cost**

		unit		model	(USD)
a. Pilot model of converting cultivation from maize land to cucumber, squash, and vegetable land	Assess soil fertility and suitability for certain crops such as cucumbers, squash, vegetables, potatoes. Technical training on production model conversion. Support some technical models and greenhouses in conversion in some communes as lessons learned. Converting cultivation will contribute to increasing economic performance many times more than growing maize.	Consultants and DAE	Select 3 pilot communes from 62 project communes; Training for households participating in the model.	Support water-saving irrigation system, melon growing model in greenhouse.	15,000 USD/ model.
b. Processing maize stalks, silage for animal feed	Processing maize stalks and making silage as feed for cattle helps reduce livestock production costs, increase household income from livestock, and reduce environmental pollution. Training and coaching households on knowledge of maize stalk silage.	Consultants and DAE	Pilot implementation in 10 communes with a lot of livestock; with 100 participating households.	Support silage bags, maize cutting machines; training in 10 communes participating in the model.	3,500 USD/ model; 2,000 USD/ training class.

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

4.4. Potato value chains

4.4.1. Analysis of potato value chain

Potatoes are suitable crops on sandy, fertile alluvial soils. Currently, potatoes are grown in many communes in the downstream areas of rivers and coastal areas. Potato production brings higher economic performance than many other crops.

Some cooperatives in Thanh Hoa have linked up with enterprises such as Pepsico, Orion and other small-scale private enterprises to grow different varieties of potatoes to supply to enterprises upon order. The market for potato products is quite large, however the ability to find markets and link production between small-scale farmers, cooperatives and enterprises is still limited, depending on outside enterprises.

The survey results in Hoang Phu commune show that potato products are registered by farming households to grow and sell to associated enterprises through production and consumption contracts between agricultural cooperatives and enterprises. However, the output sold to enterprises currently accounts for a low proportion. Households sell potatoes to traders from other provinces who buy during the harvest season. Therefore, developing the potato value chain in project communes with suitable land conditions should be considered for implementation.

The survey results of farmer groups in Hoang Phu commune, Hoang Hoa district show that households grow potatoes on a small scale, averaging 0.08 ha/household. Potato output is sold to purchasing enterprises at a fairly low price, averaging 7,000 VND/kg. However, in the period after the COVID-19 pandemic, enterprises have difficulty finding capital to buy all potato output from farmers. Cooperatives need to find purchasing enterprises and expand the market for potato products of farmers.

Potato yield produced in households reached 14.1 tons/ha and economic performance reached 44,013,300 VND/ha. Potato production performance is twice as high as rice cultivation (**Table 8**)

Table 8. Economic performance of potato farming at farm-gate

Comparative effectiveness	**Potatoes production in Thanh Hoa:** third crop after rice farming or two crops per year on the cropland		
	Quantity	Unit price (1000 VND)	Amount (1000 VND)
Gross Product (GP)			**7,875.0**
Potato area (ha/farm)	0.08		

Yield (kg/harvest)	1,125	7	7,875.0
Consumption Intermediate (CI)			**5,536.5**
Seed cost (1,000 VND)			2,610.0
Fertilizer (1,000 VND			1,726.5
Pesticide products (1,000 VND)			600.0
Value added (VA=GP-CI)			**2,938.5**
Distribution Cost (dist.)			**600.0**
Plumbing service (1,000 VND)			450.0
Harvesting service (1,000 VND)			150.0
Value added net (VAN=VA-dist)			**2,338.5**
Profit (Pr=VAN-Amt)			**2,338.5**
Profit /farm (1,000 VND)			2,338.5
Profit / ha (1,000 VND)			44,013.3
Comparative effectiveness	**1 ha**		
ROI (%)			**59.6**

Source: Survey results at the potato farming groups in the project communes, 10/ 2024.

4.4.2. Proposed CSA model intervention in the potato chain

Potatoes are grown twice a year on sandy soils and riverine soils. The first crop is from September to December and the second crop is from January to April. In some cases, potatoes are grown on 2 rice crops, from September to December.

Therefore, potato production also faces difficulties in irrigation water during the dry season. Some cooperatives have implemented a model of pumping water from ponds and using water-saving irrigation systems to serve the potato cultivation area. These farming methods respond to the difficulty of irrigation water sources.

In the future, the project implementation will provide opportunities for potato acreage to be expanded on a part of suitable double-rice crop land and on irrigated land.

To develop an effective potato value chain, we recommend implementing some climate smart agriculture (CSA) practices while improving governance capacity and market search for cooperative members.

Table 9. Proposed climate-smart agriculture (CSA) practice model with potato value chain in the project intervention area

CSA Model	Description and impact of the model	Implemen-ting unit	Scale of implementation	Support for the model	Model cost (USD)
a. Pilot model of water-saving irrigation for potatoes and use of compost in potato production.	Assessment of soil fertility and suitability for potato cultivation on double-crop rice fields and alluvial soils in some project communes. Technical training on potato cultivation and use of organic compost. Support some models of water-saving irrigation techniques in some cooperatives and replicate them in other communes. The model impacts are environmental improvement, irrigation water savings, soil health protection and increased potato crop yields.	Consultants and DAE	Select 3 cooperatives to pilot the model; Training for households participating in the model.	Support water-saving irrigation systems, use of microorganisms in soil improvement, and composting.	15,000 USD/ model.
b. Improve	Capacity building	Consultants	Select 8	Training to	2,000

cooperative management capacity and link product value chains with potato value chains	through training, market linkages and finding outcomes for potato products. Activities to support market research and link potato products along the value chain.	and DAE	cooperatives to participate in assessment and capacity building training.	improve market capacity and market research.	USD/ training course

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

4 .5. Value chains of *Solanum Procumbens* and sugarcane

4.5.1. Analysis of Solanum procumbens and sugarcane value chain

Solanum procumbens is considered a medicinal product and is used as a tea with the effect of cooling, detoxifying, good for consumers' health. Solanum procumbens has a continuous planting and harvesting cycle of 3 years. The raw materials are fresh and dried, transported to purchasing enterprises and processed into different types of products (tea bags, instant tea, Solanum procumbens extract).

Pu Mat Pharmaceutical Joint Stock Company has a production facility in Con Cuong town, Nghe An province. It is a unit that cooperates with Thai ethnic minority households in Chau Khe commune in developing raw material areas of Solanum procumbens and processing them into products of economic and health value.

Linking the cultivation and consumption of Solanum procumbens products brings much higher economic performance than growing rice or other vegetables on the same area. The yield of Solanum procumbens reaches 28.3 tons/ha/year. The profit from growing Solanum procumbens with a purchase commitment of 7,500 VND/kg can bring in an income of up to 140,500,000 VND/ha/year. The income from growing Solanum procumbens can be 7 times higher than that from growing rice.

Income from growing Solanum procumbens, many farmers want to join the association to grow and supply raw materials to processing factories. The area of Solanum procumbens has expanded from the initial 0.5 ha, increased to 2 ha and increased to 9 ha now. Meanwhile, the associated enterprise is only able to purchase and consume the output on an area of about 2 ha. This leads to the enterprise producing but having difficulty in consuming finished products. The purchase price of raw Solanum procumbens has decreased from the committed 7,500 VND/kg to 4,500 VND/kg. However, farmers are still unable to sell all raw materials to processing enterprises and need to dry and preserve them at home.

The survey results of households growing Solanum procumbens show that in the 2023-2024 crop year, households will have a profit of VND 2,220,000/household, equivalent to VND 55,500,000/ha. At this price, farmers growing Solanum procumbens still have a profit 3 times higher than growing rice. However, product consumption is considered to continue to be difficult, and it is challenging to sell all raw materials to production-linked enterprises (**Table 10**).

Thus, the value chain of Solanum procumbens is assessed to bring high economic effectiveness, a typical model in production linkage and product consumption. However, the ability to expand the product market and expand the cultivation area of Solanum procumbens will face many difficulties. Linkage support needs to pay attention to market search and product introduction for both raw materials and finished products.

In addition to medicinal plant products, Thai ethnic households also grow sugarcane under a contract to grow and consume products with Song Lam Sugarcane Joint Stock Company, headquartered in Anh Son district, Nghe An province.

Sugarcane is considered an industrial crop suitable for hilly and riverside soil conditions and requires much lower irrigation water needs than rice and other agricultural crops. However, sugarcane productivity is also greatly affected in dry weather years such as the 2023-2024 crop year. Sugarcane productivity can reach 170 tons/ha in good soil conditions and suitable weather and climate. However, productivity can drop to 80 tons to 120 tons/ha in conditions of prolonged drought and lack of irrigation water.

The survey results of growing sugarcane households show that the average yield is 11 tons/ha. The economic performance of sugarcane growing is 6,375,000 VND/household/year, equivalent to 63,750,000 VND/ha. Thus, sugarcane growing can bring high income on the condition that there are enterprises purchasing the products and the product selling price is over 1,000 VND/kg. On the contrary, if the product's selling price is below 700 VND/kg, farmers will not make a profit.

In fact, the association of growing and selling sugarcane products to processing factories was formed in the 2000s. However, when the price of raw sugarcane dropped, farmers in Chau Khe commune stopped growing sugarcane and switched to other vegetables such as ground peanuts and beans.

In addition, sugarcane productivity is also low when facing drought risks during the early planting period (from February to May). Therefore, investing in irrigation infrastructure systems also contributes to ensuring the development of sugarcane raw material areas and better household income.

Table 10. Economic performance of Solanum Procumbens and sugarcane at farm-gate

Comparative effectiveness	***Solanum Procumbens* in Nghe An :** one farming crop during three years of harvest			**Sugarcane farming in Nghe An :** one crop during one year		
	Quantity	Unit price (1000 VND)	Amount (1000 VND)	Quantity	Unit price (1000 VND)	Amount (1000 VND)
Gross Product (GP)			**5,100.0**			**11,000.0**
Production area (ha/farm)	0.04			0.1		
Yield (kg/harvest)	1,133	4.5	5,100.0	11,000	1	11,000.0
Consumption Intermediate (CI)			**1,080.0**			**4,225.0**
Seed cost (1000 VND)			-			1,200.0
Fertilizer (1,000 VND			580.0			2,825.0
Pesticide products (1,000 VND)			500.0			200.0
Value added (VA=GP-CI)			**4,020.0**			**6,775.0**
Distribution Cost (dist.)			**200.0**			**400.0**
Plumbing service (1,000 VND)			200.0			400.0
Value added net (VAN=VA-dist)			**3,820.0**			**6,375.0**
Depreciation (Amt)			**1,600.0**			**0**
Profit (Pr=VAN-Amt)			**2,220.0**			**6,375.0**
Profit /farm (1,000 VND)			2,220.0			6,375.0
Profit / ha (1,000 VND)			55,500.0			63,750.0
Comparative effectiveness	**1 ha**			**1 ha**		
ROI (%)			**77.1**			**137.8**

Source: Survey results at the farming groups in the project communes, 8/ 2024.

4.5.2. Proposed CSA model intervention in the Solanum procumbens and sugarcane chain

The value chain of growing and consuming Solanum procumbens and sugarcane is considered a closed chain from farmers to processing enterprises. Recommendations related to value chain development and climate-smart agriculture (CSA) practices can consider training on composting in production to reduce production costs, improve product quality and reduce environmental pollution. In addition, it is possible to evaluate the reserves of sugarcane by-products to support the treatment of sugarcane by-products for cattle and buffalo breeding.

Table 11. Proposed climate-smart agriculture (CSA) practice model with Solanum procumbens and sugarcane value chains

CSA Model	**Description and impact of the model**	**Implementing unit**	**Scale of implementation**	**Support for the model**	**Model cost (USD)**
a. Training on composting organic fertilizers in the production of Solanum procumbens and sugarcane.	Training on composting, using by-products from farming and livestock to reduce production costs and improve soil health.	Consultants and DAE	Implemented in conjunction with rice program training courses.	Probiotic support.	-

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

4.6. Shifting agricultural production structure with vegetables

4.6.1. Converting agricultural production structure to vegetable crops brings high economic effectiveness: cucumber, squash and flower crops

Rice and maize production on agricultural land ensures food security and household consumption. However, the need to produce crops with higher economic performance is of interest to farmers. In particular, converting from low-economic-performance crop areas such as maize, ground peanuts, beans to growing cucumbers, squash, peach blossoms, and lilies is produced by some households with high economic effectiveness.

The survey results of some households converting to agricultural production show that the performance of cucumber cultivation reaches 27,245,000 VND/household, equivalent to 247,116,670 VND/ha. The performance of cucumber cultivation can be 11 times higher than that of rice cultivation.

The performance of growing squash reached 71,029,000 VND/household, equivalent to an income of 233,894,440 VND/ha. The economic performance of growing squash was also 11 times higher than that of growing rice (**Table 12**).

However, the shift in production from rice and vegetables to some high-value crops in Thanh Chuong district (Nghe An province) and Ha Trung district (Thanh Hoa province) only took place in some households and the main consumption market was through local traders.

In addition, the production of these crops requires high technical knowledge and investment costs and requires a much larger labor force than other crops. In the near future, the expansion of the area of highly effective vegetable crops will only be limited. Therefore, the value chain of cucumber and squash products is mainly short, produced and consumed in the commune and district markets in the province.

Table 12. Economic performance of cucumber and squash at farm-gate in Nghe An

Comparative effectiveness	**Cucumbers:** one crop per year			**Green squash:** one crop per year		
	Quantity	Unit price (1000 VND)	Amount (1000 VND)	Quantity	Unit price (1000 VND)	Amount (1000 VND)
Gross Product (GP)			**46,800.0**			**110,250.0**
Production area (ha/farm)	0.10			0.29		
Yield (kg/harvest)	3,900	12	46,800.0	15,750	7	110,250.0
Consumption Intermediate (CI)			**9,815.0**			**28,218.1**
Seed cost (1,000 VND)			600.0			1,725.0
Fertilizer (1,000 VND			5,815.0			16,718.1
Pesticide products (1,000 VND)			3,400.0			9,775.0
Value added (VA=GP-CI)			**36,985.0**			**82,031.9**
Distribution Cost (dist.)			**6,740.0**			**8,127.5**
Plumbing service (1,000 VND)			400.0			1,150.0
Irrigated protecting service (1,000 VND)			340.0			977.5
Hired labors (1,000 VND)			6,000.0			6,000.0
Value added net (VAN=VA-dist)			**30,245.0**			**73,904.4**
Depreciation (Amt)			**3,000.0**			**2,875.0**
Profit (Pr=VAN-Amt)			**27,245.0**			**71,029.4**
Profit /farm (1,000 VND)			27,245.0			71,029.4
Profit / ha (1,000 VND)			247,116.7			233,894.4
Comparative effectiveness	**1 hectare**			**1 hectare**		
ROI (%)			**123.4**			**171.5**

Source: Survey results at the rice farming groups in the project communes, 8/ 2024.

Table 13. Economic performance of flowers farming at farm-gate in Thanh Hoa

Comparative effectiveness	**Peach blossom:** one crop of three years			**Tuberose:** second crop at small-scale rice farming		
	Quantity	Unit price	Amount (1000	Quantity	Unit price	Amount (1000

		(1000 VND)	VND)		(1000 VND)	VND)
Gross Product (GP)			**65,333.3**			**202,000.0**
Production area (ha/farm)	0.10			0.80		
Yield (trees/year)	107	600	65,333.3	12,500	16	202,000.0
Consumption Intermediate (CI)			**11,720.0**			**139,460.0**
Seed cost (1,000 VND)			2,000.0			4,800.0
Fertilizer (1,000 VND			6,120.0			128,000.0
Pesticide products (1,000 VND)			3,600.0			3,360.0
Value added (VA=GP-CI)			**53,613.3**			**62,540.0**
Distribution Cost (dist.)			**400.0**			**4,480.0**
Plumbing service (1,000 VND)			400.0			4,480.0
Value added net (VAN=VA-dist)			**53,213.3**			**58,060.0**
Profit (Pr=VAN-Amt)			**53,213.3**			**58,060.0**
Profit /farm (1,000 VND)			53,213.3			58,060.0
Profit / ha (1,000 VND)			184,044.4			69,900.0
Comparative effectiveness	**1 ha**			**1 ha**		
ROI (%)			**151.8**			**38.8**

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

4. 6.2. Proposed intervention model of CSA vegetable chain with high economic performance

Converting crops from rice and maize to high-value vegetables requires farmers to have scientific and technical knowledge, investment capital and technology. Therefore, the climate risks from vegetables are also greater than those from other agricultural crops. In particular, the main risks in the project intervention area are lack of irrigation water in the dry season, flooding in the rainy season as well as storms and tornadoes causing great damage to producers. In addition, there is also the risk of price fluctuations in the market that can lead to losses in production for farmers.

To encourage farmers to change their agricultural practices, we recommend climate-smart agriculture (CSA) interventions involving climate risk training, composting, investment in water-saving irrigation systems, and possibly support for greenhouse trials in growing cucumbers and high-value vegetables. These interventions can mitigate climate risks such as prolonged heat, frost, and cold.

Table 14. Proposed climate-smart agriculture (CSA) practice model with high-value vegetable value chain in the project intervention area

CSA Model	Description and impact of the model	Imple-menting unit	Scale of implementation	Support for the model	Model cost (USD)
a. Support water-saving irrigation models and greenhouses for growing high-value crops.	Assess soil fertility and suitability for certain crops such as cucumbers, squash, and high-value vegetables. Technical training on vegetable growing. Support water-saving irrigation systems and greenhouses.	Consultants and DAE	Select 3 households that want to test the water-saving irrigation model and build greenhouses.	Support water-saving irrigation system, melon growing model in greenhouse.	15,000 USD/ model.
b. Composting organic fertilizers and using microorganisms in farming.	Training on knowledge of growing high-value vegetables; knowledge of composting and using organic fertilizers as well as using microorganisms in soil improvement. Technical measures have an impact on reducing soil pollution, reducing the use of chemical fertilizers, and increasing	Consultants and DAE	Implemented in communes with the ability to grow vegetables (3 communes with about 100 participating households)	Support micro-organisms in composting; visit and study typical models.	3,500 USD/ model; 2,000 USD/ training class.

	sustainable production effectiveness.				
c. Support software to provide product market information.	Build software that provides information on product prices on the market as well as information on production technology and consumer market demand. This support will have a positive impact on local farmers and businesses.	Consultants and Department of Industry and Trade	Implemented software on the province's information portal system.	Support building software to update information on market, technology, and production areas.	30,000 USD

Source: Survey results at the farmer groups in the project communes, October 2024.

4.7. Ground peanut value chains

4.7.1. Analysis of ground peanut and other crops value chain

Ground peanut and some other crops are grown on fertile land and alluvial land on a small scale for self-sufficiency for households and partly for sale. Ground peanuts are grown from January to May and other short-term crops such as beans, peas and sesame are grown from May to July. After July, part of the area is left vacant due to flooding or is planted with a maize crop.
The market for ground peanuts, beans and sesame products is small local traders who purchase and transport them to other processing and manufacturing facilities in the province.
Thus, the value chain of ground peanuts, beans, and sesame products is only small-scale and serves the needs of family consumption and local markets. Some large purchasing facilities can purchase products from small retailers and export to markets in other provinces (**Table 15 and Table 16**).

Table 15. Economic performance of ground peanuts at farm-gate

Comparative effectiveness	**Spring ground-peanuts in Nghe An:** main crop on sandy cropland			**Spring ground-peanuts in Thanh Hoa:** main crop on sandy cropland		
	Quantity	Unit price (1000 VND)	Amount (1000 VND)	Quantity	Unit price (1000 VND)	Amount (1000 VND)
Gross Product (GP)			**8,063.2**			**4,725.0**
Ground peanut area (ha/farm)	0.09			0.05		
Yield (kg/harvest)	278	29	8,063.2	158	30	4,725.0
Consumption Intermediate (CI)			**1,706.0**			**734.6**
Seed cost (1,000 VND)			1,047.3			462.5
Fertilizer (1,000 VND			698.7			179.6
Pesticide products (1,000 VND)			50.0			92.5
Value added (VA=GP-CI)			**6,357.1**			**3,990.4**
Distribution Cost (dist.)			**384.2**			**185.0**
Plumbing service (1,000 VND)			384.2			185.0
Harvesting service (1,000 VND)			0			0
Irrigated protecting service (1,000 VND)			0			0
Value added net (VAN=VA-dist)			**5,972.9**			**3,805.4**
Depreciation (Amt)			**0**			**0**
Profit (Pr=VAN-Amt)			**5,972.9**			**3,805.4**
Profit /farm (1,000 VND)			5,972.9			3,805.4
Profit / ha (1,000 VND)			68,071.0			77,859.3
Comparative effectiveness	**1 ha**			**1 ha**		
ROI (%)			**332.4**			**388.3**

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

Table 16. Economic performance of green beans and sesame farming at farm-gate

	Green beans in Nghe An:	**Sesame farming in Nghe An:**

Comparative effectiveness	second crop after ground peanuts farming			second crop after ground peanuts farming		
	Quantity	Unit price (1000 VND)	Amount (1000 VND)	Quantity	Unit price (1000 VND)	Amount (1000 VND)
Gross Product (GP)			**993.2**			**2,109.0**
Production area (ha/farm)	0.11			0.09		
Yield (kg/harvest)	28	35	993.2	37	57	2,109.0
Consumption Intermediate (CI)			**241.6**			**131.3**
Seed cost (1,000 VND)			98.0			26.3
Fertilizer (1,000 VND			139.1			105.0
Pesticide products (1,000 VND)			4.6			0
Value added (VA=GP-CI)			**751.6**			**1,977.7**
Distribution Cost (dist.)			**54.6**			**350.0**
Plumbing service (1,000 VND)			54.6			350.0
Harvesting service (1,000 VND)			0			0
Irrigated protecting service (1,000 VND)			0			0
Value added net (VAN=VA-dist)			**697.0**			**1,627.7**
Depreciation (Amt)			**0**			**0**
Profit (Pr=VAN-Amt)			**697.0**			**1,627.7**
Profit /farm (1,000 VND)			697.0			1,627.7
Profit / ha (1,000 VND)			8,863.6			19,675.0
Comparative effectiveness	**1 ha**			**1 ha**		
ROI (%)			**317.7**			**357.7**

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

4.7.2. Proposed intervention model for CSA chain of ground peanuts and other crops

Ground peanuts and vegetables are more drought-tolerant than other crops. The main climate risks for ground peanuts, beans, and sesame are heavy rainfall and flooding. However, these vegetables are produced on a small scale and can benefit from other climate-smart agricultural practices in the local rice and vegetable value chains.

To improve the performance of vegetable production, we recommend some climate-smart agriculture (CSA) interventions related to climate risk training, composting as in the rice and vegetable value chain above. These interventions can be limited by climate risks such as heavy rain causing flooding, protecting the environment.

4.8. Aquaculture value chain

4.8.1. Analysis of aquaculture value chain

Aquaculture is highly developed in low-lying downstream districts such as Hoang Hoa and Ha Trung districts of Thanh Hoa province. Meanwhile, aquaculture is less developed in districts of Nghe An province.

The types of aquacultures are assessed as diverse. Among them, there are pila conica and freshwater fish farming in small pond systems near residential areas in Ha Trung district. Extensive shrimp farming systems and intensive shrimp farming in brackish water areas of Hoang Hoa district.

Among them, pila conica farming is a new farming model that requires little investment but requires a clean water source. The main food of pila conica is chopped vegetables and plants. The pila conica farming season usually takes place from April to December every year.

Pila conica products are considered to be agricultural products that bring higher economic value than other types of agricultural production in households. Pila conica products of Hoang Hoa district are recognized as OCOP products.

The main risks in pila conica farming are related to weather changes, prolonged drought leading to polluted stagnant water sources, making pila conica less developed. In addition, pila conica may be at risk of deadly diseases when water sources are polluted or saltwater intrusion occurs.

The market demand for pila conica products is assessed to be large. Farmed pila conica are sold to traders and transported for consumption in cities in the Northern region.
The performance of pila conica farming reached 8,862,500 VND/household/year, equivalent to 177,250,000 VND/ha. Thus, pila conica farming brings high economic performance and requires support in production processes and product consumption market information (**Table 17**).
Hung Nguyen District of Nghe An Province is a downstream district, near the Lam River estuary, which has a harvest of eunice viridis from October to November, after two rice crops every year. Eunice viridis are completely natural products, living in brackish water and river mouths.
After two rice crops, people plow the land, add organic fertilizer to enrich the soil, and drain water into the fields, waiting for the weather to change so that eunice viridis can appear and be harvested. However, raising eunice viridis requires that the fields not use chemical fertilizers or pesticides.
The main risk related to the productivity of the eunice viridis harvest is the use of chemical fertilizers and chemicals in the rice cultivation process. In addition, too high salinity also causes the eunice viridis yield to decrease more than normal.
The performance of raising eunice viridis is high, up to 7,560,000 VND/household/crop, equivalent to 101,666,700 VND/ha. Thus, after 2 rice crops, households in low-lying areas near river mouths have additional income from natural eunice viridis. Income from eunice viridis also contributes to more sustainable agricultural production by minimizing the impacts of chemical fertilizers and pesticides (Table 17).
The market for the *eunice viridis* is local, the product is sold to small traders and supplied to restaurants or household consumers in the district and province. Interventions to increase the performance of the eunice viridis value chain involve training and monitoring the salinity of water taken into the eunice viridis fields.

Table 17. Economic performance of Eunice viridis after 2 rice crops and Pila conica at farm-gate

Comparative effectiveness	**Eunice viridis:** one crop after 2 rice crops per year			**Pila conica:** one crop per year in the housing-pond		
	Quantity	Unit price (1000 VND)	Amount (1000 VND)	Quantity	Unit price (1000 VND)	Amount (1000 VND)
Gross Product (GP)			**8,400.0**			**14,600.0**
Production area (ha/farm)	0.07			0.05		
Yield (kg/year)	21	400	8,400.0	183	80	14,600.0
Consumption Intermediate (CI)			**420.0**			**4,737.5**
Seed cost (1,000 VND)			0			3,000.0
Feed (1,000 VND			420.0			1,737.5
Value added (VA=GP-CI)			**7,980.0**			**9,862.5**
Distribution Cost (dist.)			**420.0**			**0**
Plumbing service (1,000 VND)			420,0			0
Value added net (VAN=VA-dist)			**7,560.0**			**9,862.5**
Depreciation (Amt)			**0**			**1,000.0**
Profit (Pr=VAN-Amt)			**7,560.0**			**8,862.5**
Profit /farm (1,000 VND)			7,560.0			8,862.5
Profit / ha (1,000 VND)			101,666.7			177,250.0
Comparative effectiveness	**1 ha**			**1 ha**		
ROI (%)			**847.2**			**187.0**

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

Small-scale freshwater fish farming in ponds in each household in Ha Trung district is self-sufficient and improves household nutrition. Freshwater fish are raised in ponds near the house for a period of one year. In addition, a portion of the fish production is consumed in the market within the local community. The product is not a large commodity. Therefore, the value chain of freshwater fish products is a short chain, meeting the need to improve nutritional meals in households.
The main risks in freshwater fish farming are lack of water supply in dry season and polluted water quality causing fish diseases.
It is estimated that the economic value of freshwater fish farming is 12,855,000 VND/household/year, equivalent to 98,619,100 VND/ha/year (Table 18).

Coastal households in Ha Trung district, Thanh Hoa province have strongly developed the model of raising white shrimp and tiger shrimp in brackish water. The brackish water shrimp farming models include extensive shrimp farming and intensive shrimp farming. However, the risks of poor water quality and polluted water environment have led to the surveyed shrimp farming households having suffered continuous losses in recent years.

Survey results at brackish water shrimp ponds also show that the water intake and drainage systems are on the same canal system. This causes risks of disease and cross-infection between shrimp ponds. The market for brackish water shrimp products is large, shrimp are sold to traders, large enterprises and supplied to markets inside and outside Thanh Hoa province (Table 18).

Table 18. Economic performance of aquaculture in Thanh Hoa

Comparative effectiveness	**Fresh water fish production:** one crop per year in the housing-pond			**Shrimp production:** extensive and intensive shrimp production		
	Quantity	Unit price (1000 VND)	Amount (1000 VND)	Quantity	Unit price (1000 VND)	Amount (1000 VND)
Gross Product (GP)			**16,125.0**			**168,840.0**
Production area (ha/farm)	0.17			0.47		
Yield (kg/year)	400	41	16,125.0	3,517.5	60	168,840.0
Consumption Intermediate (CI)			**3,270.0**			**1,536,900.0**
Seed cost (1000 VND)			3,270.0			23,500.0
Feed (1,000 VND			0			1,043,400.0
Pesticide products (1,000 VND)			0			470,000.0
Value added (VA=GP-CI)			**12,855.0**			**-1,368,060.0**
Distribution Cost (dist.)			**0**			**188,000.0**
Plumbing service (1,000 VND)			0			188,000.0
Value added net (VAN=VA-dist)			**12,855.0**			**-1,556,060.0**
Profit (Pr=VAN-Amt)			**12,855.0**			**-1,556,060.0**
Profit /farm (1,000 VND)			12,855.0			-1,556,060,0
Profit / ha (1,000 VND)			98,619.1			-3,331,120.0
Comparative effectiveness	**1 ha**			**1 ha**		
ROI (%)			**1,690.2**			**-90.3**

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

4.8.2. Proposed intervention model for CSA aquaculture chain

Aquaculture activities face major risks with water quality, lack of water for freshwater fish farming or too high salinity for eunice viridis farming and brackish water shrimp farming. In addition, the risk of disease is too high for brackish water shrimp farming, causing great losses for shrimp farmers. In addition, heavy and prolonged rainfall also causes shock risks in shrimp farming.

To develop sustainable aquaculture, we recommend some climate-smart agriculture (CSA) interventions related to climate risk training, processes of raising eunice viridis, pila conica, and brackish water shrimp. Experiment with shrimp-fish farming models in brackish water shrimp ponds or switch to fish farming to improve water quality and environmental quality before switching to shrimp farming.

In addition, it is possible to design a system to monitor water sources, salinity and water quality in shrimp ponds, eunice viridis ponds and pila conica ponds.

Table 19. Proposed practice of climate-smart agriculture (CSA) model with aquaculture value chain in the project intervention area

CSA Model	**Description and impact of the model**	**Implemen-ting unit**	**Scale of implementa-tion**	**Support for the model**	**Model cost (USD)**
a. Testing	Brackish water shrimp	Consultants	Assess the	Test 5	5,000

shrimp-fish farming model, improving soil and water environment in extensive shrimp farming.	farming faces environmental risks and low effectiveness. Propose to improve the pond environment by combining shrimp and fish farming and monitor water quality during the farming process. The impact of the model is to improve the water environment and restore shrimp farming in the future.	and DAE	water environment, evaluate suitable fish species and test the model.	models.	USD/ model.
b. Expand the area for raising eunice viridis and pila conica,	Training, study tours to expand the area of eunice viridis harvesting (natural farming), bringing better income after the rice crop.	DAE	Conduct training for households raising eunice viridis and pila conica in 5-10 communes.	10 training classes, model visits.	2,000 USD/ class, visit model.
c. Support software to provide product market information.	Build software that provides information on product prices on the market as well as information on production technology and consumer market demand. This support will have a positive impact on local farmers and enterprises.	Consultants and Department of Industry and Trade	Implement software on the province's information portal system.	Support building software to update information on market, technology, and production areas.	$30,000 (recom-mended above)

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

5. Developing cooperatives / farmer groups in supporting the development of climate-smart agriculture

5.1. Development of cooperatives / farmer groups in the project design area

Survey results in communes in the project design area show that most of the cooperatives provide some agricultural services such as irrigation water, field protection. Some cooperatives provide fertilizer services, land preparation, rice planting services and production linkages with potato-consuming enterprises. Therefore, the capacity of business management, market research and updating scientific advances of cooperatives is relatively limited.

In addition, to equip themselves with the ability to withstand increasing climate risks such as increasingly frequent floods, cooperatives need to be equipped with knowledge about rice drying systems, investing in cold storage to preserve agricultural products, and technology for spraying pesticides using drones.

Support for cooperatives is relatively limited within the framework of the Adaptation Fund project design, so this support is mainly in training, capacity building and study tours. Based on the knowledge equipped, cooperatives can invest in infrastructure, purchase machinery and equipment to better serve the cooperative's agricultural production activities.

5.2. Proposed CSA interventions in the development of cooperatives/farmer groups

To improve the performance of production and business activities of agricultural cooperatives as well as support cooperatives to have better capacity to adapt and withstand natural disasters and climate change, we recommend some interventions as shown in the table below.

Table 20. Proposed practice of climate-smart agriculture (CSA) model to support agricultural service cooperatives in the project intervention area

CSA Model	Description and impact of the model	Implemen-ting unit	Scale of implement a-tion	Support for the model	Model cost (USD)
a. Improve cooperative management	Training, market linkage and finding output for potato products, specialty rice, and solanum	Consultants and DAE	Select training topics to	Open 8 classes on	2,000 USD/ class.

capacity and link product value chains with potato, solanum procumbens, and specialty rice value chains.	procumbens.		improve capacity, access markets, and find markets for cooper-atives.	different topics in 2 provin-ces.	
b. Testing drone equipment model in rice and crop cultivation.	Investing in drone technology in agricultural production, reducing labor (health of female workers), reducing the risk of exposure to chemicals.	DAE	Select 9 typical cooperative s to pilot the model.	Support 9 drones for 9 coope-ratives.	20,000 USD/ drone.
l. Visit and learn about rice drying model for cooperatives / farmer groups	Visiting and studying helps cooperatives and groups learn more about rice drying kilns, production costs compared to risks encountered when harvesting rice and reduce rice loss. Based on the knowledge equipped, cooperatives can invest based on the capacity and needs of the cooperatives.	DAE	Organize training courses, study tours of rice drying and product cold storage models.	Orga-nize 8 training sess-ions and study tours for coopera tives.	5,000 USD/ batch.

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

6. Identify value chain selection indicators

6.1. Identify value chain assessment indicators

The above analysis shows that agricultural production is very diversification among households in the communes in the project areas. Within the framework of the project to build water infrastructure following the criteria of the Adaptation Fund (AF), we identify a set of indicators to priority agricultural product value chains including economic, social, environmental, and institutional criteria according to multi-criteria decision analysis (MCDA) method.

MCDA is a method of building tools to support decision makers in solving decision-making problems with many perspectives, many selection criteria with different scales and is very commonly used. This method is used to evaluate and rank different options in either life or business, corporate governance or politics. The implementation process includes the following steps:

Step 1. Identify current value chains of agricultural products in the project communes.

Value chains of agricultural products are identified from the field survey results, considering agricultural livelihood activities based on the land resources and participation of farmers in the project communes.

Step 2: Determine criteria and collect and calculate absolute values

The set of criteria for determining priority livelihood models includes 5 main groups of criteria including (1) Economic; (2) Social; (3) Environment; (4) Technical and; (5) Institution.

In particular, economic criteria include investment costs related to agricultural products, economic performance achieved, level of risk of natural disasters, risk of epidemics, risk of product selling prices and potential to expand the market.

Technical indicators include the technical level required for agricultural production and the ability to expand the area to meet the product value chain.

Social indicators assessed include the ability to resolve labor issues in the assessed value chain.

Environmental indicators considered include the demand of agricultural products for water resources, benefiting from water infrastructure investments of the CRWIS project.

The institutional criteria considered includes the level of local development priority orientation with agricultural products in the value chain.

Table 21. Criteria for selecting priority value chains of agricultural products at project communes according to MCDA method

Criteria	Sub-criteria	Unit	Description
Econo-	Invested	1,000 VND	The total investment capital needed to carry out

mic aspect	costs	/ ha /year	production activities, the greater the investment capital requirement, the greater the barrier to implementing model expansion.
	Profit	1,000 VND / ha / year	Total profit of the value chain of agricultural product.
	Natural disaster risk	1 to 5 scale	Level of risks encountered in terms of natural disasters, epidemics and markets. In which 1 is the lowest level, almost no risk and 5 is the highest level when risks occur frequently and greatly affect the household's agricultural production.
	Disease risk	1 to 5 scale	
	Market risk	1 to 5 scale	
	Market potential	1 to 5 scale	Market capacity for product outputs. In which 1 is the lowest level when the produced product is basically saturated. 5 is the highest level of the almost unlimited market.
Tech-nique	Technical requirements	1 to 5 scale	The level of technical requirements for the producer. Level 1 is equivalent to almost no requirements or people are already proficient. Level 5 requires a high technical level, requiring long-term experience or formal training.
	Ability to expand production scale	1 to 5 scale	This criterion evaluates the ability to expand the production scale of the product. This criterion also takes values from 1 to 5. In which 1 is equivalent to no land reserve for expansion. Point 5 is equivalent to a very large land reserve expand the scale of production.
Society	Number of working days	Working days per ha per year	Reflects the ability to create jobs for local workers.
Envi-ronment	Benefited from CWRIS project	Number of days per harvest or a year	Evaluate the role of water infrastructure investment (CRWIS project) for each type of agricultural product during one cycle of production or one year.
	Environmental negative impact	1 to 5 scale	The Greenhouse gas emissions (CO_2) and environmental impact on the land, water and ecosystem surrounding the production area. 1 equal to small emission and no environmental impacts and 5 is high carbon foot print and high pollution.
Institu-tions	Consistent with local development orientation	1 to 5 scale	The degree of suitability of the livelihood model/product with the local development orientation. In which 1 point is not supported. 3 is not restricted but not recommended. 4 points are products that are encouraged for development but do not have specific support and 5 points are products that are being supported for development.

Source: Identifying the criteria based on MCDA method, 10/ 2024.

Step 3. Calculate the relative values of agricultural products based on the criteria

After identifying the absolute indicators in Step 2, in Step 3, we calculate the relative values of the criteria. The purpose of this step is to eliminate units and from there be able to add and subtract the values of different criteria. Accordingly, the indicators are divided into two groups, including a group of favorable factors and a group of unfavorable factors.

For the group of favorable factors, the higher the absolute value the better, the relative value of the indicator is calculated according to the formula:

$$SRij = \frac{SAij}{SA\ (max)j}$$

In which, the relative value of model i with respect to criterion j (SR ij) is the quotient between the absolute value of this indicator (SAij) and the maximum absolute value of criterion j for for all livelihood models SA (max)j .

For the group of unfavorable factors, the lower the absolute value the better, the relative value of the index will be calculated according to the formula:

$$SRij = \frac{SA\ (min)j}{SAij}$$

In which, the relative value of model i with respect to criterion j will be the quotient between the minimum value of criterion j for all models and the absolute value of this model.

Step 4. Determine the weights

Weights proposed based on the important level of criteria, in which economic criteria are the the highest weight because this is the most important factor affecting the ability to successfully and effectively deploy a value chain (weight 0.4). The group of environmental criteria plays the second most important role because this is the main goal of the project's intervention activities (weight 0.2). The group of institutional criteria also plays an equally important role because the coordination of local authorities is needed for the development of new models to be implemented smoothly (weight 0.2). Technical and environmental criteria groups are additional groups of criteria with equal weight of 0.1.

Step 5. Calculate criteria with weights

After determining the weight for each index, the relative values are adjusted with the corresponding weight according to the formula.

$$SRwij = SRij \times wi$$

In which the weighted relative value of criterion i model j (SR wij) is the product between the unweighted relative value of criterion i product j (SRij) and the corresponding weight of the criterion i (wi).

Step 6. Classifying priority value chains based on the total score of the options and rank

The final score of each livelihood model (KAPjw) is the total score of the weighted criteria:

$$KAP\ jw = \sum SR\ wj$$

After obtaining the final score of each value chain, the value chains with the highest scores should be selected to be the project's intervention models.

Based on the score achieved for each criteria and the total score achieved for each product chain, it is possible to decide which value chain to invest in during the project implementation process. In which, selects the value chains to be invested from the AF with the following priority level:

(1) The value chain has a very high impact on the economic, social, and environmental aspects and is suitable for the AF criteria, with a total score of over 80 points;
(2) The value chain has a fairly high impact on the economic, social, and environmental aspects and is suitable for the AF criteria, with a total score of 60 to 80 points.
(3) The value chain has an average impact on the economic, social, and environmental aspects and is suitable for the AF criteria, with a total score of 40 to 60 points.
(4) The value chain has a low impact on the economic, social, and environmental aspects and is suitable for the AF criteria, with a total score of 20 to 40 points.
(5) The value chain has a very low impact on the economic, social, and environmental aspects and is suitable for the AF criteria, with a total score of 1 to 20 points.

6.2. Selecting chains based on assessment indicators

The calculation results based on economic, social, environmental, and institutional indicators according to different priority weights show that value chains achieving a total score of 60 points or more can be selected for investment and monitoring in AF project design.

In particular, the value chains that should be considered include the rice chain, potato chain, solanum procumbens chain, cucumber chain, squash chain, eunice viridis chain and pila conica chain.

Table 22. Identification of value chains based on the total scores of value chain indicators

Agricultu-ral products	Economic indicators						Technique		Society	Environment		Institution	Total score
	Production cost	Profit	Natural disaster risk	Disease risk	Market risk	Market potential	Technical requirements	Expand production	Job creation	Benefited from CRWIS project	Environmental Impact	Consistent with orientation	
Rice	0.34	0.88	2.33	7.00	7.00	7.00	5.00	3.33	1.00	10.00	5.00	20.00	68.9
Maize	1.10	0.36	2.33	7.00	7.00	5.60	5.00	3.33	0.67	0.35	10.00	12.00	54.7
Potato	0.25	1.25	7.00	7.00	7.00	7.00	5.00	5.00	2.50	0.50	10.00	12.00	68.5
Solanum procumbens	0.59	1.57	7.00	7.00	1.75	2.80	5.00	5.00	3.33	0.75	10.00	16.00	60.8
Sugarcane	0.41	1.81	7.00	3.50	2.33	4.20	5.00	3.33	1.00	0.25	10.00	12.00	50.8
Cucumber	0.10	7.00	3.50	7.00	3.50	5.60	1.67	5.00	4.33	1.50	5.00	16.00	60.2
Squash	0.14	6.63	3.50	7.00	3.50	5.60	1.67	5.00	4.33	1.50	10.00	16.00	64.9
Peach blossom	0.16	5.21	2.33	3.50	2.33	2.80	1.00	3.33	4.00	0.25	3.33	12.00	40.3
Tuberose	0.11	1.98	2.33	3.50	3.50	2.80	1.67	3.33	6.67	3.00	3.33	12.00	44.2
Ground peanut	0.81	1.93	2.33	3.50	2.33	2.80	5.00	3.33	1.00	0.25	10.00	12.00	45.3
Beans	7.00	0.25	2.33	3.50	2.33	2.80	5.00	3.33	1.00	0.25	10.00	12.00	49.8
Sesame	3.53	0.56	2.33	7.00	2.33	2.80	5.00	3.33	1.00	0.15	10.00	12.00	50.0
Eunice viridis	1.57	2.88	3.50	3.50	7.00	5.60	1.67	3.33	3.33	5.00	10.00	20.00	67.4
Pila conica	0.16	5.02	3.50	3.50	3.50	5.60	1.67	3.33	4.33	1.50	10.00	20.00	62.1
Fish	0.98	2.79	7.00	3.50	3.50	5.60	2.50	1.67	1.67	9.00	3.33	16.00	57.5
Shrimp	0.00	-94.36	2.33	1.40	2.33	7.00	1.00	5.00	10.00	5.00	3.33	20.00	-37.0

Source: Survey results at the farmer groups in the project communes, 10/ 2024.

7. Conclusion and recommendations

Climate risks in agricultural production are very high in AF project design communes of both Nghe An and Thanh Hoa provinces. In particular, the risk of heavy rain, storms and floods is assessed as a high risk in both provinces. In addition, climate risks related to drought in agricultural production in Nghe An province are quite typical, causing great damage to the summer-autumn rice crop and other vegetables. Meanwhile, the risk of saline intrusion is typically observed in low-lying, coastal districts of Thanh Hoa province.

Other risks related to storms, tornadoes, and floods also occur frequently and cause great damage to agricultural production in both provinces. Some risks are small and localized, related to cold and frost, but have little impact on agricultural production.

In addition, major risks in the aquaculture industry are related to water pollution and the risk of disease transmission between aquaculture ponds due to the sharing of water sources for pond supply and wastewater discharge.

Production scale is increasingly becoming commodity-based with some products such as potatoes, medicinal plants, sugarcane, and aquatic products, so risks of large fluctuations in selling prices and consumption markets are emerging issues in agricultural production.

The agricultural product value chains in the communes participating in the project are mainly short, simply organized chains from producers directly to consumers or local self-consumption. In addition, some product chains with production linkages and product consumption are being formed such as medicinal plants and potatoes. However, production facilities and cooperatives still lack market information, lack business management capacity, market research and are completely dependent on orders from enterprises. These limitations lead to cooperatives and farmers lacking production strategies according to market demand.

Interventions related to climate-smart production practices of the surveyed chains will be based on the characteristics of each product value chain. It is necessary to improve the capacity of communities and cooperatives in climate risk knowledge and knowledge of applying climate-smart agricultural models.

In addition, it is possible to consider enhancing the capacity of cooperatives in terms of business management knowledge, using technology and investing in better infrastructure to respond to climate change adaptation and resilience.

Annex 3. CRWIS Project - Environmental Social Management Plan (ESMP)
Note: The Report was conducted before the merging process taking place in July 2027. Therefore, database and information collected were based on the existing institutional arrangement (districts still existed). After the merging process, the target communes under the previous target districts are no change. Therefore, all the database and information are still valid.
Contents

A. Summary Description of the Project

1. Context

Geography. Vietnam is located in the tropical monsoon belt of Southeast Asia. Due to its topography that falls from the northwest to the southeast – extensive coastline in the east and mountainous borders with Lao PDR and China in the north and west, it has a warm climate that includes tropical and temperate regions [86]. Viet Nam's long coastline, geographic location, and diverse topography and climate contribute to being one of the most hazard-prone countries of Asia and the Pacific Region[87]. Although over 70% of the country lies below 500m above mean sea level (MSL), more than 75% of the country is covered by plateaus, hilly regions and low mountains, and the other 25% is lowlands or plains[88]. Vietnam is divided into eight sub-regions with distinct agro-ecological, socio-economic and climate profiles. Given that a high proportion of the country's population and economic assets are located in coastal lowlands and deltas, the World Bank ranked Viet Nam among the countries likely to be the most affected by climate change. Without effective adaptation measures, by the end of the 21st century, an estimated 12 million people will face permanent floods, primarily concentrated in the country's two low-lying mega-river deltas. In addition to the threat of permanent floods, livelihoods in Viet Nam's low-lying areas face major challenges from saline intrusion, which has already forced land-use changes, abandonment, and reduced yields in many provinces[1]. CRWIS provinces (Thanh Hoa and Nghe An) fall in the North-Central Coast Region and span all three climatic zones. The country has two major deltas which span 25% of its area: the Red River Delta in the north (16,700km^2) and the Mekong Delta in the south (40,000 km^2). Starting from Thanh Hoa's Ma River Basin to Binh Thuan at the end of the South-Central Coast, there is a chain of small narrow deltas with a total area of 15,000km^2.

Climate. Viet Nam has a tropical climate zone, with the entire country experiencing the effects of the annual monsoon. Due to its long territorial stretch in latitudes and diverse topography, Viet Nam witnesses significant climatic differences among the regions across the country. In the northern region, average temperatures range from 22–27.5°C in summer to 15–20°C in winter, while the southern areas have a narrower range of 28–29°C in summer to 26–27°C in winter. The annual average rainfall varies sharply among regions, ranging around 600 mm and 5,000 mm and most commonly around 1,400 mm and 2,400 mm. About 80-90% of total rainfall accumulates in the rainy season. Annual rainy days last from 60 to 200 days and differ among regions. The annual average relative humidity is about 80-85%. Vietnam's rainy seasons are linked to the southwest (Jun-Sep) and northeast monsoons (Dec-Mar): rainfall occurs between May-Oct in the north and south, and in the central regions from Sep-Jan. Thanh Hoa's annual precipitation is about 1828 mm and Nghe An receives an annual precipitation of about 1969 mm[89]; in both cases, 75-77% of the rains fall between May-September. The dry (winter) season extends from October-April and accounts for 25% of the annual rainfall (Figure 2.A.iii and Figure 2.A.iv). While northern Vietnam's average temperatures range from 22-27.5 degree Celsius in the summer and 15-20 degree Celsius in the winter, southern areas have lower diurnal variation (summer / wet: 28-29 degree Celsius, dry / winter: 26-27 degree Celsius).

El Niño-Southern Oscillation (ENSO) is a major driver of inter-annual climate variability in Vietnam. For the North Coastal region, which includes Thanh Hoa and Nghe An, there is a statistically significant relationship between ENSO years and annual rainfall – i.e., below normal rains in El Niño years for April-May and October-November90. This has direct impacts on agriculture: for example, below normal rains ahead of the southwest monsoon can delay and impact rice sowing / early growth of May-September rice and other crops. Analysis[91] of data between 1980-2007 shows that for southern parts of Nghe An (target of CRWIS), ENSO results in 10-30% reduction in September-November rainfall due to a weaking of northeast monsoon. Conversely, during La Nina years, the total rainfall between September-November increases between 9-19%.

Vietnam's economy, poverty and development statistics

Vietnam successfully transitioned from a low-income to a lower-middle income country in 2010; its economic growth rate was one of the highest in the world, averaging 7% between 1990-2017[92]. GDP was 8% in 2022 (consumption rebound after COVID-19, low base effects) but will slowdown to 6.3% in 2023[93]. Simultaneously, it attained the Millennium Development Goal target on poverty reduction ahead of its schedule due to its strong economic growth, trade liberalization, and poverty reduction policies that prioritized disadvantaged groups. The GRDP (gross regional domestic product) of Thanh Hoa was

[86] WBG, ADB, 2020. Climate risk country profile: Vietnam. The World Bank Group and the Asian Development Bank. https://www.adb.org/sites/default/files/publication/653596/climate-risk-country-profile-viet-nam.pdf

Viet Nam is ranked 91 out of 191 countries by the 2019 INFORM Risk Index based on its high exposure to flooding (ranked 1st together with Bangladesh), tropical cyclones and their associated hazards (ranked 8th), and drought (ranked 82nd).

Statistical Yearbook of Vietnam, 2022. https://www.gso.gov.vn/wp-content/uploads/2023/06/Sach-Nien-giam-TK-2022-update-21.7_file-nen-Water.pdf

World Bank CCKP. Precipitation for 1991-2020. https://climateknowledgeportal.worldbank.org/country/vietnam/climate-data-historical

Katzfey, J.J., McGregor, J.L., and Suppiah, R., 2014. High-Resolution Climate Projections for Vietnam: Technical Report. CSIRO, Australia. 266 pp. https://www.rccap.org/wp-content/uploads/2017/05/vietnam-projections-tech-report.pdf. Only in the Central Highlands is the relationship negative across all months.

[91] Vu, T.T., Nguyen, H.T., Nguyen, T.V., Nguyen, H.V., Pham, H.T.T., Nguyen, L.T., 2015. Effects of ENSO on Autumn Rainfall in Central Vietnam. *Advances in Meteorology*, vol. 2015: 264373. https://doi.org/10.1155/2015/264373

OECD (2019). Transition Finance Country Study Viet Nam: On the edge of transition. Organisation for Economic

[93] https://www.worldbank.org/en/country/vietnam/publication/taking-stock-vietnam-economic-update-march-2023

12.51% in 2022 – ranking 7th in the country, and that of Nghe An ranged between 7.5%-9.08% over 2016-2022. The agricultural sector experiences one of the lowest growth rates among all sectors (3.36%, 2022 compared to 7.78% for industry and construction and 9.99% for service sector[94]), even as it plays a crucial role in the economy from an employment and food security perspective.

In terms of population, Thanh Hoa and Nghe An have the third and fourth highest populations among all provinces in Vietnam; in fact, only provinces with urban centres of Ho Chi Minh and Hanoi are higher. Vietnam's poverty rate declined from 20.7% in 2010 to 4.3% in 2022[95], and per capita income has increased from 210 USD in 1989 to around 2308 USD in 2022 (a 11-fold increase). While the monthly per capita income level in Thanh Hoa province is close to the national average, Nghe An's is lower. The population of Nghe An is more rural and has a higher poverty rate than Thanh Hoa and the national rural average. Nghe An's poverty rate did drop from 17.7% in 2016 to 6.2% in 2022 but it is unclear how much of this is owing to change in methodology[96]. Overall, the two provinces are by no means the poorest in the country[97]; but Nghe An is consistently among the 15 poorest provinces and the per capita income – both provinces and for five out of the eight CRWIS districts – is lower than national average. When both poor and near-poor are considered, 11.88%[98] of Thanh Hoa households and 12.61%[99] of Nghe An's can be said to be more vulnerable to economic and climate shocks – particularly because they are more dependent on agriculture and wage employment. Poverty rates also vary by proportion of Ethnic Minorities and geographic region[100]: for example, 71.4% of all poor households in Nghe An are non-Kinh/Chinese peoples. Among the six Nghe An-CRWIS districts, the highest rate of poor and near-poor are found in mountainous district of Con Cuong (19.94% and 16.85% respectively, 2022).

It is noteworthy that five of the six Nghe An-CRWIS districts have lower poverty rates than the provincial poverty rate; three of the six districts also have lower near-poor rates and two others are close to provincial average. This is unsurprising since (as stated) the highest rates are found in mountainous districts, which also have a higher Ethnic Minorities population but are not targeted owing to lack of irrigation/canal systems. However, Con Cuong is one of the five districts (out of 21 Nghe An districts) with the highest rate of poor households, and Anh Son and Thanh Chuong are two of the top ten[101].

Hoang Hoa and Ha Trung have lower poor and near-poor rates than their provincial average[102] and are not among the top five or ten of Thanh Hoa's 27 districts with highest rate of poor/near-poor households. But among the four coastal districts of Thanh Hoa, Hoang Hoa has the highest rate of poor households (3.26%). Similarly, Ha Trung has the highest rate of poor households (2.95%) among the eight delta districts of Thanh Hoa.

While agriculture may not appear a major source of cash income, it is critical to food security, nutrition and self-employment. Vietnam's 13.94 million people out of 50.60 million (27.5%, 2022) are directly employed in agriculture, forestry and fishing production[103]. However, a higher number of provincial households continue to rely on agriculture, forestry and fishing for employment: 34.9% Nghe An and 34.04% in Thanh Hoa[104]; this is likely to be even higher if one disaggregates by rural population, household-level engagement in agriculture, and poor/near-poor households.

2. Project Approach

The Project Goal is to strengthen climate resilience and social inclusion of water-insecure rural communities for a sustainable socioeconomic development in Thanh Hoa and Nghe An provinces. This will be achieved through the two interlinked outcomes over a four-year implementation period of:

a. Improved water availability and control through climate-resilient infrastructure development;
b. Integrated water management and climate resilient agriculture (Improved capacity of and coordination between local institutions and water user groups for climate-informed and inclusive water management and strengthened resilience of smallholders' agricultural businesses).

2.1. Component 1 Improved water availability and control through climate-resilient infrastructure development

2.1.1. Sub-component 1.1 Improved access to and efficiency of irrigation for smallholders

To reduce the climate-vulnerability of the targeted beneficiaries, it is necessary to enhance the efficiency of farm-level water use to ensure greater water and food security. Field observations have found tertiary on-farm canals to be in poor condition with field-to-field irrigation is still being practiced due to incomplete on-farm canals and this causes difficulties for water distribution between fields.

[94] Statistical Yearbook of Vietnam (2022). https://www.gso.gov.vn/wp-content/uploads/2023/06/Sach-Nien-giam-TK-2022-update-21.7_file-nen-Water.pdf
[95] GSO (2022). Result of the Viet Nam Household Living Standards Survey 2022 (VHLSS)
[96] For 2016-2021, poverty rate was based on the new national poverty line (multi-dimension poverty criteria) set by the GoV for period 2016- 2021. Decision No. 59/2015/QD-TTg dated November 19, 2015 of the Prime Minister. From 2022, poverty rate is based on the multi-dimensional poverty regulation for the period of 2022-2025. Decree No. 07/2021/ND-CP dated January 27, 2021 of the Government.
[97] The poorest provinces are in the Central Highlands and Northern Midland and Mountainous regions, with the highest rate of poor and near-poor households.
[98] Thanh Hoa, November 2022, Results of Thanh Hoa poor households and near-poor households assessment.
[99] Nghe An, Decision No. 4258/QD-UBND dated December 29, 2022. Results of Nghe An poor and near-poor households assessment. https://drive.google.com/file/d/1I5JcZGXglo27Sx4vYozMbmWJ43xPJODd/view?usp=drive_link
[100] ADB (2022). Agriculture, Natural Resources and Rural Development Sector Assessment, Strategy and Road Map - Viet Nam 2021–2025. Asian Development Bank (ADB): Manila.
[101] Nghe An, December 29, 2022. Results of Nghe An poor and near-poor households assessment.
[102] Thanh Hoa, November 2022, Results of Thanh Hoa poor households and near-poor households assessment.
[103] Statistical Yearbook of Vietnam (2022). This statistic may not include all agricultural value chain activities. When sectors are differently classified, ILO's database for 2022 shows: 33.59% for agriculture, 30.5% for industry, 35.7% for services, and a minor proportion of non-classified.
[104] Nghe An Statistical Yearbook 2022, Statistical Publishing House- 2023; Thanh Hoa Statistical Yearbook 2022, Statistical Publishing House- 2023

Farmer frequently complained at the length of time that it took for water to arrive to their fields and requested for the irrigation system to ensure that the water can be pumped out during flooding, as well as in as flooding frequently causes problems frequently causing the loss of crops. Some of the main concerns raised included the elevated tidal level of the river, the unpredictable nature of precipitation, coming sooner in year and more erratic. Also, in some villages mainly in Ha Son commune, Ha Trung district, Thanh Hoa province, the hydro-electric dams release water when it rains causing floods and limits water release during periods of drought. Water availability during the dry season is severely restricted and to address this the project will aim to enhance water management capacity. It will aim to achieve this through the piloting of an integrated approach of enhancing on-field water management capacity though improving farm-level tertiary irrigation including the ability to regulate water levels sufficiently to be able to practice water saving Alternating Wetting and Drying (AWD) paddy rice irrigation under sub-component 2.1.2. This sub-component will furthermore demonstrate to farmers the benefits of upgrading small pumping station that will allow for improved access to water during drought months when the upstream dam limits the release of water. Some farmers have been proven to be risk averse with respect to while other have expressed active interest in the prospect of reservoirs, as this will provide farmers with some relief as they bridge the wet and fry seasons.

2.1.2. Sub-component 1.2 Improved flood control and livelihoods protection

Consultations have highlighted the need for a multi-hazard Early Warning Systems (EWS) to help farmers adapt to multiple risks. Consequently, the project will aim to pilot an integrated agrometeorological EWS tailored to the different conditions in each province with Thanh Hoa being a coastal area and Nghe An province being mountainous. The EWS will integrate various elements including the monitoring of meteorological conditions. Some possible outputs that will assist farmers will be the issuance of regular daily, weekly or monthly meteorological bulletins. These may include weather forecasts for the next 24 hours, 5 or 10 days; extreme weather forecasts; the state and phase of development of agricultural crops, pest and disease; the state of agricultural drought, flooding and other dangerous agro-climatic conditions. Bulletins could also include advisories on agricultural practices and measures to adapt to expected meteorological conditions.

The climate change and sea level rise are making the estuarine water increasingly more brackish, while when it floods following heavy rains, the water turns fresh. The uncertainty about the quality of the water is difficult for farmers to manage as crops and fish/prawn production are sensitive to sudden changes in water salinity. Currently farmers do not have access to information relating to the salinity of water that would help them in deciding in the selection of types of fish and prawns either more or less saline or fresh water tolerant. The multi-hazard EWS will therefore also include automatic water pollution and salinity (brackish) warning systems that would help communes particularly those along on the coastline with low-intensity fish and prawn production, adapt and mitigate some of the associated risks.

Livelihoods are further increasingly affected by pests resulting from climate change. To help farmers adapt to this phenomenon that is expected to increase in the future, the design mission proposes the development and implementation of an insect monitoring system as part of the multi-hazard EWS, as this would help improve the pest response mechanism.

2.2. Component 2 Integrated water management and climate resilient agriculture

2.2.1. Sub-component 2.1 Improved capacity and coordination for integrated water management.

To address the cross-sectoral challenges in water management the project will aim to improve the awareness and capacity for integrated water management. This aims to leverage the benefits of the multi-hazard EWS developed under sub-component 1.1 for a coordinated approach to reducing the smallholder risk to life or livelihood. An integrated multi-hazard EWS with analysis, warnings and results being shared with all stakeholders who's interests and livelihoods depend on the availability of water, will aim to improve communication on activities as well as a greater awareness about the impacts thereof with the aim to ensure that there is a more efficient and equitable use of water**.** Key to enhancing the equitable sharing of limited water resources is awareness raising and facilitating a multi-stakeholder dialogue including with provincial and district agencies Provincial People's Committee (PPC), Department of Agriculture and Environment (DAE), Department of Finance (DOF), hydropower plants, irrigation companies, and cooperatives for improving coordination in water management. The project will therefore use the data gathered as a basis for informed decision-making for improved water management and to foster an environment with the ultimate goal of enhancing cooperation and coordination between all stakeholders.

The project will aim to strengthen the flow of information between stakeholders regarding water use planning and management, land use, and weather data and climate information for improved planning and programming. To achieve this the project will promote a platform where the identified stakeholders, are able to discuss the evidence-driven issues inter alia generated by the multi-hazard EWS but also the concerns of all stakeholders with a view to find a mutually acceptable solution to limited access to water. Based on the findings of the output the project will develop a strategy paper on communal water use and agreed actions. This will then form the basis of an institutional capacity building plan for

equitable water use in the watershed by improving inter-sectoral, inter-district coordination and cooperation in water planning and management. Ultimately the project will prepare and integrate sector plans (for example the Climate Change Adaptation and Disaster Risk Management Action Plans and the Agricultural Development Plans) that would inform the development of an operational plan for an inclusive institutional coordination mechanism on integrated water management.

2.2.2. Sub-component 2.2 Strengthened resilience of smallholders' agricultural businesses

Consultations have shown that farmers are increasingly suffering crop failure from heat stress and lack of water, as well as changing water salinity and flooding. Farmers explained that they have been trying many different crops to adapt to the changing agroclimatic conditions, however that despite their many attempts, crops have continued to fail. When pressed as to who was providing the crops and whether they were in fact climate-resilient crop varieties, it emerged that many farmers were trying through trial and error as well as hearsay from other farmers as to which crops were more likely to be successful against heat and water stressors. To overcome this identified problem the project will consult with climate research institutes to identify the most suitable climate-resilient crops and train the DAE extension services to subsequently train the farmers. The project will in addition to supplying climate-resilient seeds, through farmer field schools, teach best practices in CSA to address higher frequency of droughts and water shortages, sea-level rise and salt intrusion, rising temperatures, rainfall intensity. Techniques may include water saving irrigation techniques such as drip or sprinkler irrigation, implementing moisture-preserving practices such as mulching, alternate wetting and drying (AWD), systems in rice (component of the System of Rice Intensification (SRI) technique, 'Three Reductions, Three Gains" (3R3G) technique.

The consultations have identified some pilot value chain initiatives by the government to partner local smallholders with producers that have been successful and worth replicating. This was the case also in Con Cuong district where in an effort to diversify away from sugar cane, the commune entered into a pilot agreement with a processing company for 2ha of solanum procumbent, known for its medicinal properties. Farmers who were hesitant to begin with upon seeing its success subsequently went on to overproduce 10ha of the produce which is out of contract. Connecting farmers with producers will be an important element of helping ensure the climate-resilience of smallholders with specific high-value food value chains. The survey of eligible value chains was conducted during the design from select producers to ensure that this activity does not represent Unidentified Sub-Projects (USPs). This will be made possible through the development of Public Private Producer Partnership (4P) platforms to be promoted by the project that will support in value chain governance.

Farmers will be further supported through the development of a mobile market price advisory system as farmers have complained they are not informed about current market food prices. This is a challenge when negotiating with intermediaries that come and buy their produce, and meaning farmers are not necessarily getting a fair price for their produce. Farmers expressed interest in having advance access to such information for better price negotiation and such an app that will need to be coordinated with national, provincial, and district authorities. The provincial Department of Trade and Industry (DOIT) is suggested to lead the development and management of the app.

The project design is compliant with AF Environmental and Social Policy and Principles as well IFAD social, environmental and climate assessment procedures (SECAP). The project is designed to maximize impact in a cost-effective manner. IFAD has previously successfully constructed tertiary irrigation canals in some countries and have proven their effectiveness in helping farmers adapt to climate change, improve agricultural productivity while reduce production costs, as well as use limited natural resources sustainably.

CRWIS is aligned to national legislation and policies on agriculture, water management, climate change adaptation, gender equality and women's rights, land management, natural resource management among others. The project is aligned with the key National Strategies and Plan including, among others:

- National Sustainable Development Strategy in Viet Nam for 2020-2030
- National Adaptation Plan (NAP) for the period 2021-2030, a vision to 2050
- National Sustainable agriculture and rural development strategy in 2021-2030, vision to 2050
- National Water Resource Strategy until 2030 with a view to 2045
- National Strategy on green growth for the period 2021-2030, vision to 2050
- National plan to adapt to climate change for the period of 2021 - 2030, with a vision to 2050

Project implementation will rely on existing government processes and structures that will be a fundamental part of the CRWIS project ESMP. CRWIS will be fully integrated into the NTPs led by the Ministry of Agriculture and Rural Development. The two PMUs in project provinces of Thanh Hoa and Nghe An have been already established and will be responsible for overseeing project implementation with financial and project risks being assessed on an on-going basis throughout implementation.

B. Screening and Categorization.

The Environmental and Social Screening presented here below identified some minor risks, but mitigation measures have been integrated into the project, which has therefore been categorised as a

category B project. This section provides an analysis of the environmental and social impacts and risks identified as being relevant to the project and proposes a management plan that will screen ESPs, mitigate risks, and report to the Adaptation Fund. These primarily relate to the small-scale irrigation infrastructure under Component 1. The following table provides a brief overview of the potential risks the project poses in relation to the 15 Environmental and Social Principles, this is followed by a preliminary environmental and social risk assessment.

Table 1: Overview of Environmental and Social Risk Assessment

Checklist of environmental and social principles	**No further assessment required for compliance**	**Potential impacts and risks – further assessment and management required for compliance**
ESP 1 Compliance with the Law	x	**No risk** No further assessment of potential impacts and risks is required. As detailed in section II-E the proposed project will be in compliance with relevant laws. The project will be executed and coordinated by the People's Committees of Nghe An and Thanh Hoa provinces which further ensure compliance with applicable national laws.
ESP 2 Access and Equity	X	**Low risk** ▪ The project will not reduce or prevent communities in the targeted areas from accessing basic services. The project will take several transparent steps that will help ensure that the benefits of the project are being distributed fairly with no discrimination nor favouritism. Project targeting will comprise targeting criteria based on gender and Ethnic Minority quotas. The project will advertise broadly through radio, posters, leaflets town hall and village meetings and workshops. ▪ There is a low risk that women and ethnic minorities may not have access to information about the project. The project will ensure that i) the benefits of the project are being distributed fairly with no discrimination nor favouritism; ii) project targeting will comprise targeting criteria based on gender, youth and Ethnic Minority quotas. ▪ There is a low risk that percentage of women, youth and ethnic minorities participating in consultation activities on the design of water infrastructure may not reach the required gender representation (40% women) because females are often not invited for consultation due to stereotype that women know less than men. The project will publicize the list of beneficiaries at public places and ensure that women account for at least 40% of participants in consultations about the project. To ensure gender equality, the project will i) select a list of beneficiary households with both husband and wife's names; ii) write full names of the women in the invitation for design consultation; iii) invite community facilitators to be involved in disseminating project information
ESP 3 Marginalized and Vulnerable Groups	x	**Low risk** ▪ Marginalised and vulnerable groups (MVGs) face with various constrains such as floods and droughts, poverty, environmental degradation, lack of adaptation capacity. ▪ CRWIS will (i) improve irrigation water availability and management for approximately 4,000 ha of agricultural land in Ma river and Lam river watersheds, and strengthen flood control and prevention for approximately 2000 ha of agricultural and residential land in two provinces; (ii) assist MVGs to build climate resilience through adaptation activities (e.g., raising awareness, upgrading pumping stations, establishing EWS and developing CSA through a participatory and gender sensitive approach. ▪ There is low risk that people from MVGs may not participate in project meetings and events because of different reasons (e.g., (i) lack of confidence; (ii) being discouraged from joining the discussion by others due to discrimination; (iii) lack of labor in the family; and (iv) lack of motivation to participate. CRWIS will i) ensure MVGs be invited to project's consultation meetings and incorporate their feedback; ii)

		maintain regular contacts with the groups during project design and implementation; iii) empower MVGs to make decisions on concrete adaptation actions, valuing their local knowledge and respecting their land, property and customary rights; iv) apply the Household Methodology with the targeting MVGs being monitored through regular household visits during the project implementation.
ESP 4 Human Rights	x	**No risk** ▪ No further assessment of potential impacts and risks is required for compliance with human rights since the project is designed to respect and adhere to the requirements of all relevant conventions on human rights in compliance with the ESP. CRWIS adheres to the principle "support borrowers in achieving good international practices by supporting the realisation of United Nations principles expressed in the Universal Declaration of Human Rights and the toolkits for mainstreaming employment and decent work". CRWIS promotes women's human rights based on the United Nations Convention on Elimination of ALL Forms of Discrimination Against Women (CEDAW). ▪ The project will further diversify agricultural production including but beyond rice production with climate-resilient crops and access to market and value chain development. To enhance adaptation and resilience for women and other MVGs, the project will also support the mainstreaming of gender, using GALS, a change approach based on underlying principles of social and gender justice, inclusion and mutual respect. ▪ According to Vietnamese laws, the community has the right and responsibility to routinely monitor environmental performance during construction to ensure that their rights and safety are adequately protected and that the mitigation measures are effectively implemented by contractors and the PMU.
ESP 5 Gender Equity and Women's Empowerment	x	**Low risk** ▪ There is a low risk that there will be little participation of women in some program activities. The project will conduct a baseline survey on the gender gaps (social norms, access to resources, decision making, representation, benefits), climate impact, adaptation needs and capacity. Based on the baselines, the Gender Action Plan will be updated and monitored during the project implementation. CRWIS will guarantee the promotion of gender equality and allow women to participate fully and equally without suffering any adverse effect from doing so. ▪ Different stages and functions of any value chain under Component 2 will be associated with gender-specific knowledge, assets, decision-making powers and responsibilities. CRWIS will promote gender sensitive approaches to agri extension, vocational training, business skills development, small-cale processing infrastructure, contract development and other value chain innovations (such CSR and youth inclusion in STEM/technologies). ▪ There is a risk that GEWE (Gender Equality and Women's Empowerment) is considered as an 'add on' topic among many cadres whose capacity of gender mainstreaming is limited. During the project life, women machinery will be consulted at different levels, and a full Gender Assessment will be conducted enabling the appropriate risk screening of the ESP 5 on GEWE. CRWIS will apply two main gender frameworks: i) Gender Action Learning System (GALS), a community-led empowerment methodology that can be adapted to different cultural and organisational contexts; ii) Women Economic Empowerment (WEE), a UNWOMEN's framework.
ESP 6 Core Labour Rights	x	**Low risk** ▪ Viet Nam has rejoined the ILO in 1992 and has ratified 9 fundamental Conventions. The project will at all times ensure workers rights are respected and upheld to international standards. ▪ It is likely a lack of contracts for vulnerable workers, particularly EMs hired for seasonal works. The project will ensure these seasonal

		workers do not take any risks, particularly risks related to OHS, working condition and payment. ▪ The personnel hired by project agencies have the right to a competitive salary and adequate working hours (no more than 48 hours per week). The same applies to the workforce involved in the project through organizations / contractors. However, it is possible that these provisions are disregarded by a contractor or third-party organizations The project will ensure that clauses of working conditions be included in all legally binding instruments/contracts during the project execution. ▪ There is some risk that children between 15 and 18 years of age might provide labour. The project will require all contracts be complied with the minimum age requirements and all contractors maintain a labour registry for all contracted workers with supporting documents confirming the age of workers. ▪ There may be environmental risks to labourers involved in water infrastructure activities owing to historical pollution (air, water) in Thanh Hoa province. CRWIS will pay attention to social dimensions such as community health, safety, labour, MVGs, and historical factors, particularly in relation to natural resource management. The project will minimize adverse social impacts and incorporate externalities. It will avoid and mitigate any potential adverse impacts on health and safety, labour and working conditions and well-being of workers and local communities. ▪ In some situations during the project life, Gender based violence-- GBV (e.g. verbal and physical abuse, sexual harassment, violence against children…) may occur due to influx of labourers at the project area. The project will mainstream the requirement to prevent GBV into the bidding documents and all contracts to be awarded by PMU to all project contractors; ii) require all contractors to prepare a Code of Conduct to prevent GBV using the national guideline for GBV prevention; iii) require all workers of project contractors to sign code of conduct, including provisions to prevent GBV.
ESP 7 Indigenous Peoples	x	**Low risk** The design identifies that the proposed project area is inhabited by the Thai Ethnic Minority Group. In compliance with AF requirements section II-H describes the Consultative Process and how EMs have been consulted, annex 4 demonstrates the lists of those consulted including EMs as well as annex 3 describing the Thai EM community in the project area. EMs have limitted knowledge about climate adaption and resilience and they often have own ways of learning, information sharing and application of knowledge. CRWIS will i) consider to provide support and ToT training to the respected people in ethnic groups ii) facilitate peer-learning groups through exchange and learning visits among EMs; iii) Prioritise training to extension workers from EM groups for broader knowledge/techniques tranfer; iv) Enhance EM knowledge about value chains; v) Introduce incentive for private sector partnership to improve market access for EM products. Some potential negative impacts relating to the project activities were also identified by Thai EM people during this consultation process. These related to transient impacts during construction, related to just, noise, waste generation and potential temporary disruption to farming activities. CRWIS will update the EMP, based on EMs' reflections. PMUs will ensure that the EMP requirements are incorporated into the civil works bidding and contractual documents for all construction works under Component 1, and conduct monitoring of compliance with the EMP during the implementation of construction activities.
ESP 8 Involuntary Resettlement	x	**No risk** As designed at full proposal stage, the proposal does not foresee involuntary resettlement. CRWIS will rehabilitate the existing small scale water infrastructures, hence no land acquisition and/or involuntary resettlement is required.

ESP 9 Protection of Natural Habi-tats	x	**No risk** The project is not expected to have any negative impact on critical natural habitats including those that are (a) legally protected; (b) officially proposed for protection; (c) recognised by authoritative sources for their high conservation value, including as critical habitat; or (d) recognised as protected by traditional or indigenous local communities.
ESP 10 Conserva tion of Biological Diversity	x	**No risk** The project is not foreseen to have adverse impacts on biodiversity. There is no risk given there are no elements of known biological diversity importance in the project area as per IUCN red list of threatened species, UNESCO Man and Biosphere programme reserve, Ramsar site etc.
ESP 11 Climate Change	x	**Low risk** The project will not have any negative impact on climate change. The project does not promote any drivers of climate change (energy, transport, heavy industry, building materials, large-scale agriculture, large-scale forest products, and waste management), it will therefore not contribute to climate change as it is based on the premise of assisting smallholders to adapt in a climate neutral fashion. Primarily, CRWIS will promote CSA practices prioritized in the Targeted Adaptation Assessment including AWD; reclamation of manure to produce organic fertilizers; integrated fertilizer and pesticide management; climate-informed advisories to farmers with a focus on water-use efficiency. All these measures possibly have mitigation co-benefits.
ESP 12 Pollution Prevention and Resource Efficiency	x	**Low risk** ▪ The project will be implemented in a way that meets applicable international standards for maximizing energy efficiency and minimizing material resource use, the production of wastes, and the release of pollutants through the planning process, among others. Impacts related to potential use of fertilizers and pesticides will be further assessed during implementation and related mitigation plans will be developed. ▪ The proposed project activities will not pose any significant pollution risks and no further access to water and reduced inefficiencies in water management assessments will be required. The project will bring environmental benefits in improved water management and climate change adaptation, and generally improved.
ESP 13 Public Health	x	**No risk** It is not foreseen that the project will adversely affect public health as all proposed project activities as presented in this full proposal aim to improve access to water, improve livelihoods and adapt to climate change. It is foreseen that CRWIS will have an overall beneficial impact on the public health with improved access to water, climate-proofed yields and increase quality of produce that will also provide improved food security and nutritional benefits
ESP 14 Physical and Cultu-ral Heri-tage	x	**No risk** Viet Nam ratified the World Heritage Convention in 2005. The project area does not contain UNESCO World Heritage Sites. The project will ensure whether there are any national cultural heritage sites in the project areas and propose measures to avoid any alteration, damage, or removal of physical cultural resources, cultural sites, and sites with unique natural values.
ESP 15 Lands and Soil Conserva-tion	x	**No risk** The project is designed to have positive impact on lands through various techniques in soil conservation under the CSA approach. The training will help improve soil water storage, control erosion, improve soil structure, and boost nutrient management and will include understanding the impact increased drought stress can have on their particular crops, provide simple solutions to reduce water stress during droughts; using mulch to prevent soil evapotranspiration; and learn about the benefits of drip irrigation etc. Farmers will learn that they can adopt to minimise damage to soils and crops from increasingly frequent torrential rain including drainage

		options, laying of gravel to increase soil water uptake and reduce erosion. Farmers will also learn about the benefits of organic agriculture and composting to improve soil structure and boost nutrient management etc.

1. **Principle 1: Compliance with the Law**

No further assessment of potential impacts and risks is required for compliance with the law, since the project complies with all relevant national legislations on agriculture, water management, climate change adaptation, employment, women's rights, among others.

CRWIS has mainstreamed an ESMP into the review and approval process, that ensures it is compliant with legal requirements. Specifically, the project is compliant with:

- Law on Environmental Protection (2020)
- Law on Water Resources (2023)
- Law on Construction (2014)
- Law on Irrigation (2017)
- Land Law (2013, amended 2024)
- Law on Gender Equality (2006)
- Code of Labor (2019)
- Law on Hydro-Meteorology (2018)
- Law on Irrigation (2017)
- Law on Natural Disaster Prevention and Control (2013)
- Law on Compulsory Purchase and Requisition of Property (2008)
- Law on Forest Protection and Development (2017)
- Law on Urban Planning (2020)
- Law on Biodiversity (2018)
- Law on Cooperatives (2023)
- Decree No. 09/VBHN-BTNMT dated October 25, 2019, on the management of wastes and scraps
- Decree No 18/2015/ND-CP details the provisions, of the Law on Environmental Protection regarding environmental protection master plan, strategic environmental assessment, environmental impact assessment and environmental protection plan.

The project responds to the following National Plans and Strategies:

- National Sustainable Development Strategy in Viet Nam for 2020-2030
- National Adaptation Plan (NAP) for the period 2021-2030, a vision to 2050
- Viet Nam's Nationally Determined Contribution to the United Nations Framework Convention on Climate Change (UNFCCC) (updated in 2022)
- National Sustainable agriculture and rural development strategy in 2021-2030, vision to 2050
- National Water Resource Strategy until 2030 with a view to 2045
- National Target Programs (NTPs) including the National Target Programme for New Rural Development (NTP NRD), the National Target Programme for Sustainable Poverty Reduction, and the National Target Programme for Ethnic Minority
- National Strategy on Gender Equality for the 2021 - 2030 period.
- National Strategy on Environment Protection (NSEP) to 2020, with vision to 2030
- National Strategy and Action Plan on Biodiversity by 2020 (2013)
- National Strategy on green growth for the period 2021-2030, vision to 2050
- National plan to adapt to climate change for the period of 2021 - 2030, with a vision to 2050
- Ten-year Socio-Economic Development Strategy (SEDS) and the Five-year Socio-Economic Development Plans (SEDPs)
- National Action Plan on the Implementation of the 2030 Agenda for Sustainable Development (2017)
- Plan of restructuring agricultural sector in a period of 2021 – 2025
- National Strategy to develop Viet Nam's rice export market in the period of 2017 - 2020, with a vision to 2030
- Action Plan for the Development of Advanced and Water Saving Irrigation for Upland Crops to Assist Water Resources Sector Restructuring 2015-2020, and orientation 2021-2025

IFAD has since 2008 built a close operating relationship with the GoV to ensure that relevant authorities are not only being consulted, but are also directly involved in the project approval process and ensuring that the national laws and policies are being correctly applied. Where this involves the application of technical standards (outcomes 1.1. and 2.1), the process has been detailed in section 'II-E' of the project document as well as in section 'II-A'.

The Province People Committees (PPC) of Thanh Hoa and Nghe An provinces, respectively will act as Lead Project Implementing Agencies who become accountable for the project execution. The PPC will establish a Project Steering Committee (PSC) in each province, to be led by the PPC Chairperson or

the Deputy Chairman. PSCs are mandated to lead the project implementation, ensure coordination and integration of the project with all the national target programmes and donor-funded projects. The PSC is composed of PPC, DOF, DAE, DOIT, WU, DOLISA, FU, CA, YU, CEM NTPs. The PSC provides the strategic direction to the implementation of CRWIS, oversees project planning, financing and procurement processes, mobilizes adequate and timely finance for the AWPB, reviews the progress and reporting on results. In each province PPC is the project owner who implements the project through its lead agency which is the Agricultural and Rural Development Project Management Unit (Thanh Hoa province) and Department of Agriculture and Environment (Nghe An province). In each province, this unit will work closely with other relevant departments such as Department of Finance (DPI),

2. **Principle 2 Access and Equity**

The project will not reduce or prevent communities in the targeted areas from accessing basic services. The project will take a number of transparent steps that will help ensure that the benefits of the project are being distributed fairly with no discrimination nor favouritism. Project targeting will comprise targeting criteria based on gender, youth and Ethnic Minority quotas. CRWIS beneficiary targeting strategy is informed by the assessment of the livelihoods, constraints and aspirations of the different target groups of which 40% of women and 20% of youth including from ethnic minorities (where relevant). Direct beneficiaries will be selected from the following socio-economic groups: (i) poor and near-poor rural households, (ii) water-insecure and climate vulnerable smallholder farmers, and (iii) women (including women-headed households) and youth farmers.

There is a low risk that women and ethnic minorities may not have access to information about the project, so they do not know the criteria to register to participate. The project will ensure that information about the project and the criteria for participating in the project will be disseminated widely on various chanells such as radio, posters, leaflets, commune/village meetings and social media (eg. Zalo) with a relevant outreach strategy. Beneficiaries will be explained as they have been throughout the participatory and gender-balanced consultations during the design, that this is a project with a strong focus on women and youth, but that also adult men will also be eligible to provided that they are from the targeted geographical areas and that they are from poor or near poor families. In addition, the project will publicize the list of beneficiaries at public places (such as the Commune People's Committee, commune cultural house, village culture house) for 10 days for villagers to know about these lists. If needed, the project will organize public voting, giving priority to female breadwinners of poor and near-poor households, and ethnic minority households if the number of eligible people to register outweighs those allowed by the project. The grievances procedure will be promoted to ensure everyone being included is entitled.

There is a low risk that percentage of women, youth and ethnic minorities participating in consultation activities on the design of water infrastructure may not reach the required gender representation (40% women) because female are often not invited for consultation due to stereotype that women know less than men. The project will ensure that women account for at least 40% of participants in consultation meetings and sharing information on water infrastuture planning framework to prioritize water allocation (particularly where irrigation water is used for domestic/household purposes). To ensure gender equality, the project will select a list of beneficiary households with both husband and wife's names. It should be written, including the full names of the women in the invitation for design consultation. Community facilitators will be involved in disseminating information on water allocation/ planning framework and associated activities. Where appropriate, at least 30% of community facilitators shall be women and 20% shall be youth or ethnic minorities.

3. **Principle 3: Marginalised and Vulnerable Groups (MVGs)**

CRWIS beneficiary targeting strategy is informed by the assessment of the livelihoods, constraints and aspirations of the different target groups of which 40% of women and 20% of youth including from ethnic minorities (mostly Thai Ethnic Minority communities in Chau Khe). Direct beneficiaries will be selected from the following socio-economic groups: (i) MOLISA's criteria-based poor and near-poor rural households, (ii) water-insecure and climate vulnerable smallholder farmers, and (iii) women (including women-headed households and women with disability) and youth farmers.

Climate vulnerability and livelihood adaptation. Floods and droughts, poverty, environmental degradation, lack of livelihood opportunities, lack of adaptation knowledge and skills, access to resources including finance and technology have all been identified as the main constraints and vulnerabilities of the MVGs. Risks of these constraints to the MVGs will be reduced through (i) improve irrigation water availability and management for approximately 4,000 ha of agricultural land in Ma river (1500 ha in Thanh Hoa province) and Lam river (2500 ha in Nghe An province) watersheds, and strengthen flood control and prevention for approximately 2000 ha of agricultural and residential land along the Hoat and Cung rivers (1000 ha in Thanh Hoa province), and Lam river (1000 ha in Nghe An province); (ii) assist smallholder farmers build resilience to climate change through concrete activities including helping farmers find solutions to a climate change aggravating factor namely that of equitable water management along the two rivers in both provinces; (iii) raise awareness about the challenges farmers face, and also find workable solutions such as EWS and CSA through a participatory and

gender sensitive approach. Selection of pumping stations and associated activities at design stage will take these priority groups into account; considering the context-specific socio-economic and climate vulnerabilities (temporary local inundation, salinization and droughts – Ha Trung; river flooding and river erosion – Hoang Hoa; drought and river flooding – Nghe An, including salinization in coastal communes).

People from MVGs may not participate in project meetings and events because of the following reasons: (i) lack of confidence; (ii) being excluded /not being respected by other members of the groups/ being discouraged from joining the discussion by other members in the community; (iii) lack of labor within the family and poor house conditions; and (iv) lack of motivation to participate in development project. CRWIS will (I) ensure MVGs be invited to project's consultation meetings using relevant communication methods prepared for them; incorporate feedback from these MVGs consultation meetings prior to project implementation/selection of investment activities and ensure they will participate and receive project benefits; (ii) maintain regular contacts with the groups during project design and during implementation activities; (iv) empower MVGs to make decisions on concrete adaptation actions, valuing their traditional and local knowledge and respecting their land, property and customory rights; and (v) apply the *Household Monitoring* methodology in which the risk of disproportionate adverse impacts on MVGs will be further minimised through the project's monitoring programme. Regular household visits, group discussions and feedback will allow each household to see progress against its own goals. Challenges can be identified during regular household-level follow-up visits and processed before they become even greater barriers to achieving the project objectives.

4. **Principle 4: Human Rights**

No further assessment of potential impacts and risks is required for compliance with human rights since The project is designed to respect and adhere to the requirements of all relevant conventions on human rights in compliance with the ESP. CRWIS adheres to the principle "support borrowers in achieving good international practices by supporting the realisation of United Nations principles expressed in the Universal Declaration of Human Rights and the toolkits for mainstreaming employment and decent work".

The project will further diversify agricultural production including but beyond rice production with climate-resilient crops and access to market and value chain development. To enhance access to productive resources as well as adaptation and resilience for women and girls as well as other MVGs, the project will also support the mainstreaming of gender, using GALS. GALS is a change approach based on underlying principles of social and gender justice, inclusion and mutual respect. In particular it promotes women's human rights based on the United Nations Convention on Elimination of ALL Forms of Discrimination Against Women: - Right 1: freedom from violence; Right 2: equality of property ownership; Right 3: equality of decision-making; Right 4: equality of work and leisure; - Right 5: freedom of thought and association.

According to Vietnamese practices, the community has the right and responsibility to routinely monitor environmental performance during construction to ensure that their rights and safety are adequately protected and that the mitigation measures are effectively implemented by contractors and the PMU. If unexpected problems occur, they will report to the PMU and/or commune people committees.

5. **Principle 5: Gender Equality and Women's Empowerment**

Viet Nam is signatory to a number of international instruments dedicated to gender equality, including the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and the Sustainable Development Goals (SDGs).

CRWIS project goal is to strengthen climate resilience and social inclusion of water-insecure rural communities for a sustainable socioeconomic development in Thanh Hoa and Nghe An provinces. The project has 3 components: i) Improved water availability and control through climate-resilient infrastructure development; ii) Improved capacity of and coordination between local institutions and water user groups for climate-informed and inclusive water management; and iii) Strengthened resilience of rural livelihoods through development of pro-poor and climate-adapted agricultural business models. Through targeted consultations project design and implementation will ensure that gender considerations are integrated in each activity.

From the beginning, meetings and workshops will be held and printed materials will be distributed to inform stakeholders of the objectives of the program. In addition, the specifications for contracting the execution of fully identified subprojects will request that the contracting organizations have experience working in selected areas, preferably; who have developed leadership roles in projects they have carried out; and that they hire local staff with leadership talents, among others, without gender discrimination. Contractors should also strictly adhere to gender norms in organizing consultations relating to the project interventions.

There is a low risk that there will be little participation of women in program activities. During the execution of the CRWIS project, the provisions of the Gender Equality Law and relevant legislations will be complied with, and all activities will guarantee the promotion of gender equality and allow women to participate fully and equally without suffering any adverse effect from doing so. In addition, a baseline

survey will be carried out on the gender gaps (social norms, access to resources, decision making, representation, benefits), climate impact, adaptation needs and capacity. Based on the baselines, the Gender Action Plan will be updated and monitored during the project implementation.

Under Component 2, the value chain subcomponent project will address different issues including improved natural resource management, climate resilience, gender equality, decent labour and working conditions, community health and safety, and poverty alleviation. Different stages and functions of any value chain will be associated with gender-specific knowledge, assets, decision-making powers and responsibilities. Additional good practices for CRWIS's support to and promotion of value chain might include: (i) gender sensitive approaches to agri extension, vocational training, business skills development, smallscale processing infrastructure, contract development and other value chain innovations; (ii) corporate social responsibility strategies that improve women's economic and decision-making position within value chains; iii) Inclusion of youth in STEM/technologies.

There is a risk that GEWE is considered as an 'add on' topic among many cadres whose capacity of gender mainstreaming is limitted. During project formulation and implementation women machinery will be consulted at national and local level and a full Gender Assessment will be conducted enabling the appropriate risk screening of the ESP 5 on Gender Equality and Women's Empowerment. Two main gender frameworks will be applied:

- **Gender Action Learning for Sustainability (GALS)** is a community-led empowerment methodology that can be adapted to different cultural and organisational contexts – including communities where no organisation exists, cooperatives of varying sizes, private commercial companies and NGOs and donor agencies. It can be adapted for any issue including: livelihoods, food security, financial services, value chain development, conflict resolution, governance, health, reproductive rights and climate change. GALS develops participatory visioning and planning skills and strengthens social networks for women and men at all levels, based on the generic Participatory Action Learning System (PALS) methodology. But GALS focuses specifically on developing new visions for relationships between women and men as equal human beings, and implementing changes in gender inequalities in resources and power. GALS is also mainstreamed in organisations and with multiple stakeholders to increase effectiveness of any development process. Through developing self-motivated structures for pyramid peer sharing and integrating into existing activities of implementing public or private agencies it can empower many thousands of people to improve their lives and communities at relatively low cost.
- **Women Economic Empowerment (WEE)**. According to this UNWOMEN framework, effective Economic Empowerment of Women occurs when women enjoy control over and benefit from their own resources, assets, income and time, and at the same time when they are able to manage risks and improve their economic and welfare status. The seven key drivers of WEE examine gender issues and women's mobility as farmers, business and cooperative leaders/owners, and formal and informal employees in the chain.

6. Principle 6: Core Labour Rights

Viet Nam has rejoined the ILO in 1992 and has ratified 9 fundamental Conventions. These include: Forced Labour; Right to Organise and Collective Bargaining; Equal renumeration; Abolition of Forced Labour; Discrimination (Employment and Occupation); Minimum Age; Occupational Safety and Health; Worst Forms of Child Labour; and Promotional Framework for Occupational Safety and Health. The project will at all times ensure workers rights are respected at all times and upheld to international standards.

There maybe a lack of contracts for vulnerable workers, particularly ethnic minority persons hired for seasonal works that last less than one month's duration. The project will ensure that seasonal workers (especially EM workers) who work less than one month do not take any risks, particularly risks related to OHS, working condition, and payment, all contractors will be required to sign contracts with all seasonal workers that respect seasonal workers in the same way that workers with contracts of more than one month's duration are respected. This aims to protect the seasonal workers (particularly EM workers) from taking the above-mentioned risks to avoid absence of a working contract.

The personnel hired by project agencies have the right to a competitive salary and adequate working hours (no more than 48 hours per week). The same applies to the workforce involved in the project through organizations / contractors. However, it is possible that these provisions are disregarded by a contractor or third party organizations that carry out projects activities. The project will ensure that clauses of working conditions will be included in all the legally binding instruments/contracts during the project execution. The monitoring and evaluation process will follow specific indicators related to this requirement, and non-compliance may cause the termination of contractual relationship.

It is highly unlikely that children under 15 years of age or forced labour will be involved in project activities. However, there is some risk that children between 15 and 18 years of age might provide labour. The project will set labour and working condition standards in line with GoV legislations and focus on employment for local communities. In all contracts between PMU and contractors, there shall

be provisions that require compliance with the minimum age requirements, including penalties for non–compliance. The contractor will be required to maintain a labour registry for all contracted workers with supporting documents confirming the age of workers.

There may be environmental risks to labourers involved in infrastructure activities owing to historical pollution (air, water) in Thanh Hoa province. CRWIS will pay attention to social dimensions such as community health, safety, labour, MVGs, and historical factors, particularly in relation to natural resource management. The project will minimize adverse social impacts and incorporate externalities. It will avoid and mitigate any potential adverse impacts on health and safety, labour and working conditions and well-being of workers and local communities.

In some situations during the project life, Gender based violence-- GBV (e.g. verbal and physical abuse, sexual harassment, violence against children…) may occur due to influx of labourers at the project area. The project will mainstream the requirement to prevent GBV into the bidding documents and all contracts to be awarded by PMU to all project contractors; ii) require all contractors to prepare a Code of Conduct to prevent GBV using the national guideline for GBV prevention; iii) require all workers of project contractors to sign code of conduct, including provisions to prevent GBV.

7. **Principle 7: Indigenous Peoples**

Ethnic Minorities constitute a minor proportion of the CRWIS target population. Chau Khe Commune, Con Cuong District, Nghe An Province is the only commune that is home to three ethnic minority groups, including Thái (678 households), Thổ (375 households), and Khơ Mú (79 households). These ethnic minority group account for 73.8% of the commune population. In compliance with AF requirements section II-H describes the Consultative Process and how EMs have been consulted, annex 4 demonstrates the lists of those consulted including EMs as well as annex 3 describing the Thai EM community in the project area.

The design showed that EMs have limitted knowledge about climate adaption and resilience and they often have own ways of learning, information sharing and application of knowledge. CRWIS will i) consider to provide support and ToT training to the respected people in ethnic groups (elders, nominated heads etc) to enhance learning opportunities for Ems; ii) Establish and facilitate peer-learning groups through exchange and learning visits among EMs, villages and communes; iii) Provide training to extension workers, giving priorities to the workers from the EM groups, then these workers will transfer knowledge and techniques and experiences to larger communities; iv) promote high-value and indigenous agriculture commodities; v) Enhance EM knowledge on how to involve in the selected value chains and how to improve post-harvest processing, packaging and branding of such products; vi) Introduce incentive for private sector partnership to improve market access for EM products.

The design showed many positive anticipated benefits for EM people were identified through the project activities in accordance with the project design and objectives, including increased access to irrigation water resources, benefits from the adoption of advance water efficient irrigation techniques and technologies, and better market linkages and access, and increased capacity for better livelihoods. Some potential negative impacts in relation to the project activities covered in this ESMP were also identified by Thai EM people during this consultation process. These related to transient impacts during construction, related to just, noise, waste generation and potential temporary disruption to farming activities. The consultations confirmed the need to update the EMP for the project, based on the reflections of Thai EM people in Chau Khe including as both direct and indirect beneficiaries and the anticipated positive and negative impacts of the project on EM people.

Each PMU is responsible to ensure that the EMP requirements are incorporated into the civil works bidding and contractual documents for all construction works under Component 1, ensuring that no contractor commences any construction activity prior to the approval of the EMP, and conducting monitoring of compliance with the EMP during the implementation of construction activities.

8. **Principle 8: Involuntary Resettlement**

As designed at full proposal stage, the proposal does not foresee involuntary resettlement. CRWIS will rehabilitate the existing small scale water infrastructures, hence no land acquisition and/or involuntary resettlement is required.

9. **Principle 9: Protection of Natural Habitats**

There are no critical habitats, protected areas or areas of ecological significance in the project area. The project is not expected to have any negative impact on critical natural habitats including those that are (a) legally protected; (b) officially proposed for protection; (c) recognised by authoritative sources for their high conservation value, including as critical habitat; or (d) recognised as protected by traditional or indigenous local communities.

10. **Principle 10: Conservation of Biological Diversity**

The project is not foreseen to have adverse impacts on biodiversity. There is no risk given there are no elements of known biological diversity importance in the project area as per IUCN red list of threatened species, UNESCO Man and Biosphere programme reserve, Ramsar site etc.

11. **Principle 11: Climate Change**

As designed in this CN the project will not have any negative impact on climate change. The project does not promote any drivers of climate change (energy, transport, heavy industry, building materials, large-scale agriculture, large-scale forest products, and waste management), it will therefore not contribute to climate change as it is based on the premise of assisting smallholders to adapt in a climate neutral fashion.

Primarily, CRWIS will promote CSA practices prioritized in the Targeted Adaptation Assessment including: AWD; reclamation of manure to produce organic fertilizers; integrated fertilizer and pesticide management; climate-informed advisories to farmers with a focus on water-use efficiency. All these measures possibly have mitigation co-benefits.

12. **Principle 12: Pollution Prevention and Resource Efficiency**

The project will be implemented in a way that meets applicable international standards for maximizing energy efficiency and minimizing material resource use, the production of wastes, and the release of pollutants through the planning process, among others. Impacts related to potential use of fertilizers and pesticides will be further assessed during implementation and related mitigation plans will be developed.

The proposed project activities will not pose any significant pollution risks and no further assessments will be required. The project will bring environmental benefits in improved water management and climate change adaptation, and generally improved access to water and reduced inefficiencies in water management.

13. **Principle 13: Public Health**

It is not foreseen that the project will adversely affect public health as all proposed project activities as presented in this full proposal aim to improve access to water, improve livelihoods and adapt to climate change. It is foreseen that CRWIS will have an overall beneficial impact on the public health with improved access to water, climate-proofed yields and increase quality of produce that will also provide improved food security and nutritional benefits.

14. **Principle 14: Physical and Cultural Heritage**

Viet Nam ratified the World Heritage Convention in 2005. The project area does not contain UNESCO World Heritage Sites.

The project will ensure whether there are any national cultural heritage sites in the project areas and propose measures to avoid any alteration, damage, or removal of physical cultural resources, cultural sites, and sites with unique natural values.

15. **Principle 15: Lands and Soil Conservation**

The project is designed to have positive impact on lands through various techniques in soil conservation under the CSA approach.

The training will help improve soil water storage, control erosion, improve soil structure, and boost nutrient management and will include understanding the impact increased drought stress can have on their particular crops, provide simple solutions to reduce water stress during droughts; using mulch to prevent soil evapotranspiration; and learn about the benefits of drip irrigation etc.

Farmers will learn that they can adopt to minimise damage to soils and crops from increasingly frequent torrential rain including drainage options, laying of gravel to increase soil water uptake and reduce erosion. Farmers will also learn about the benefits of organic agriculture and composting to improve soil structure and boost nutrient management etc.

C. Environment and Social Management Plan

The project has been designed in full compliance with Vietnam's water, environmental and construction laws and relevant safeguard procedures that have been fully mainstreamed into the selection procedures under section II-E of the project proposal and will form the core element of the ESMP and provide for ongoing screening as and when project areas and activities are being defined. PMU in each province will oversee and approve each proposed investment under component 1. Applications of construction works will have been reviewed and approved on the basis of the technical construction drawings for compliance with construction laws, the source of water being used, the quantity of water being requested to use, the number of users. Water usage will be metered and monitored through the national structures in compliance with national laws.

This ESMP will be further updated before the final application screening process for the Adaptation Fund ESPs to ensure that all smallholders benefitting from this activity co-funded by the Adaptation Fund, will be using the proposed water infrastructure work. A report on the screening and ESMP will accompany the annual PPR will be prepared and presented in the format included at the end of this Annex. This screening process will be part of the scoring of the project interventions.

As part of the PPR tracker the project will also report on all the indicators (including gender and youth), identifying those indicators that are not meeting their targets and propose the corrective measures being taken by the PMU. Below is a summary EMSP management plan and reporting requirements.

Environmental and Social Risk Management Plan

ESP	Level of risk	Risk mitigation measures
ESP 1 Compliance with the Law	No risk	▪ Mainstreaming the ESMP into the review and approval process to ensure it is compliant with legal requirements. ▪ The established Project Steering Committee (PSC) leads the project implementation to ensure its coordination and integration with the laws
ESP 2 Access and Equity	Low risk	**Potential risks** ▪ Women and EM may not have access to project information ▪ Percentage of women, youth and EMs participating in consultation activities on the design of water infrastructure and EWS may not reach the required gender representation (40% women) **Risk management** ▪ Ensure project targeting will comprise targeting criteria based on gender, youth and EM quotas. ▪ Distributing the project benefits fairly with no discrimination nor favouritism. ▪ Publicize the list of beneficiaries ▪ Select a list of beneficiary households with both husband and wife's names and write full names of the women in the invitation for design consultation; ▪ Invite community facilitators to be involved in disseminating project information.
ESP 3 Marginalized and Vulnerable Groups (MVGs)	Low risk	**Potential risks** ▪ MVGs face with various constrains (eg., floods, droughts, poverty, adaptation capacity) ▪ MVGs may disengage from project meetings and events because of different reasons **Risk management** ▪ Improve irrigation water availability and management for approximately 4,000 ha of agricultural land in Ma river and Lam river watersheds, and strengthen flood control and prevention for approximately 2000 ha of agricultural and residential land in two provinces; ▪ Build MVGs' resilience through adaptation activities (eg., raising awareness, upgrading pumping stations, establishing EWS and developing CSA through a participatory and gender sensitive approach. ▪ Ensure MVGs be invited to project's consultation meetings and incorporate their feedback; ▪ Maintain regular contacts with the groups during project design and implementation; ▪ Empower MVGs to make decisions on concrete adaptation actions, valuing their local knowledge and respecting their land, property and customary rights; ▪ Apply the *Household Methodology* with the targeting MVGs being monitored through regular household visits during the project implementation.
ESP 4 Human Rights	No risk	▪ The project will further diversify agricultural production including but beyond rice production with climate-resilient crops and access to market and value chain development. ▪ Mainstreaming of gender, using GALS, a change approach based on underlying principles of social and gender justice, inclusion and mutual respect. ▪ Stricly adhere to the Law on Democracy at Grassroot Level and the new Decree 59/2023/NDCP on Community Monitoring
ESP 5 Gender Equity and Women's Empowerment	Low risk	**Potential risks** ▪ Gender is likely considered as an 'add on' topic among cadres ▪ Little participation of women, especially women headed households in some program activities. ▪ The new Gender Law is likely issued in 2025, during the project implementation **Risk management** ▪ Ensure that gender considerations are integrated in each activity through targeted consultations. ▪ Allow women to participate fully and equally without suffering any adverse effect from doing so. ▪ Conduct a baseline survey on the gender gaps (social norms, access to

		resources, decision making, representation, benefits), climate impact, adaptation needs and capacity. ▪ Associate different stages and functions of any value chain under Component 2 with gender-specific knowledge, assets, decision-making powers and responsibilities. ▪ Promote gender sensitive approaches to agri extension, vocational training, business skills development, small-cale processing infrastructure, contract development and other value chain innovations (such as CSR and youth inclusion in STEM/technologies). ▪ Apply two main gender frameworks: i) Gender Action Learning System (GALS), a community-led empowerment methodology that can be adapted to different cultural and organisational contexts; ii) Women Economic Empowerment (WEE), a UNWOMEN's framework.
ESP 6 Core Labour Rights	Low risk	**Potential risks** ▪ A lack of contracts for vulnerable workers, particularly EMs hired for seasonal works. ▪ Regulations on working conditions such as working hours (no more than 48 hours per week) maybe disregarded by a contractor or third party organizations ▪ Gender based violence-- GBV may occur due to influx of labourers at the project area. **Risk management** ▪ Clauses of working conditions will be included in all legally binding instruments/contracts that establish the observance and fulfillment of these fundamental principles during the program. The monitoring and evaluation process will follow specific indicators related to this requirement, and non-compliance may cause the termination of contractual relationship. ▪ Ensure the seasonal workers do not take any risks, particularly risks related to OHS, working condition and payment. ▪ Require all contracts be complied with the minimum age requirements and all contractors maintain a labour registry for all contracted workers with supporting documents confirming the age of workers. ▪ GBV (gender based violence) is mainstreamed into all bidding documents/contracts; all contractors are required to prepare a Code of Conduct to prevent GBV and all workers of project contractors are required to to sign code of conduct, including provisions to prevent GBV.
ESP 7 Indigenous Peoples	Low risk	**Potential risks** A commune in the project is inhabited by Thai Ethnic Minorities. EMs have limitted knowledge and skills about climate adaption and resilience There is a low risk relating to transient impacts during construction (just, noise, waste generation and potential temporary disruption to farming activities). **Risk management** The Consultative Process with EMs have been consulted in compliance with AF requirements Update the EMP based on EMs' reflections to ensure that the design and implementation of projects foster full respect for EM' identity, dignity, human rights, livelihood systems and cultural uniqueness. Training and coaching is provided for EM on CSA and value chain TOT training for EM extension workers who can tranfer to other EMs EMP requirements are incorporated into all bidding and contractual documents for all construction works under Component 1; and EMP implementation is monitored during the implementation of construction activities.
ESP 8 Involuntary Resettlement	No risk	The established Project Steering Committee (PSC) leads the project implementation to ensure its coordination and integration with the laws
ESP 11 Climate Change	Low risk	**Potential risk** ▪ Primarily, CRWIS will promote CSA practices including: AWD; reclamation of manure to produce organic fertilizers; integrated fertilizer and pesticide management. **Risk management**

		▪ CSA knowledge and skills as well as climate-informed advisories will be provided to farmers with a focus on water-use efficiency. **Reporting** ▪ It is unlikely the project will have any negative impact on climate change. The project will therefore conduct the screening and report as soon as the project areas have been determined. In the unlikely event that the project is identified to have a risk to climage change, the project will develop an ESMP in relation to ESP 11 and monitor and report in the biannual progress reports; annual supervision reports to IFAD as well as the annual PPR to the Adaptation Fund; MTR and final evaluation and impact assessment.
ESP 12 Pollution Prevention and Resource Efficiency	Low risk	**Water permit** ▪ The project will work with the provincial authorities to screen and verify the proposed irrigation investments to ensure their sustainability and issue water permits. The water permit management plan has been detailed in section II – E of the proposal. It complies with the national standards surrounding water use as well as the AF ESP. **Off-farm irrigation** ▪ The project will ensure the off-farm irrigation may only be accessed with efficient water irrigation technologies. This will be verified and reported on. **Reporting** ▪ The project will submit biannual progress reports; annual supervision reports to IFAD as well as the annual PPR to the Adaptation Fund; MTR and final evaluation and impact assessment.
ESP 13 Public Health	No risk	▪ The project is expected to have an overall beneficial impact on the public health with improved access to water, climate-proofed yields and increase quality of produce that will also provide improved food security and nutritional benefits. ▪ No risk to public health resulted from the screening for determinants of public health in the EMSP in annex 4. It covered: income and social status; education; physical environment; social support networks; health services; land use; unsustainable farm g; and water. ▪ If and when community health is significantly affected, a health-impact assessment must be conducted and mitigation measures included in the project design.
ESP 15 Lands and Soil Conservation	Low risk	**The project will** ▪ Ensure that all the technical guidelines of the MAE will be observed during the implementation of agricultural practices to avoid any possible risk in this matter. In addition, information will be included throughout the execution of the project on the security, preparation, and response of the different actors in the locations in the event of extreme weather events that generate risks of soil degradation and human security. ▪ Plan for all activities which involve significant disturbance of soil or operating with drainage lines and waterways during the driest months ▪ Provide training that helps improve soil water storage, control erosion, improve soil structure, and boost nutrient management and will include understanding the impact increased drought stress can have on their particular crops, provide simple solutions to reduce water stress during droughts; using mulch to prevent soil evapotranspiration; and learn about the benefits of drip irrigation etc.

D. Consultation and Public Disclosure

The project proposal was developed through a gender and youth sensitive participatory approach. The field survey focus groups assisted the development of interventions and the activities were designed based on local community concerns. During the field surveys every effort was made to meet with women groups, ethnic minorities, women unions and youth unions at different levels. The stakeholder consultations have been very gender and youth focused with meetings being arranged with smallholders that were timed to be sensitive to their respective needs as well farmer's needs more generally. This was arranged by the PMU and local authorities with specific instructions to be gender sensitive. The design team's schedule (including a gender specialist) was arranged around communities' needs at times of day they suggested. It was also repeatedly requested to arrange separate women groups. The consultations were focused on developing an understanding of local contexts, challenges, existing adaptation practices to climate change impacts and to gain local perspectives on possible future interventions that will improve local adaptive capacity.

The main concerns that emerged from the consultation process have been integrated into the project design. These included: surprising climate change, lack of access to water for production; reports of inability to connect to sources of water due to absence of tertiary irrigation canals; complaints of erratic rainfall and serious droughts; inability to sell produce to the market; lack of access to desired credit due to collateral requirements; lack of market information, and lack of advice on market trends and crop diversification. Gender specific concerns include lack of confidence, unequal division of labor, limitted network capacity, lack of voice and agency, stigma and discrimination towards women headed households and women with disability. Youth complained about lack of employment, inability to access to technology in production and marketing, difficulty to access credit for start up, mostly due to high collateral requirements. In both Thanh Hoa and Nghe An, a significant number of young people have migrated either to the North or the South; some went abroad as 'exporting workers' to make both ends meet.

ESMP consultations of key stakeholders for outcomes 1.1. and 2.1 will be further undertaken as part of the verification of the application and the finalisation of the Screening and Environment and Social Management Plan (ESMP) under the proposed project. The aim of consultations will be to: (i) disseminate information about the sub-projects/components (irrigation scheme rehabilitation/modernization, land area benefiting from irrigation water supply, arrangements for an equitable water distribution system and ensuring at least 50 percent of farmers are women, criteria and conditionality for an efficient water use and sustainable agronomic practices, etc.); (ii) verify the identification of potential impacts and their proposed mitigation plan (ESMP); (iii) verify the significance of the impacts and the mitigation measures; and (iv) allow the stakeholders to express their concerns and opinion about the project activities. The consultations will be conducted at four levels: at the village, commune, district and provincial levels.

A formal presentation of the Screening and management plan will be made at the commune and district councils. The presence of the persons whose land is in the supplied area of the irrigation scheme and the group of land users will be present in these meetings. The presentation of the screening and ESMP required for the obtaining of water permits will be undertaken in the most appropriate way to the literacy level of the members present in the meetings.

Public Disclosure: for outcome 1.1. a copy of the screening and management plan will be submitted to the Commune People Committee where it can be accessed by any member of the villagers for future references. The projects will form part of the documentation that will be in public domain and will be available at the provincial management team offices for inspection with prior information.

E. Grievance Mechanism

The proposed project will utilize the existing IFAD's grievance mechanism to allow affected to raise concerns that the proposed project is not complying with its social and environmental policies or commitments. The consultative process with the community and beneficiaries aims to ensure prevention of grievances that might arise from the project activities. However, if at all, there are any grievances, the below redressal mechanism is proposed:

Grievance redressal mechanism would be shared with the community during the project inception workshop and subsequent meetings with the beneficiaries

As part of the grievance redressal mechanism, the contact details of the project partners - Cluster Coordinator/ Project Manager would be made available to stakeholders including project beneficiaries and the community. Contact numbers would be displayed at common or predominant places along– with the project details. This is expected to promote social auditing of project implementation. The grievance mechanism will be available to the entire project intervention areas. However, the functionality of the mechanism rests with the beneficiaries considering that the project including the grievance mechanism is envisaged to be a bottom up approach.

Grievances are aimed to be addressed at the field level by the project team which will be the first level of redressal mechanism. If the grievance is not resolved at the field level, it will be escalated to the PMU

and then to IFAD who will be responsible for addressing grievances related to violation of any of the provisions of Environmental and Social Policy of the Adaptation Fund. All grievances received and action taken on them will be put up before the PMU and Steering Committee meetings and will also be included in the progress reports for reporting and monitoring purposes.

F. Monitoring and Reporting

As described in section III – D of the proposal, the project will have a comprehensive monitoring and reporting programme that will include quarterly reports, technical reports, annual project reports, the AF PPR tracking, annual IFAD supervision mission reports, a Mid-term Review and a final evaluation and impact assessment.

In the logical framework, the Project elaborates M&E indicators to measure and monitor climate resilience, adoption of CSA practices and value chain development, gender and youth issues, and capacity development of community, farmer and government institutions.

The ESMP will involve the following Internal and External Monitoring process:

Internal Monitoring Process: The internal monitoring will be undertaken by the PPMU. Each of the environment and social parameters will be monitored along with the implementation of their mitigation measures. The project will submit a Compliance and Impact Monitoring Report to the IE every six months and the consolidated report will also be annexed in the Annual Report.

- Daily monitoring will be carried out under the coordination of the environmental team formed by the Contractor.
- The construction activities shall comply not only with contractual environmental protection and pollution control requirements but also with environmental protection and pollution control laws of the Socialist Republic of Viet Nam (i.e., Decree No. 15/2013/ND-CP on quality management of construction works; Circular No. 04/2017/TT-BXD dated March 30, 2017 of the Ministry of Construction providing regulations on occupational safety management in construction work; Circular 08/2017/TT- BXD on construction waste management).

Monitoring activities includes:

- Compliance monitoring: i) Where all safeguard requirements are met according to safeguard policy statements; ii) Develop and update checklist of lead information and data to acquire during implementation;
- Quality monitoring is required : i) To assess the adequacy, suitability, effectiveness and efficiency of ESMP implementation; ii) To include monitoring variables;

External Monitoring Process: An environmental audit and Social Audit will be carried out in sample villages within each province every year to verify the implementation of ESMP and to report on the conduct of ESMP and its impact in the village. The Audit Reports will be shared with the IE, and a consolidated statement of these audits will be annexed to the Annual Report of the project.

1. Implementation Schedule

The implementation schedule of ESMP will be as follows:

Activities	Time					
	PY1	PY2	PY3	PY4	PY5	PY6
Development of technical guidelines for the project		Q1				
Capacity building of project team		Q1				
Environmental and Social Screening	Q1-4	Q1-4	Q1-4	Q1-4	Q1-4	
ESMP of water infrastructure works	Q1-4	Q1-4	Q1-4	Q1-4	Q1-4	
Implementation of ESMP	Q1-4	Q1-4	Q1-4	Q1-4	Q1-4	
Monitoring and reporting of ESMP	Q1-4	Q1-4	Q1-4	Q1-4	Q1-4	Q1-4

2. Cost for Screening and ESMP

The preparation and implementation of ESMP will have costs that have been built in to the project budget. The cost implications and their source of funds will be as follows:

ESMP related activity	Source of funding to cover costs
Capacity building of project team	Built-in the Project Execution Cost

Preparation of screening and ESMP	Built-in the Project Execution Cost
Screening and ESMP	Built in the Project Execution Cost
Mitigation measures	Built in the Project Execution Cost
Monitoring and reporting	Built in the Project execution cost

G. Institutional Arrangements and Capacity Building

In line with the project's implementation arrangement specified in the project design, the project/subproject owners are implementing agencies and therefore responsible for ESMP implementation. The PPMU will be responsible for ensuring effective application of the ESMP for all activities. Predominant responsibility of implementation will belong to the PPMU safeguards specialists (two per province, one focused on environment/climate, and the other focused on social inclusion/gender).

The PPMU-level responsibility includes overall planning and supervision of E&S activities, including the hiring of qualified national E&S capacity building consultants – individual or firm – to provide E&S training and TA including supervision, monitoring, and reporting of E&S implementation to IFAD/AF every six months. When necessary, the PPMU will also ensure training and coordination with the Department of Health (DOH) in instances where activities involve occupational health and safety or similar subjects of overlap.

The PPMU subproject owners are responsible for: (i) hiring a qualified specialists (two per province) to prepare and finalize E&S documents (ESCMPs, ECOPs, updated SEP, annual EM Plans, etc.); (ii) securing IFAD clearance of E&S documents and approval of the government; and (iii) implementing the ESCMPs, SEPs, EM Plans, and Gender Action Plan. A qualified national consulting firm may be hired to assist during the implementation of the ESCMP, SEP, and EM Plan, and Gender Action Plan, if needed. This may include support to monitoring of environmental quality and preparation of E&S monitoring reports for submission to the CPMU. The subproject owner will also ensure that the (i) final subproject design has incorporated measures to mitigate potential negative impacts during construction and operations; (ii) final ESCMP, ECOP and COC on Workers' behavior and SEA are incorporated into bidding and contract documents; and (iii) contractors are aware and committed to complying with these obligations, with E&S actions built into the contract cost. After approval, the subproject owner is responsible for ensuring that the ESMP, SEP, EM Plan, ECOP, and COC on SEA (if applicable) are effectively implemented and monitored. Before construction, the subproject owner will assign a Construction Supervision Consultant (CSC) and/or field engineer to be responsible for day-to-day supervision of contractor performance on E&S and report the results in the subproject progress report.

Organisation/ Designation	Responsibility
PPMU	The PPMU will be responsible for ensuring effective application of the ESMP for all activities
PPMU Safeguard Specialists (one in each province) under the supervision of PPMU Director.	▪ Prepare Screening and ESMP through the process of community consultation and through field visits to the target water infrastructure works. ▪ Coordinate with experts (civil engineering, agriculture engineering, climate change adaptation, natural resources management...) for the screening of impacts on soil and water, biodiversity and natural resources. ▪ Plan and oversee E&S activities ▪ Ensure training and coordination with the Department of Health (DOH) on OHS if needed. ▪ Prepare a Presentation of Screening and ESMPs, oversee implementation of ESMP that will be undertaken by field staff members and service providers.
The PPMU subproject owners	▪ Hire qualified specialists to finalize E&S documents (ESCMPs, ECOPs, SEP, annual EM Plans, etc.); ▪ Secure IFAD/AF clearance of E&S documents and approval of the government; and ▪ Implement the ESCMPs, SEPs, EM Plans, and Gender Action Plan (with assistance of a hired consultant, if needed) and prepare E&S monitoring reports for submission to the CPMU. ▪ Ensure that the (i) final subproject design has incorporated measures to mitigate potential negative impacts during construction and operations; (ii) final E&S documents are incorporated into bidding and contract documents;

	and (iii) contractors are aware and committed to complying with these obligations. ▪ Ensure that E&S documents are effectively implemented and monitored.
Application Evaluation Committee (PPMU Director, Adaptation Fund Climate Specialist, Consultant/Engineer)	▪ Review Screening and ESMP. It can also undertake sample checks and give expert opinion on the quality of Screening and the mitigation measures identified in ESMP. ▪ Monitor and review the process of Screening and ESMP. Review the prepared Screening to ensure it fulfils acceptable standards and quality. ▪ Make recommendations to Selection Committee
Selection Committee (including MAE, MoF)	Final approval of grant including ESMP.

H. Estimated ESCMF implementation cost

Description	**Cost (US$)**	
Staff cost	AF	Government Contribution
Environment & Climate Safeguards Specialist in Thanh Hoa	26,400	26,400
Environment & Climate Safeguards Specialist in Nghe An	26,400	26,400
Gender & Social Safeguards Specialist in Thanh Hoa	26,400	26,400
Gender & Social Safeguards Specialist in Nghe An	26,400	26,400
Project Monitoring & Evaluation Expert in Thanh Hoa	26,400	26,400
Project Monitoring & Evaluation Expert in Nghe An	26,400	26,400
Environmental and social studies/assessments		
Environmental and social studies/assessments in Thanh Hoa	40,000	
Environmental and social studies/ assessment in Nghe An	40,000	
Capacity building & training		
Capacity building & training in Thanh Hoa	40,000	
Capacity building & training in Nghe An	40,000	
TOTAL COSTS	**318,400**	**158,400**

Annex 4. CRWIS PROJECT GENDER ASSESSMENT

Note: The Report was conducted before the merging process taking place in July 2027. Therefore, database and information collected were based on the existing institutional arrangement (districts still existed). After the merging process, the target communes under the previous target districts are no change. Therefore, all the database and information are still valid.

Contents

I. BACKGROUND

Over the past few decades, Viet Nam has made significant progress in promoting gender equality and women empowerment, being signatories to a range of international conventions and showing a strong commitment to fulfilling its obligations. Viet Nam has developed or revised legal frameworks and policies to promote gender equality, notably the Law on Gender Equality and the National Strategy on Gender Equality 2021-2030. In 2023, Viet Nam's ranking on gender equality increased from 83rd to 72nd out of 146 countries (World Economic Forum's Global Gender Gap Index). Despite these efforts, Viet Nam continues to face gender-related challenges, such as sex ratio imbalance at birth, gender based violence, limitted voice and agency among poor women and ethnic minorities as well as a lack of consistent implementation of gender equality legislations.

Cultural norms are slower to change and continue to stay rooted in a patriarchal system. These persisting norms and beliefs about men and women underlie the gender gaps and inequalities in Vietnamese society: unequal opportunities provided for leadership and decision-making roles, the ongoing reality of gender inequality despite existing laws and policies, the distinct roles men and women have within the home and within agricultural practices, and unequal access to resources such as information, finance, technology, market and employment. As embedded in the cultural norms, men are more involved in activities outside of the household, including community associations, and have more leadership and decision-making authority within them. As the project looks to involve the community in the water integrated management, special consideration must be taken to not only get women to participate, but also elevate their influence within the water integrated management.

Poverty and inequality affect the ability of households to adapt to climate change. For example poorer households may lack confidence, knowledge, skills and capitals needed access non-farm employment or invest in new livelihoods with less exposure to climate change.[125] Some of the highest levels of vulnerability and low adaptive capacity in the project area are amongst the landless, who are predominantly ethnic minorities or female-headed households. Additionally, rural women have less adaptive capacity than men. Women's livelihoods and roles within the household make them highly dependent on natural resources and therefore more vulnerable to adverse effects of climate change. Likewise, women and ethnic minorities are also more vulnerable than men due to limited asset ownership, reduced access to capital/credit and agricultural inputs, limited access to information, lower awareness of climate adaptive strategies, less diverse income sources, and more reliance on seasonal, unstable, and low-paying jobs.[126]

Employment.

In Viet Nam women continue to form a large majority of the working poor, earn less income, and are more often affected by under- and un-employment and precarious working conditions than men. Women in Viet Nam are principally found in lower paid occupational sectors or in vulnerable employment. The majority of women work as unpaid family workers (18.84 hours per week, 2 times higher than men[105]), and in largely "invisible" areas of informal employment as migrant domestic workers, homeworkers, street vendors and in the entertainment industry. Women's position in the labour market is largely affected by socio-economic disadvantages caused by gender-based discrimination. Vietnamese women often have less access to productive resources, education, and skills development and labour market opportunities than men. In great part, this is because society assigns both a lower status and most of the unpaid care work to Vietnamese women, and expects them to engage in productive work in subsistence agriculture and the market economy.[106] Intersecting forms of discrimination and disadvantage compound the difficulties faced by certain groups of women, such as women living with disability, migrant women, Ethnic Minority women and those living in rural areas, single mothers, as well as older and elderly women. These groups of women typically face greater barriers to opportunities, and lower returns on their labour and market engagement.[107]

Women in agriculture.

Women are more likely to be employed in subsistence agriculture than men. Ten years ago, agricultural employment accounted for more than one-half of working women in Viet Nam, in 2019, agriculture accounted for 36.1 per cent of female employment. The services sector taken together (i.e. market and non-market) represented the largest sector of employment.[108] In Thanh Hoa and Nghe An provinces, women are involved in agricultural activities, mostly cultivating subsistence crops and raising small numbers of livestock. The average land size for agricultural production per women ranges from 500 m^2 to 2,000 m^2. However, women have limited access to agricultural advisory and extension services, training and technology transfer due to various gender-biased social norms such as men being considered head of households. This has led to their limited knowledge, skills, competencies, and low productivity. While men and young people are leaving villages to work in other sectors, women need to spend more time working in the field. Focus group discussions with women in five communes across two provinces reveal that women earn low profits from agricultural production and face challenges in finding alternative or

[105] MOLISA. 2023. Report on implementation of the gender equality national targets. Vietnam
[106] ILO Equality and Discrimination in Viet Nam Equality and discrimination in Viet Nam | International Labour Organization (ilo.org) (accessed June 2024)
[107] UNWOMEN (2021) Country Gender Equality Profile Viet Nam 2021
[108] Ibid

supplementary employment. Their profits from agricultural value chains are minimal, and they depend on traders who purchase their products at fluctuating market prices.

Youth

Youth are defined as people between 16 and 30 and account for 22.5% of the population: 20.31% and 21.53% in Nghe An and Thanh Hoa respectively in 2022[109]. While this unique demography can be an advantage, youth unemployment rates have only increased from 3.5% (2010) to 7.4% (2022); the effect of COVID-19 on young women's employment was worse than young men, particularly because the consequences fell most on sectors employing a large proportion of women. Of the youth in Nghe An and Thanh Hoa, about a third were engaged in agriculture-related activities (34.05% in Nghe An, 32.3% in Thanh Hoaii) in 2022, and an equal proportion leave the district or province for employment (34.17% of Nghe An, 27.5% of Thanh Hoa). Thanh Hoa (27.5%) has a higher proportion of youth employed in the industry or service sector, particularly in Hoang Hoa factories, compared to Nghe An (5.95%). Naturally, a higher proportion of youth are employed in Thanh Hoa (87.5%) than in Nghe An (63%)[110]. Rural youth engaged in agriculture face multiple challenges, including insufficient capital and awareness of technologies, and limited access to land. Consequently, youth prefer to migrate or work in non-agricultural sectors.

In an effort to address unemployment, the government has instituted policies and programmes on vocational training and entrepreneurship[111]. For example, young people can borrow money from the National Youth Union Fund for new start-ups; however, the size of the loans is limited (about 100 million VND, USD 4,217). Nghe An and Thanh Hoa officials are keen to engage youth in high-value agriculture with agri-businesses, and encourage youth participation in eco-tourism, traditional crafts, and other activities. There's also potential for youth to be up-skilled in irrigation development and operations.

Ethnic Minority

The Ethnic Minority (EM) in the project area are the Thai community, who primarily reside in the western part of Nghe An province, including the mountainous district of Con Cuong. Their living areas are characterized by rugged terrain, dense forests, and river valleys, which shape their way of life and economic activities. Social conditions, religious practices, and decision-making processes of the Thai Ethnic Minority are influenced by their unique cultural heritage and historical background. Living in rural and mountainous areas, the Thai people predominantly engage in agriculture, including wet rice cultivation, animal husbandry, and forest-related activities. Their traditional lifestyle is closely tied to their environment, with a strong emphasis on community and family ties. Social status within the Thai community is often linked to age, gender, and contribution to the community. Elders are highly respected for their wisdom and experience, while men generally hold more prominent roles in public decision-making. However, women also play vital roles, especially within family and in managing household affairs. Social status can also be influenced by one's skills, knowledge of traditional practices, and involvement in community activities. The decision-making process is often communal and collective. Village elders and community leaders, who hold significant respect and authority play a crucial role in guiding decisions related to cultural ceremonies. Decisions are typically made through discussions and consensus during community meetings, ensuring that the voices of different members are heard and considered. Decisions within households are often made in the same manner, although this process may differ from household to household. Culturally, The Thai in Nghe An is known for its rich cultural heritage, including traditional music, dance, and clothing. The Xoe dance and the use of traditional musical instruments like the bamboo flute and drum are prominent cultural expressions. Traditional Thai clothing, characterized by colorful patterns and intricate designs, is worn during festivals and important ceremonies. The religious practices of the Thai people are deeply rooted in animism and ancestor worship. They believe in a variety of spirits associated with natural elements such as mountains, rivers, and forests. Ancestor worship is an integral part of their religious life, with regular rituals and offerings made to honor deceased family members and seek their protection and blessings. Festivals and ceremonies, such as the Xang Khan festival, are essential in their religious and cultural life, providing opportunities for community bonding and the reinforcement of cultural values.

The Thai people in the project area primarily cultivate rice (500-1,000m^2/household), solanum procumbens (Cà gai leo), acacia (Keo), maize, green melon, peanut, and sugarcane. They also raise livestock (cow, pig, chicken) for food and additional income. Consultations with the Thai people in Chau Khe commune, Con Cuong district, highlight their difficult situation. Due to low profits from agricultural production, most young people have left the commune to seek employment in other provinces and abroad. The remaining Thai people are highly vulnerable to climate change impacts such as droughts and floods due to their geographical location, dependence on agriculture, and socio-economic conditions. Mountainous areas, where the Thai people live, are susceptible to extreme weather events. Steep slopes and deforestation can exacerbate the effects of heavy rainfall, leading to landslides and flash floods. Some Thai communities are located in river valleys, making them vulnerable to riverine flooding. Changes in rainfall patterns can

[109] DOLIA in Nghe An and Thanh Hoa
For Nghe An: https://drive.google.com/drive/folders/1ImpN2HSEPqjdLL76PK_DwDR2WngyXmu0
For Thanh Hoa: https://drive.google.com/drive/folders/1S4Vl5LusH0YPVJ-PSlzT1KfLqktJcC8K
110 Data provided by Youth Union of Nghe An and Thanh Hoa Provinces, 2024.
[111] Decision 1331/QD-TTg on the Vietnamese Youth Development Strategy 2021-2030 was released on 24 July 2021.

lead to sudden rises in water levels, inundating homes and agricultural land. Extended periods of drought can lead to water scarcity, affecting both drinking water supplies and agricultural needs. The consultation with Thai women reported that prolonged droughts sometime destroy their whole crops. However, the men's group stated that drought is not a big problem because they live next to a hydropower dam. This results in food insecurity and increased competition for limited resources. Floodwaters can also contaminate water supplies, leading to health risks such as waterborne diseases.

According to the Thai people consulted, the irrigation system is degraded, leading to an insufficient water supply, and fields in higher locations cannot receive enough water. Thai farmers are required to pay an annual fee to the village irrigation team, despite frequent delays in the water supply. Although weather forecasts are disseminated through various channels, no effective solutions have been identified to mitigate the negative impacts of climate change on their daily lives and agricultural production. Thai farmers have experimented with various crops considered more resilient to climate change, but the results have been limited. Some crops are still destroyed by extreme weather conditions, while others are more resilient but have low productivity.

Health. Average life expectancy at birth has risen steadily from 74.6 in 2008 to 75.3 in 2018, with women's life expectancy an estimated eight years longer than that of men's. At 79.4 years, Vietnamese women live longer than the average life expectancy for women, globally (74.3 years). Viet Nam has made exceptional progress in improving maternal health, over the period 1990 – 2015, the maternal mortality ratio (MMR) declined by 4.4 per cent annually, one of the highest global annual rates of change.179 In terms of deaths averted, the MMR declined from 69 per 100,000 live births in 2009 to 46 in 2019. There was also a corresponding drop in the under-five mortality rate over the same period, from 24 per 1,000 live births in 2009 to 21 in 2019. Health inequities are prevalent along ethnic lines in Viet Nam. Data in 2015 showed that the overall average life expectancy of the 53 ethnic minorities was 72.1, one year younger than the national average at 73.2 at the time.[112] However, the difference appeared to have widened, with data in 2019 suggesting a gap in life expectancy of nearly three years - 70.7 years for Ethnic Minority people as compared to 73.6 years, nationally.[113]

Unpaid care work. Vietnamese women spent around 270 - 300 minutes per day on unpaid care work, as compared to 140 - 170 minutes per day for men.[114] The 2019 Labour Force Survey showed that women and men spent 18.84 hours and 8.93 hours, respectively per week on housework. The time spent by women on unpaid care work is more than double that of men. The economic value of unpaid care work can be measured by the time spent performing the work. The ILO estimates unpaid care work to be around 9 percent of global GDP or USD 11 trillion, in which the value of women's unpaid care work accounts for 6.6 percent of global GDP or USD 8 trillion.[115]

Gender based violence (GBV). Despite the progress identified by the above indicators Gender Based Violence still exists in Viet Nam. 62.9 percent of Vietnamese women had experienced a form of sexual, emotional, economic or physical violence in their lives, and 31.6 percent had experienced such violence in the last 12 months (UNFPA, 2019). GBV also includes physical violence, and 'one in 10 injuries required medical treatment being caused by physical and/or sexual violence' in Viet Nam (UN Women, 2021).

Women exposed to climate change. Vietnam is particularly vulnerable to the adverse effects of climate change and natural disasters. The increased frequency and severity of natural disasters and the impacts of climate change are posing new challenges to gender equality and women's empowerment in rural areas. Women are more likely to depend on small-scale and subsistence agriculture such as vegetable production, and small livestock that are prone to loss when disasters strike. Women's small and medium businesses are under-capitalized and concentrated in food and retail sectors that are more vulnerable to the impact of disaster. Additionally, women are more likely to deal in perishable goods or small retail operations that are more exposed to losses during disasters and have fewer assets that support them to absorb shocks. Women from poor and Ethnic Minority households, have fewer savings or other resources to cope with losses which is compounded by restricted access to land and assets needed to secure financing at such times. A lack of formal land ownership can limit women's access to post-disaster financial or in-kind assistance for damaged land or crops. Women's comparatively limited access to and control over household assets and resources restrict women's options to diversify their livelihood options to respond to climate change. Rural women are more likely to be engaged in low-yielding subsistence agriculture that is more at risk in a disaster and through the impact of climate change. A high dependency on land and natural resources for livelihood generation by women who are considered poor and from Ethnic Minority groups make them more vulnerable. Less access to resources, credit, markets and extension services seriously disadvantages poor women and men and limits their coping strategies.

Gendered impacts of climate change in agriculture.

[112] Committee for Ethnic Minority A-airs, UNDPA, and Irish Aids. 2016. Ethnic Minorities and Sustainable Development Goals: Who Will Be Left Behind? – Results from analyses of the survey on the situation of 53 ethnic minorities in 2015.
[113] General Statistics Oce. 2020. Results of the Survey on the Socio-economic Situation of 53 Ethnic Minority Groups 2019. Hanoi: GSO.
[114] Action Aid, 2016. Make a House Become a Home; Action Aid. 2017. Unpaid Care Work: Redistribution for Sustainable Development
[115] UNWOMEN (2021) Country Gender Equality Profile Viet Nam 2021

According to a report prepared by FAO (2019), agriculture contributes 21% of Viet Nam's GDP, and employs over 47% of the country's labor force. Women constitute a critical workforce in agricultural production, especially in rural areas, where 63.4 percent of working women are in agriculture compared to 57.5 percent of working men (41). The relatively larger proportion of women in the agricultural labor force is the result of the 'feminization of agriculture'; that is, women having to take up a rising share of farmwork due to the outmigration of men to the city to pursue urban job opportunities. At the same time, they continue to play other roles that include reproduction, community development, and taking care of the elderly and children.

Vietnamese women and men undertake different roles and responsibilities in agriculture. In animal husbandry, women are found to be more involved in taking care of poultry and production of dairy products, as well as food processing, preparation and selling, while men tend to take on work related to large animal care, fishing, hunting, and slaughter. In the fields, women undertake planting and grass cutting, while men are in charge of pesticide spraying. In the community, women tend to attend meetings organized by the Women's Union or those associated with family planning and population, while men participate in a wider range of political activities such as those relating to law, security, and agriculture/ forestry extension.

In Viet Nam, agriculture and animal husbandry are not lucrative activities so men from rural areas who assume the gender role of being the primary provider of the family, tend to migrate to urban areas to pursue other income opportunities; especially since extreme weather events create higher fluctuations in agricultural production (45). Women remain in the countryside, and assume responsibility for agricultural production and food security, as well as taking care of children and the elderly (46). According to Josephine et al., (2019) the majority of them are older women and women with infants who do not have opportunities to leave the rural work in agriculture. This results in the 'feminization" of agriculture, whereby farming is not only done by women, but women are also expected to stay in rural areas to undertake farming activities and practices due to gendered norms and rules. Similarly, in CRWIS area, rural to urban migration is a common phenomenon where more migration of male heads of household compared to other regions and most migrants are youth - both young women and young men. Young people typically find agriculture to be an unattractive sector for employment. As they move out from rural areas to find other employment, young people leave behind an aging population of farmers, who may not have as much incentive or ability to implement CSA techniques. The aging population in the two provinces also increases the dependency ratio in households, adding pressure for household income and increasing women's unpaid labor to care for children and elderly. Likewise, in cases where male heads of household have migrated, women are left with more responsibility, both in rice production and other income generation.

National projects show that the most affected groups are ethnic minorities largely due to their marginalized status and lack of voice. Research shows that these groups have little say in decision-making processes that affect their lives. Projects that ignore gender and other forms of social exclusion can sustain or exacerbate disadvantage among ethnic minority communities (V1 USAID 2023). For CRWIS, Thai EM is the focus of this project. At the national level, gender inequality is more pronounced in ethnic minority groups than in the majority Kinh ethnic group. However, discussions with women in Con Cuong (Nghe An) show that gender equality was quite good among Thai communities: women contributed equal percent of household income, had equal access to education opportunities as men, and were equally involved in resource management. However, discrimination against people with disabilities is a serious barrier to their participation in Vietnam and CRWIS provinces as well including decision making and access to assets. There is limited information available on the roles they play within agricultural production in the project area.

The loss of livelihoods and independent sources of income for poor women through natural resources can disrupt gender relations within families and communities and push women into situations of greater poverty, vulnerability, and financial dependence. In general, the positive impacts from large-scale infrastructure tend to benefit men more than women. The negative externalities (such as family and social disruption due to resettlement, loss of livelihoods, sexual exploitation and abuse from labor influx, or other changes in the community tend to affect women more than men. (V1 USAID 2023)

Climate change leads to different choices about crops, management, and investments. In theory, CCA projects would promote drought- or salinity-tolerant species to cope with ecosystem changes, but new species could put families at risk. If new crops or varieties are profitable and dominated by men, they may result in displacing women from the plots where they previously cultivated subsistence food crops and the increased income may not go toward family expenses.

Climate changes may increase agricultural labor demands. New breeds of animals and high-yield crop species often require high levels of care and more inputs than traditional varieties. For animal husbandry, women's workload may increase. If new cash crops are only provided to men, women's traditional workload and responsibilities for family nutrition are likely to increase. This project needs to consider the issues of women's time, risk management strategies, and responsibilities for family food security. If interventions are well designed, increasing time- and labor-saving technologies that are useful to women can have an overall positive impact on household livelihood and productivity.

Climate change can result in seasonal food shortages. Rural households have traditional strategies for ensuring food supplies in the event of floods and droughts. Women are often responsible for food and seed storage. They generally control small livestock and process their by-products that can be a source of ready cash in emergencies.

II. PROJECT INFORMATION

The project goal is to "Strengthen climate resilience and social inclusion of water-insecure rural communities for a sustainable socioeconomic development in Thanh Hoa and Nghe An provinces". The Project Development Objective (PDO) is Increased adaptive capacity of communities to respond to the impacts of climate change

The CRWIS project will be implemented in two districts (Ha Trung and Hoang Hoa) in Thanh Hoa province and six districts (Con Cuong, Anh Son,Do Luong, Thanh Chuong, Nam Dan and Hung Nguyen) in Nghe An province. In Thanh Hoa province, CRWIS will target 24 communes out of the 57 communes in the two targeted districts, accounting for 32,000 beneficiary households or 120,000 individuals (33.2 per cent of the overall districts' population); and in Nghe An province, the project will target 38 communes out of the 142 communes along the Lam river watershed in the six targeted districts, accounting for 41,800 beneficiary households or158,000 individuals (16.9 per cent of the overall districts' population). As the target, women will represent 50 per cent of the direct beneficiaries and youth will represent 20 per cent.

III. GAPS AND BARRIERS

1. Legal and institutional gaps.

The prevailing gender norms of Vietnam - female deference to male perspectives and preferences, and a focus on ensuring family stability and happiness - and women's underrepresentation in politics shape the development of laws and policies at different levels of society. The policy framework across different sectors does not adequately address women's unique needs and priorities, including in agriculture and the environment. Institutionally, several bodies are tasked with promoting gender equality, with MOLISA and WU being the key ones, with input from other ministries and sectors. While, WU represents women and promotes equality, its ability to affect legislations is limited. There is a mix range of policy frameworks on gender matters, from political engagement to social and economic development of women, including land ownership, property and inheritance, and political representation. These laws are in line with international best practice and have budget allocations. Vietnam has also ratified numerous international conventions on advancing gender equality. **Below are key legislations on CC and GE:**

- **The National strategy on climate change for the period to 2050, issued in July 2022** by the Prime Minister, includes specific tasks to *'ensure social security and gender equality',* focusing on raising awareness, knowledge and capacity of women for DRR and CCA, as well as strengthening the role and participation of women, in addition to developing policies on mobilizing and managing financial resources to encourage and strengthen the participation of businesses and people, especially women.
- **The National Strategy on Gender Equality for the period 2021-2030** gives specific indicators in politics, education, healthcare, economics and labour, including the agriculture sector. Some of them (e.g., the ratios of women leaders, wages, education and time for unpaid work) relate to women's needs, access to resources and decision-making for CCA.
- **The Law on Natural Disaster Prevention and Control (2013)**, issued by the National Assembly, regulates disaster prevention and control activities and the rights and obligations of agencies, organizations, households, individuals and international organizations in disaster prevention and control. Gender equality is considered as one of the basic principles of disaster prevention and control.
- **The revised Law on Environmental Protection (2020)** mentions that "Environmental protection is in harmony with social security, children's rights, gender equality, ensuring everyone's right to live in a healthy environment" in Article 4.
- **The updated NDC (2020)** makes multiple references to the impacts of climate change on women.
- **The NAP for 2021-2030 with a vision to 2050**, enacted in 2020 by the Prime Minister (Decision No. 1055/QD-TTg). Currently, the Department of Climate Change (DCC) under MONRE has the responsibility to guide and monitor the implementation of the NAP (Decision No. 1266/2017/QD-BTNMT dated 25/10/2022 of MONRE) and CCA activities within MONRE based on Decision No. 148/QD-TTg.
- **The National Monitoring and Evaluation System for Climate Change Adaptation Activities** (Decision No. 148/QD-TTg) issued by the Prime Minister in January of 2022 introduces two gender indicators for effectiveness assessment of CCA activities, listed as follows: a. Percentage (%) of people and women in vulnerable areas due to climate change impacts who received vocational training and changed livelihoods (indicator 8.2).; b. Percentage (%) of people and women in vulnerable areas due to climate change impacts who are trained in soft skills on climate change adaptation, natural disaster prevention and control (indicator 8.3).
- **Gender and inclusion (GESI) in Climate and Agriculture Policy**. There are several policies advancing women and EM equality and development in these areas such as the Law on Environmental Protection, the MARD 2016 Action Plan on Climate Change and the National Strategy on Climate Change for 2050. The Land Law allows women to have their name listed on titles, with equal ownership rights to their husbands. Government policy on access to credit in rural areas is generally favorable, with women accessing finance through the Vietnam Bank for Social

Policies, the Women's Union and the Youth Union. CRWIS provinces have also issued several policies such as the Thanh Hoa's Document 4210/UBND-NN regarding requirements for district and commune to report on NDC 2022 and the implementation of National CC Strategy until 2050 and the Nghe An's Environment Report 2022 for the Nghe An Master Planning 2021 Vision 2050.

However there are a number of challenges, including:

- First, while some progress have been made recently to increase the governance mechanisms developed to accelerate the cooperation between MOLISA and other ministries on climate change, the institutional gaps remain with respect to integrating climate change considerations within the gender equality framework, and vice versa and there are limited institutional arrangements to ensure coordination between technical institutions and ministries working on climate and gender issues. For example, MONRE (now MAE) is not a member of the NCFAW (Decision No. 114/QĐ-TTg dated 22/08/2008 of the Prime Minister). Neither MOLISA nor VWU participate in the NCCC. While the Ministry of Planning and Investment (MPI) is the state agency tasked with the allocation of climate finance, the collaboration between the Gender Equality Department (under MOLISA) and MPI is still limitted to ensure that women will also obtain the benefits of investments in CCA . In addition, the level of awareness, understanding, and capacity to implement CCA and gender equality efforts and projects differ between ministries. For instance, the Ministry of Agriculture and Environment (MAE) has already received substantial support from UNDP through the National Adaptation Plan-Agriculture (NAP-Ag) project and from other development partners and CSOs to advance CCA and in the process, integrate gender equality. Others, such as the Ministry of Health (MOH) and former MONRE, have only recently started working on CCA.
- Second, GE has only been referred to in the Socio Economic Development Strategy as part of the solutions but is not yet an objective to be fulfilled in a similar way to other SED objectives. This indicates that gender issues have not been placed on a par with other socio-economic goals by Vietnamese strategic planners. The lack of attention to GE objectives is also reflected in the fact that the set of targets under the Strategy has no disaggregation by gender, even with the most relevant social targets. (UNV 2022 p27). Accordingly, the provincial governments of Thanh Hoa and Nghe An comply with the request of formulating climate plans and gender action plans stemming from the national level. However, gaps remain when it comes to integration into socio-economic development plans (SEDPs) and implementation. The implementation of gender strategies and action plans is still weak due to the absence of guidelines and the lack of sex-disaggregated data to provide further analysis and evidence on various aspects of gender equality. Technical capacities, budget and financial incentives to mainstream gender in climate policies are also lacking. Little is known about the gender equality in the workplace among private sector. IFAD requires that all workers of project contractors are required to sign code of conduct, including provisions to prevent Gender Based Violence, Sexual Abuse, and Sexual Harassment. However, GBV is little known by companies in general and contractors in particular.
- Third, prevailing biases and a lack of guidelines and incentives to implement these policies at the local level often means that these initiatives fall short. Government departments such as previous MARD and MONRE (now merged into MAE) generally do not have significant training on GESI issues, and mainstreaming suffers as a result. For instance, the MARD 2016 Action Plan and the accompanying Decision 819 do require gender integration and women's participation, but they do not include a specific gender component for any key task focusing on technical issues in the sector. The degree of mainstreaming across provinces also varies but it was not applied effectively in Thanh Hoa and Nghe An. CN mission found that both provincial authorities recognized the need for women's empowerment in the context of climate adaptation, but the climate risks are not fully recognized in the province's climate change action plans. Furthermore, at all levels of government, GESI targets often lack measures of success, and ME capacity is often weak, thus making it difficult to respond to challenges.
- Fourth, gender and EM issues tend to be poorly mainstreamed in sectors that are considered 'ungendered ' including environment and agriculture. The Law on Promulgation of Legal Docs states that gender integration is a principle of formulating new laws, but Article 59 states gender mainstreaming is only required if the laws have regulations related to gender equality issues. As women are also much less likely to participate in the highest levels of governance, they are unable to shape policies to ensure their specific needs being addressed. In addition, key women bodies such as the Women's Union and MOLISA, often uphold traditional gender norms, counteracting progress on these issues (57). As a result, despite being a formal priority for decades, gender equality policies in Vietnam often fail to achieve their goals. While authorities are encouraged to take gender and inclusion issues into consideration, they receive limited guidance or incentive to do so, and there are few mechanisms in place to ensure effective implementation. Policies often lack effective guidelines, targets and monitoring. Such policy shortcoming may result in important consequences for women and EM and reinforce male-dominated cultural norms.
- Fifth, the lack of clear guidelines and protections for women and minorities result in men receiving greater benefits. In practice men tend to benefit from mechanization and technology transfers. Men often engage more with agricultural extension services, with women more excluded from training and support. By contrast, women's roles

in agriculture, largely confined to planting, maintaining and harvesting in the fields, may expose them to harsher work environments. While the Land Law does allow joint land titling, in practice, many households only use the husband's name as the administrative procedures are simpler. Despite favorable formal credit policies, women and youth also face issues with having the collateral required for accessing loans, securing a viable divorce settlement, and claiming rights to land when widowed.

- Sixth, the national guide on M&E mostly focuses on quantitative indicators rather than qualitative and has very few indicators on gender. For example, regarding indicators on CC training: i) Number of civil servants, public employees, and employees who have been trained, fostered on climate change; ii) Number of civil servants, public employees, and employees participating in each training class/course or workshop on climate change (p89) ; iii) Percentage of people receiving information and raising awareness about climate change adaptation; iv) Total number of cadres, civil servants, public employees, and employees participating in propaganda and awareness-raising activities; v) Total number of cadres, civil servants, public employees, and employees of the ministry; vi) Participation rate (V GUIDE M&E 2023 p90)

2. Participation in decision making

Women's responsibility for housework and caregiving will impact the time they have available to participate in any project intervention, including training. Ensuring women and other traditionally excluded groups are able to participate in interventions is a critical first step to effective and equitable programming. Yet even if women, ethnic minorities, and persons with disabilities participate, the existing education gaps may make it difficult for these groups to absorb the relevant information in an actionable way. Additionally, application rates for new CSA techniques are often low among all farmers, even after receiving training. In this context, it will be important for the project to think critically about how gender dynamics affect participation, what knowledge is needed, and barriers to adopting new agricultural practices.

Capacity to participate. Women's busy workload with paid and unpaid work can make it challenging for them to participate in training, meetings, or other development activities. Some projects have found it helpful to schedule trainings or meetings during late morning or early afternoon to best fit women's household schedules. However, adjusting the timing of a training session does not guarantee that women will have the time or feel comfortable to participate. Activities take time that would otherwise be spent on household tasks or livelihood activities. The increased time burden is a common complaint women have about their experience with CSA development programs. This factor needs to be considered in the CRWIS design and, where possible, the project should find ways to reduce women's time burden through gained efficiencies in agricultural practices or by encouraging more participation of men and boys for household tasks traditionally done by women. Women also may not feel comfortable attending capacity development activities, given their lack of experience participating in training and cultural norms that suggest men are more appropriate to engage in activities outside the home. This can be mitigated by intentionally designing activities that target women's specific roles in agriculture, offering learning opportunities outside of the classroom (e.g., demonstration trials), and providing women's only spaces (including female trainers). Persons with disabilities, regardless of gender, also face cultural and physical barriers to participation, which can be mitigated with accommodations, such as targeted invitations, less emphasis on written materials, smaller learning groups, and access to transportation.

Presence and power in community decision-making: The project will work closely with community organizations, local government, and other groups to promote resilience within communities. These spaces tend to be dominated by men. As found in the CN mission, men are more involved than women in activities outside the home, including participation in community groups, local politics, and other public venues for decision making. This gap is further reinforced by unequal, gendered power dynamics within these groups that favor men's voice and leadership. By convening communities around issues like climate adaption and resilience the project has an opportunity to not just encourage women's attendance but find ways to shift the balance of power and ensure women have roles with influence.

The additional burdens on women's time, particularly their responsibility over unpaid care work in the home, and cultural biases toward deference to male perspectives on key decisions, mean that women may not be able to fully participate in policy dialogues and also less likely to be aware of policy and dialogue initiatives of interest to them. In addition, lower levels of female and minority representation at all levels of government may mean that policymakers are less receptive to messages on women's empowerment and resilience. CRWIS will solicit feedback and perspectives directly from these marginalized communities, aiming to understand their concerns and identify solutions. For example, dialogues should be held at times and in venues that are accessible to women and ethnic minority communities, and accommodations should be made to ensure that persons with disabilities may fully participate rather than simply be present. Policy discussions could also explore related issues hindering inclusion in CSA and value chains, including social protection policies and support schemes during adverse climate events.

Consultations with authorities in Thanh Hoa and Nghe An show that women are under-represented in water governance. There has been more progress in achieving greater gender balance at the community level, but their percentage still declines at national and provincial planning bodies. *Research shows that* Involving women in water governance leads to enhanced performance of companies and better water related outcomes (10 E1 ADB 2023)**.** Women's involvement in water supply systems design and maintenance results in user-friendly designs and improved customer satisfaction (IFC 2019; Thompson et al. 2017). Increasing gender diversity in the water sector workforce enhances financial performance, innovation, efficiency, and customer relations of water utilities (World Bank 2019). Women's participation in water committees improves water management and sustainability,

promoting socially inclusive, environmentally sustainable, and economically beneficial water practices (Thompson et al. 2017).

Women are less likely to participate in community meetings and decision-making structures, which leads to a lack of gendered perspectives in local CCA plans. (18 V1 UNDP 2022). There are gender differences in production decisions. At the commune, village and household level, men and women also have different roles in water works, aquaculture and the storage of food sources to adapt to climate change. In most areas, men more often than women grow cash crops and women sometimes lose access to land when men expand their plots or shift to new cash crops. In addition, men and women often have different and complementary bases of traditional knowledge about plant and animal care. Women often shoulder a major part of the responsibility for the maintenance of animal health and productivity and understand and monitor wild ecosystem conditions for forage. This knowledge also drives gender differences in production decisions.

3. Gender norms and Beliefs

Gender norms in Vietnam are rooted in patriarchal traditions that give men more power and privileges than women. Like most patriarchal societies, men are traditionally viewed as the 'stronger' or 'more capable' sex - believed to be better leaders, better at politics, more adept at using technology, 'pillars of family,' and the main decision makers within a household and society. On the other hand, women are seen as the 'weaker' sex - believed to be better suited to homemaking and caregiving, and valued for virtues such as beauty, gentility, and modesty. While men are also encouraged to value their family, the priority for them is providing cash for the family. This gender norm - that women are responsible for home affairs and men are responsible for affairs outside of the home - underlies many of the gender power dynamics discussed in this paper. Likewise, pervasive gender norms still dictate that male 'face' should be preserved, with the result that many believe women should not express their views publicly. Women are the day-to-day managers and are responsible for managing day to day household decisions, including finances, while men retain final authority for decisions around large assets.

In agriculture, these gender norms are manifested through gendered division of labor that give men any tasks deemed 'hard labor'. This belief that women are weaker is one underlying reason why women are paid less for agricultural work. On average, men earn 30 percent more than women for daily wage labor because men's agricultural work is considered 'harder' or requires more technical skills. Gender norms also stereotype women as more hardworking and meticulous in their agricultural work than men. In addition, men are stereotyped as being less responsible and women are expected to be better at managing household finances and paying back loans on time.

Although cultural norms suggest men as the default 'head of household' to make larger decisions, women do participate jointly or take full responsibility for many agricultural and household decisions. FGDs in Thanh Hoa and Nghe An found that decision-making on farm-related matters differ from household to household depending on a husband's short-term or long-term absence and the woman's level of experience, knowledge, and access to agricultural extension services and inputs. Clearly, lack of knowledge is a key barrier preventing women from weighing in on certain decisions in agri production and that access to training empowered women to more actively participate in these decisions within their household.

Although men are traditionally expected to work outside the home, gender norms in Vietnam are changing such that women have been increasingly participating in the paid labor market for decades. Both male and female family members provide labor in different livelihood activities, depending on social and economic status, gender roles, opportunity costs, and access to resources. Incomes from various sources are pooled and wives manage the family budget. For farming households in CRWIS area, rice income alone is typically insufficient); thus, women often raise small livestock or grow vegetables, while men may contribute through aquaculture, cultivation of other crops or working for others in construction works. Both men and women may pursue off-farm income generation or seasonal agricultural work, depending on the household's socioeconomic status and access to land

From the national to the commune level, women are underrepresented in politics and thus have unequal opportunities to influence decision making across sectors, including agriculture and climate change. For various authorities and sectors women often serve in supportive roles, such as deputy or vice chair, admin officer or financial officer, rather than in positions of authority. The Women's Union is an active avenue for women to engage in politics at the local, provincial, and national levels - however, this body's influence is constrained by lack of resources and understaffing, and by the limited way it is integrated into the rest of the political system).

This trend of women's low participation also carries over into other avenues for community-based decision-making, such as business associations, agricultural groups, and development projects. According to one study, only 2.5 percent of women are members of a trade or business association (29) and women's leadership within agricultural cooperatives is also reportedly low, at 23 percent (30). In addition to cultural norms that promote men as natural leaders, women also face other barriers to participation, including lack of time and access to information about these initiatives. Additionally, many development projects invite women to meetings but do nothing to redistribute power between men and women or increase women's influence on decision-making processes; their participation is prioritized as a part of consulting vulnerable groups, without being given influencing power in the design or management of the initiative.

Climate Adaptation. Men and women apply different strategies to cope with the effects of climate change and adapt their agricultural practices in line with their gendered roles within the household. Research shows that women (and female heads of household) are more likely to use savings or loans, employ expenditure saving strategies, sell livestock, raise their own vegetables or seek government aid in times of stress, while men (and male heads of household) are more likely to dispose of assets or do nothing (42). Among rice farmers in Thanh Hoa and Nghe An,

men are more likely to use fertilizers or pesticides, adjust water management, leave the field fallow, change cropping patterns, or change from crop to livestock, while women tend to store more seeds for the next season or use higher seed rates. Irrigated rice cultivation requires more heavy labor to set up and operate the irrigation system and therefore tends to involve more labor from men, while rain-fed cultivation retains more of women's involvement in traditional tasks. Men's role is also higher when responding to extreme weather events, such as floods, which require more heavy labor for replanting and preparing fields.

Skills for resilience. Due to cultural norms and gendered roles, women tend to be more responsive to the changing needs of their households. As caregivers and household managers, they have specialized experience and skill sets that could be scaled up to community resilience work if women had the opportunity and enabling conditions to participate in community-level activities and decision-making. The CRWIS Project has an opportunity to embrace women's skills and empower women to have more leadership and access to decision-making spheres, where they could influence communal practice and boost resilience.

When it comes to the adoption of CSA techniques, however, there are fewer differences in how men and women approach the decision. For example, in the Mekong Delta, CSA technology has a low to medium adoption rate among most farmers, regardless of gender, due to low availability of required inputs, high costs of installation, financial constraints, limited access to tailored information, and limited guidance and support for CSA adoption from the district and provincial authorities (46). Two studies did find that men were either more likely to use or more interested in CSA practices and climate adaptation strategies, which researchers attributed to women's lack of awareness of the benefits of these technologies and a perception that the strategies required high input costs (47). Women tend to prefer CSA techniques that are more cost-saving and are most concerned about employing strategies that have costly inputs or require specialized skills training (49).

4. Gender Roles, Responsibilities, and Time Use

Over the last decades, men's and women's roles have been changing yet cultural norms continue to heavily gender the responsibilities men and women have, both in livelihood activities and within the household. The division of labor is often based on the gendered assumption that men are physically stronger than women. Men are responsible for the tasks requiring heavy labor or specific technical skills, including use of machinery for preparing the land, managing irrigation, and applying pesticides; their involvement is more concentrated in preparation, crop care, and harvesting phases. Alternatively, women are responsible for tasks that do not require physical strength or specialized technical skill, including transplanting, weeding, and seed cleaning, selection, and storage; their involvement is highest in crop establishment and post-harvest phases (76).

Research shows that the **division of labor** in rice production can vary from household to household based on the demographic makeup of the household, the type of production system, challenges encountered, and degree of mechanization used. Men and women are both involved in rice production in Vietnam, but with differing contributions throughout the country. In the Mekong Delta, there is less out-migration of men than other regions, therefore, men do most labor in rice production. However, in many villages of Thanh Hoa and Nghe An with high level of men migration, women or women headed households take the main responsibility for all phases of production. Female-headed households, with absent or migrant male members, often experience labor shortages.

As households introduce more machinery into production, women's labor participation declines. Mechanization in rice production is changing the gender role. As men take on more roles, women become increasingly active in alternative livelihoods, such as livestock or non-rice crops. Both men and women contribute to a household's income outside of rice farming, however the type of livelihood activities done by each are heavily gendered. Shrimp farming, for example, involves mostly male labor, except for various duties women may hold at shrimp processing facilities. Mixed shrimp/fish and rice cultivation is becoming more common for households in some regions, but little is known about how gender impacts the division of labor for these activities.

The roles men and women play in agriculture are heavily gendered. Cultural norms dictate that women are responsible for managing the household - including chores like cooking and cleaning - and taking care of children and elderly. This norm is pervasive across the country and impacts the workload of all women, regardless of education level, ethnicity, age, location (rural/urban), marital or childbearing status. As elsewhere, women in Thanh Hoa and Nghe An have additional responsibilities for food production (vegetable gardens), collecting fuel for cooking, and securing water for domestic uses. These household responsibilities come in addition to other forms of income generation. The double burden of paid and unpaid labor means women have significantly less time than men to spend outside the home. This affects women's ability to participate in a wide range of activities, including agricultural extension; a heavy workload is consistently identified as a top barrier for women to participate in agricultural training .

Shifting cropping patterns will change the workload of men and women within a household. For example, in aquaculture and mixed rice- shrimp cultivation, men take on most of the roles in production, which may lead to a decrease in women's role in agriculture. While this redistribution of responsibility may work well for some, the project should consider how different households may experience this shift and prepare to provide other options for women to diversify their livelihoods in-line with the adaptation of the project. Project interventions can inadvertently increase women's work burdens if the gender division of labor is not considered.

5. Access To and Control Over Assets and Resources

An individual's ability to access and have control over assets and resources is influenced by cultural norms, legal policies and regulations, intra-household dynamics, and socioeconomic status. Women, ethnic minorities, and persons with disabilities often have unequal access to a range of critical resources, including information, technology, agricultural

extension services, and land ownership. Research in Thanh Hoa and Nghe An found that women's knowledge of budgeting, financial management, and investing was low, which can be a risk factor in climate vulnerability.

Access to Agricultural Information. There is still a large gap between men and women's access to agricultural training and services. In one study, 87 percent of female farmers did not attend any agriculture-related training (99). Another study found that 60 percent of male-headed households attended agricultural training, compared to 35 percent of female-headed households, and women participants accounted for only 20 percent of total attendance (100). Reasons for this differential access are wide-ranging: i) women are not considered as specific recipients of agricultural extension training, thus excluding them in the invitation; ii) cultural barriers that prevent women from attending, including feeling intimidated by the presence of men in meetings and not having time to attend, given household responsibilities; iii) Education gaps and training approaches (women reported agricultural training too complicated or overly lengthy.

Women mostly learn about new technologies or the application of new techniques through hands-on experiences and good examples from their villages. Women may also obtain farm- related information from their social networks, relatives, other women in the village, and their husbands, although some studies have found that men do not always share the information, they learn with their wives. Women may require additional, accessible training in literacy, entrepreneurship, or financial management to successfully venture into new businesses. Before beginning any CSA or VC programming, the project should consult with a wide range of women, youth, and ethnic minorities to understand specific barriers they face in pursuing non-farm employment.

Gender norms greatly influence access to and control over assets. It is common for men to own all large assets, including house and land. Control of other, smaller assets within a household are based on gender roles. Women own small livestock and other basic household commodities, while men are more likely to own agricultural equipment such as water pumps. This gendered expectation about who controls assets often prevents women from having full or joint ownership of these productive resources. As a result, although women make up 60 percent of the agricultural labor force in Vietnam, only 9 percent are farm owners. As for land, if women do not have their names on a household's land ownership certificate, they are unable to access credit from formal sources, as most farmers use land as the main collateral to secure loans. Lack of land ownership makes it more difficult for households to diversify their income sources. As for access to water, at the national level, the percentage of households with access to tap water is only about 52 percent (Hung 2022) but this rate varies largely between provinces. While in the major cities such as Ho Chi Minh, Hue and Hai Phong, more than 80 percent of households have access to clean water, other provinces such as Nghe An and Thanh Hoa lag, with less than 50 percent of households having access to clean water. In CRWIS communes, most farmers don't have access to tap water, and must face other irrigation and water quality problems, leaving a big burden for poor households especially women headed households.

Barriers to adopting new practices:

Farmers may neglect to apply knowledge learned if it is not directly related to their roles in production. The heavily gendered roles in rice production should be considered when promoting new practices. In some communes, extension has focused on male-dominated aspects of rice production and opportunities for mechanization, thus excluding women. By more intentionally targeting capacity development to women's roles in rice production and less machinery-heavy techniques, women and female-headed households can also access new practices that may increase agricultural yields and empower women.

Farmers may hesitate to adopt CSA or VC techniques if such practices are not gender sensitive. It may be due to low availability of inputs, financial constraints, limited access to information, and limited gendered extension (or lack of female extension workers). For example, if women grow fewer or no cash crops and do not have other sources of income, they are less likely to be able to afford agricultural inputs or new technologies. Access to crop or livestock insurance is limited in general and women may not be members of the producer or marketing groups that secure group plans. In addition, within the value chains for various crops, women often become restricted to less profitable nodes in the chain.

If extension agents do not use tailored gender-specific extension and information channels and approaches that take account of women's roles, functions, mobility, and time constraints and schedules, they are less likely to be successful at reaching women. Men receive many of these supporting resources through existing agricultural extension, however, women and other vulnerable groups have less access. Women may also be hindered from adopting new practices due to a lack of involvement in agriculture or business associations (due to cultural norms and lack of time). Having a network of peers engaged in similar activities can be an important avenue for sharing new ideas and offering resources and support needed to put those ideas into practice. FGDs in Thanh Hoa and Nghe An shows that women gain access via membership in women's groups. Therefore, it is critical for the CRWIS project to promote women's access to inputs, credit, tailored information, and a full range of agriculture-related guidance and support.

6. Access to job, market and services

Access to job. Unemployment is high in many CRWIS communes among young people. High rate of migration in Thanh Hoa and Nghe An is a big issue in terms of labor force as most of migrants are men. CRWIS project should pay attention to this issue and its impact on women. In the context of water infrastructure works there will be issues of contractual labour. Contractual conditions will need to consider and mitigate the risk of child labour, forced labour, ethnicity-based discrimination, poor working conditions, and Gender-Based Violence.

Access to market. Women may face more market-related barriers. As with agriculture, women have greater mobility constraints for taking their products to wholesalers and retail customers. CN mission showed that most women's groups in Thanh Hoa and Nghe An operate agri business on a small scale but have weak market linkages. Women have lower rates of membership in producer cooperatives or may be restricted from joining. With less access to credit and other support, women entrepreneurs are unable to make the necessary investments to secure and maintain national certification (such as OCOP) for their products. In Nghe An there are 567 OCOP products in which only 1 product obtained 5 star category, the remain 37 products categorized as 4 star and 529 products categories as 3 star (https://ocop.nghean.gov.vn/tin-hoat-dong/phat-trien-lien-ket-chuoi-gia-tri-va-tieu-thu-san-pham-ocop-nghe-an-647.html). Among these products very few are owned by women or women led cooperatives or groups.

Access to financial services. Women, female-headed households, ethnic minorities, and persons with disabilities all face barriers to accessing traditional financial services, including lack of land ownership (to use as collateral). Any assessment of the potential for new avenues of financing must consider options for accessing credit that are available for anyone, regardless of land ownership. Due to gender norms and roles, women are often more cost- conscious and may forgo adoption of new practices due to cost or lack of access to financing. Increasing their skills and knowledge related to financial management could empower women to more effectively manage decisions around financial services

IV. RECOMMENDATIONS

1. Recommendations by Components

CRWIS project should pay attention to the quality of interventions in terms of their ultimate impact on women, youth and EM. Project design features that address gender equality and women's empowerment should avoid "tick-box" practices that do not consider their full impact on women. For example, while measures could be implemented to create jobs for women and youth, these could end up being low-quality or underpaid if not planned carefully. Quotas for women and youth' involvement could be instituted, but if these do not reflect the local context, they could fail or even cause backlash. Project teams should consider all measures in terms of their impact on women, youth, and EM and be monitored effectively, ideally with their participation.

Consider the risks of backlash and identify strategies to mitigate these risks. Gender equality is about creating opportunities for all—regardless of gender—rather than preferential treatment of women and girls. A critical part of achieving gender equality and preventing backlash can include spending time in building relationships and building trust in the project; working with men and boys to change discriminatory attitudes about women and girls; engaging high profile male leaders to advocate for gender equality; and referring to gender equality principles enshrined in national laws and policies. Another risk is that authorities or decision-makers may treat gender action plans and gender designs as an 'adds on' element and not as an integral part of the project, which may result in delays or non-implementation of gender features.

For Component 1, CRWIS needs to attend to the quality of water infrastructure designing with consideration of the vulnerable groups' culture, needs and priorities. This includes i) Better physical design: Integrating and prioritizing women's needs in infrastructure design codes, standards, and guidelines; ii) Provision of water access points and other facilities to ease women's access to water for their home gardens and household drinking and cleaning needs; ii) Inclusive service design: Planning service delivery and operation of infrastructure to include women's needs and priorities; iii) Promotion of labour- and time-saving technologies (e.g. technologies for water collection, water efficient production technologies, agricultural mechanization technologies); iv) Strengthening women's representation and decision-making power in water infrastructure design, delivery, and operations, both from supply and demand side; v) Engage men and community leaders in community awareness activities for GEWE incl. GBV; vi) Establish community led monitoring of the infrastructure with active participation of commune/village women leaders (WU, YU, FU, Fatherland Front).

For Component 2 Main recommendations focus on strengthening value chain for the production, marketing, and commercialization of Climate smart and gender inclusive products and services. This includes: i) Conduct gender analyses on potential VC in CRWIS project; ii) Provide support for women on CSA; iii) Provide support for cooperatives; iv) Provide support for cadres (see below in session on VC)

For Component 3—Project Management: It is important to include gender action plan indicators in periodic reports and project monitoring system. This means to match the CRWIS' GAP Indicators to fit with MONRE (now MAE) indicators such as Indicator 8.2. Percentage of people and women in vulnerable areas due to climate change who received vocational training and changed livelihoods; Indicator 8.3 Percentage of people and women in vulnerable areas due to climate change impacts who are trained in soft skills on climate change adaptation and disaster prevention. This indicator integration will also support Thanh Hoa and Nghe An in their reports to the government as required.

2. Recommendations by Themes

2.1. Gender mainstreaming (GM) and youth empowerment for increased climate adaptive capacity

2.1.1. Conduct a Comprehensive study on gender gaps, CC impact, adaptation needs and resilience capacity, barriers and opportunities. The study team will i) work with vulnerable groups and gather further insight into the most pressing needs and acute priorities of women, ethnic minorities, and youth; ii) understanding the gender, ethnic, and area-specific barriers they face in pursuing livelihood diversification; iii) Examine how to build climate resilience by engaging women in roles with agency and influence; iv) identify

possible partnerships and expertise available to support gender mainstreaming. As a process, the Project would benefit from additional consultations through this study to better understand gender roles and needs related to CSA/VC. This study will apply different methodologies, including GALS (Gender Action Learning System), *Institutional mapping, Social network mapping, gender-sensitive institutional analysis,* a stakeholder validation in activity design (to ensure findings of the gender analysis are validated by the specific communities). The findings of this study will help inform the *Planning and design of gender-sensitive adaptation strategies.*

2.1.2. Provide GESI (Gender equality and social inclusion) training and GM handbook for project implementers

Training (and coaching, if possible) will be provided for project implementers (cadres at different levels, irrigation companies, service providers, extension workers, community facilitators...). The topics of training include GM know how and the implementation of GAP.

Key topics include

- Gender-inclusive project design and implementation
- Women's participation in irrigation governance institutions
- The quality of women's participation and inputs
- Sensitizing decision-makers to the added value of gender-balanced participation and inclusiveness.
- Awareness on inclusion issues, including intersectionality
- Inclusion issues in agriculture and methods to identify effective solutions.
- Integrated water management in the context of climate change
- How to identify potential inclusion 'champions' at different levels of government and provide them with the resources needed

Design a Gender Mainstreaming Handbook

Key contents

- How to implement GM at both levels (programming and organizing)
- How to conduct GAP effectively and integration with National target programs
- How to provide practical guidance on monitoring for inclusion, such as indicator development and analysis, routine data collection efforts, and support on making use of the findings.
- How to identify gender-related policy issues, such as credit access and terms, access to training and technology, access to information, and market access.

2.1.3. Leadership trainings

- These training courses will be designed for leaders of women and youth organisations/groups with a focus on female leaders.
- TOT Training for leaders (women and men) of different organisations of women, youth, and EM
- Leaders of Women and Youth Union at 3 levels (district, commune, village)
- Leaders of Agri. Coops, Women Production Groups, FU's vocational units, MSME
- The training courses will be repeated yearly for monitoring and impact
- Several 200 women and youth leaders will be selected for training

2.1.4. Implementation of a Household Methodology

- Household methodologies (HHMs) are methodologies that enable family members to work together to improve relationships and decision making and achieve more equitable workloads. Their purpose is to strengthen the overall well-being of households and all their members. For CRWIS, a household-based approach will be implemented, building on successful pilots in other IFAD projects in similar contexts, to support behavior changes equitably involving the whole family, in relation to climate action, family planning and budgeting, production and financial and business literacy. Existing training modules will be adapted to the project needs, with support from selected service providers. The CRWIS household-based approach will also ensure that there are follow-up mechanisms (such as champion couples) to initial training to ensure continuity. The household-based approach will be promoted by through a specific service contract for groups participating in Component 1 target area.

2.2. Enhanced capacity of women, youth, ethnic minorities

2.2.1. Support to women and youth agri entrepreneurs, agri coops, production groups

Training to reduce barriers for women, youth and ethnic minorities to participate in and effectively learn from capacity development activities. This could include scheduling sessions during late morning or early afternoon to best fit women's household schedules, providing targeted invitations for EM and youth, designing courses to be comprehensible to people of all literacy levels, including more hand-on activities, providing women's only spaces (including female trainers), and simplifying training sessions and/or breaking the material into shorter modules.

- Training on **WEE (Women Economic Empowerment**). According to this UNWOMEN framework, effective Economic Empowerment of Women occurs when women enjoy control over and benefit from their own resources, assets, income and time, and at the same time when they can manage risks and improve their economic and welfare status. The seven key drivers of WEE examine gender issues and women's mobility as farmers, business and cooperative leaders/owners, and formal and informal employees in the chain.

- Using WEE approach the project will focus its support on i) increasing women's skills, income earning, and employment opportunities, including for home-based and technical roles; training and advisory services to improve on-farm water management to cope with climate variability; ii) supporting to increase the gender balance of producer and marketing groups; iii) training and supporting gender champions through women networks; iv) Strengthening the social network between farmers, agricultural cooperatives, and local governments to enhance farmers' capacity to cope with CC.

2.2.2. Strengthen value chain for the production, marketing, and commercialization of Climate smart and gender inclusive products and services

Conduct gender analyses on potential VC in CRWIS project. The focus is to analyze the changes, barriers, challenges and motivations of women participating in the selected chain at all three levels: (i) at the individual level inside women themselves (confidence in decision making and actions; perceptions of themselves and other women); (ii) at the relational level in power relationships in networks related to the value chain around women, such as households and cooperatives, livelihood groups, enterprises; and (iii) at the environmental level in a broader and informal context such as social norms, attitudes and beliefs, or formal changes in the framework of the policy environment. The purpose of the analysis is to provide an overall picture of empowerment, not just what the Project is designed to achieve. Thereby, the Consultant proposes solutions to promote gender equality and improve women's economic rights in the selected value chains. This gender analysis can be conducted separately or as part of the livelihood assessment/ or gender-inclusive market assessment.

Provide support for women on CSA. As discussed above, there is risk involved in changing agricultural practices. Poor households, particularly female-headed and ethnic minority households, are more vulnerable to the adverse effects of a disruption to their livelihoods and require more support to access the financing, training, and support needed to successfully navigate the change. To reduce harmful, unintended consequences, CRWIS should consider how men, women, and female-headed households may experience shifts in rice cultivation or agricultural practices differently and prepare to provide other livelihood options for women whose labor may be displaced by the change. Helpful women-specific training topics may include production of high-quality, stress-tolerant rice varieties, any low-input, non-mechanized CSA techniques that can increase agricultural yields or reduce input costs, financial literacy or financial management.

Provide support for cooperatives. This study highlights the role of cooperatives in connecting farmers and other stakeholders in the supply chain. The integration of scientific and technical knowledge with farmers' knowledge through cooperatives is crucial to support the effective operation of producing and marketing activities. VC based production also creates a favorable condition to apply integrated pest management, integrated crop management, and advanced CSA to increase farmers' resilience towards crop diversification and water-secure production. Besides, cooperatives may provide the access to formal credit with favorable interest rates from the banks or other organizations to reduce the risks of livelihood diversification for farmers.

Provide support for cadres: In addition to the training topics as mentioned above with women, other topics may include i) training on marketing, business management, value chain analysis, cost benefit analysis; ii) Link value chain work to gender responsive credit programs; iii) VC, CSA and policy advocacy.

2.2.3. Women and youth forums on climate change and Women economic empowerment (WEE)

These women and youth forums are proposed to include the following actions and considerations:

- Increase stakeholder understanding: Supporting stakeholders to better understand and respond to women's needs, barriers, and adaptation capacity through training, capacity building, and awareness raising.
- Increase women's decision-making and representation in water infrastructure design, delivery, operations and monitoring as well as in managing water supply and developing CSA.
- Institutional change: Shifting institutional practices, systems, and cultures to incorporate women's needs and priorities in policies and processes (leading to transformative changes).
- Engaging the participation of CSOs in Thanh Hoa and Nghe An (such as Hong Duc University, Eco Research Center in Nghe An)
- Provide mechanisms to link market actors regularly and promoting women leadership.
- Encourage gender balanced membership of associations
- strengthening the capacity of women/women's organizations to engage in policy dialogue.

V. Proposed CRWIS Budget for Gender

		2025	2026	2027	2028	2029	2030	Total
	Output 2.1.1 Improved capacity and coordination for integrated water management							
	THANH HOA							
	Gender mainstreaming (GM) and youth empowerment for increased climate adaptive capacity							
1	Comprehensive study on gender gaps, CC impact, adaptation needs and capacity, opportunities and recommendations	10,000	10,000					20,000
2	GESI (Gender equality and social inclusion) training and GM handbook for project implementers	12,000						12,000
3	Leadership trainings (repeated) for selected 200 women and youth leaders of CBOs (Agri. Coops, Women Production Groups, FU's vocational units, MSME		4,000		4,000			8,000
	Subtotal 1							**40,000**
	NGHE AN							
	Gender mainstreaming (GM) and youth empowerment for increased climate adaptive capacity							
1	Comprehensive study on gender gaps, CC impact, adaptation needs and capacity, opportunities and recommendations	10,000	10,000					20,000
2	GESI (Gender equality and social inclusion) training and GM handbook for project implementers	12,000						12,000
3	Leadership trainings (repeated) for selected 200 women and youth leaders of CBOs (Agri. Coops, Women Production Groups, FU's vocational units, MSME		4,000		4,000			8,000
	Subtotal 2							**20,000**
	Output 2.1.2. Strengthened resilience of smallholders' agricultural businesses							
	THANH HOA							
	Enhanced capacity of women, youth, ethnic minorities							
1	Support to women/youth/EM agri entrepreneur, agri coop, production groups		10,000					10,000
2	Strengthen value chain for the production, marketing, and commercialization of Climate smart and gender inclusive products and services	10,000						10,000
3	Women and youth forums on climate change and Women economic empowerment (WEE)		10,000			10,000		20,000
	Subtotal 3							**40,000**
	NGHE AN							
	Enhanced capacity of women, youth, ethnic minorities							
1	Support to women and youth agri entrepreneur, agri coop, production groups		10,000					10,000
2	Strengthen value chain (Business Plan) for the production, marketing, and commercialization of Climate smart and gender inclusive products and services	10,000						10,000
3	Women and youth forums on climate change and WEE		10,000			10,000		20,000
	Subtotal 4							**40,000**

Appendix 1- CRWIS Gender Strategy

Aim	To increase CRWIS's impact on gender equality and strengthen women's empowerment in the 2 provinces in Vietnam		
	At least 50 percent of the beneficiaries will be women (including young women and women from ethnic minorities)		
Objec-tives	Economic empowerment	Decision-making and representation	Equitable workload balance
Activities	- Increasing women's access to and control over assets (natural resources, inputs, technologies and finance) and to economic services (training and business development) - Extension Services for farmers with beneficiaries consisting of at least 50% women - Creating new spaces/ opportunities/ markets and support for women's economic engagement - Support women as role models/change makers to break through barriers - Invest in grants that improve women's climate resilience - Invest in interested women's skills in water works	- At least 30% women's participation in community-based forums (eg.,village committees, grievance committees) - At least 30% representation of women in consultation and decision-making forums - Selected women will be trained to be gender champions - Leadership training for women - Invest in increasing the collective capacity and knowledge of women to take climate action (through livelihood diversification, CSA/VC, social capital, group empowerment)	- Provision of water access points and other facilities to ease women's access to water for their home gardens and household drinking and cleaning needs - Promotion of labour- and time-saving technologies (e.g. technologies for water collection, water efficient production technologies, agricultural mechanization technologies) - Engage men and community leaders in community awareness activities for GEWE, GALS
M&E	- Sex-disaggregated indicators - IE. 2.1 Individuals demonstrating an improvement in empowerment - Gender Indicators integrated within the log frame (Number of women with new jobs; % of supported groups with women in leadership positions; Number of women's groups and women's businesses supported with equipment and marketing services) - Survey results on beneficiary feedback disaggregated by age, gender, EMs status; Qualitative data through women focus groups		

Appendix 2- CRWIS Youth Strategy

Aim	To increase CRWIS's impact on the social and economic empowerment of youth in the two provinces in Vietnam	
Out-reach	At least 20 percent of the beneficiaries will be young people	
Objec-tives	Economic empowerment	Decision-making and representation
Activities	- Access to climate-smart technologies and approaches that attract young people and finance - Strengthened links with profitable markets - At least 20% of targeted grant support for women's increased climate resilience are under 35 years of age or employ three or more youth under 25 years of age - Creating new income opportunities for youth, e.g. off-farm agribusiness enterprise development - Invest in interested youth's skills in construction	- Leadership training for youth Ensure the participation of youth in community-based forums, such as village committees, grievance committees and other community-based organizations established under the project - Ensure representation of youth in consultation and decision-making forums - At least 40% of farmer group membership is under 35 years of age
M&E	Age-disaggregated indicators	

Annex 5. An Assessment of Thai Ethnic Minority

The Ethnic Minority (EM) in the project area are the Thai community, who primarily reside in the western part of Nghe An province, including the mountainous district of Con Cuong. Their living areas are characterized by rugged terrain, dense forests, and river valleys, which shape their way of life and economic activities. Social conditions, religious practices, and decision-making processes of the Thai Ethnic Minority are influenced by their unique cultural heritage and historical background.

Social conditions and status. Living in rural and mountainous areas, the Thai people predominantly engage in agriculture, including wet rice cultivation, animal husbandry, and forest-related activities. Their traditional lifestyle is closely tied to their environment, with a strong emphasis on community and family ties. Social status within the Thai community is often linked to age, gender, and contribution to the community. Elders are highly respected for their wisdom and experience, while men generally hold more prominent roles in public decision-making. However, women also play vital roles, especially within family and in managing household affairs. Social status can also be influenced by one's skills, knowledge of traditional practices, and involvement in community activities.

Decision-making process. Traditionally, the decision-making process within the Thai Ethnic Minority is often communal and collective. Village elders and community leaders, who hold significant respect and authority play a crucial role in guiding decisions related to cultural ceremonies. Each commune where the Thai people live has five socio-political organizations live other communes across Viet Nam, including Trade Union, Farmers' Union, Ho Chi Minh Communist Youth Union, Women's Union, and Veterans' Association. Decisions are typically made through discussions and consensus during community meetings, ensuring that the voices of different members are heard and considered. The provincial Socio-Economic Development Plan serves as a guidance for this process. Land use and agricultural practices, including the selection of crops and breeding animals, are guided by the district people's committee and the commune people's committee. Decisions within households are often made in the same manner, although this process may differ from household to household.

Cultural traditions and religious practices. The Thai ethnic community in Nghe An is known for its rich cultural heritage, including traditional music, dance, and clothing. The Xoe dance and the use of traditional musical instruments like the bamboo flute and drum are prominent cultural expressions. Traditional Thai clothing, characterized by colorful patterns and intricate designs, is worn during festivals and important ceremonies. The religious practices of the Thai people are deeply rooted in animism and ancestor worship. They believe in a variety of spirits associated with natural elements such as mountains, rivers, and forests. Ancestor worship is an integral part of their religious life, with regular rituals and offerings made to honor deceased family members and seek their protection and blessings. Festivals and ceremonies, such as the Xang Khan festival, are essential in their religious and cultural life, providing opportunities for community bonding and the reinforcement of cultural values.

Agricultural production and exposure to climate change. The Thai people in the project area primarily cultivate rice (500-1,000m^2/household), solanum procumbens (Cà gai leo), acacia (Keo), maize, green melon, peanut, and sugarcane. They also raise livestock (cow, pig, chicken) for food and additional income. Consultations with the Thai people in Chau Khe commune, Con Cuong district, highlight their difficult situation. Due to low profits from agricultural production, most young people have left the commune to seek employment in other provinces and abroad. The remaining Thai people are highly vulnerable to climate change impacts such as droughts and floods due to their geographical location, dependence on agriculture, and socio-economic conditions. Mountainous areas, where the Thai people live, are susceptible to extreme weather events. Steep slopes and deforestation can exacerbate the effects of heavy rainfall, leading to landslides and flash floods. Some Thai communities are located in river valleys, making them vulnerable to riverine flooding. Changes in rainfall patterns can lead to sudden rises in water levels, inundating homes and agricultural land. Extended periods of drought can lead to water scarcity, affecting both drinking water supplies and agricultural needs. The consultation with Thai women reported that prolonged droughts sometime destroy their whole crops. However, the men's group stated that drought is not a big problem because they live next to a hydropower dam. This results in food insecurity and increased competition for limited resources. Floodwaters can also contaminate water supplies, leading to health risks such as waterborne diseases

According to the Thai people consulted, the irrigation system is degraded, leading to an insufficient water supply, and fields in higher locations cannot receive enough water. Thai farmers are required to pay an annual fee to the village irrigation team, despite frequent delays in the water supply. Although weather forecasts are disseminated through various channels, no effective solutions have been identified to mitigate the negative impacts of climate change on their daily lives and agricultural production. Thai farmers have experimented with various crops considered more resilient to climate change, but the results have been limited. Some crops are still destroyed by extreme weather conditions, while others are more resilient but

have low productivity.

Implications for the full proposal design. Given the situation of EM in the project districts, increased investments are needed to ensure their inclusion and equitable benefits. Consultations with the Thai EM provide important insights for designing the full project proposal, alongside investments in the irrigation system. First, developing climate-smart agricultural value chains, including more climate-resilient crops, is crucial improving their livelihoods. Second, improving capacity and coordination for integrated water management is essential to facilitate agricultural activities. Third, resilience of Ethnic Minority smallholders and their businesses needs increasing through enhancing the early warning system, providing market information, and developing climate-resilient techniques and market linkages.

Annex 6. Minutes of meetings and consultations

Contents

1. Nghe An

1.1. Nghe An Agriculture and Rural Development Investment and Construction Project Management Bureau

Investment total

- $ 4,639,500, for the following categories:
    + Climate change resilient, smart agriculture models, which have the potential for replicating
    + Water infrastructure and sensors (worms, water level, salination, etc)

1.2. Nghe An Province Department of Agriculture and Rural Development

General opinion: Production is small-scale, local, partial; lacking in capital and equipment to expand; labor force is elderly. There is a desperate need for upgrading irrigation system

Agricultural production

- Rice:
+ Do Luong and Thanh Chuong districts are at an advantage, while others, especially in mountainous areas, need capital support to produce
+ Lowlands (Hung Nguyen, Nam Dan districts) need high-yield, short-term rice crops to adapt to flooding in monsoon season
+ Highlands (Anh Son, Con Cuong) need investment in irrigation system to restore indigenous varieties and introduction to local companies to secure output consumption
+ Investment in irrigation and transportation is crucial in planning permanent rice fields.
- Vegetable
+ Organic vegetable project (Hung Nguyen) and cooperative certified for growing organic vegetable (Nam Dan): farmers stop producing when the project ends; there is a need for policies and support (biological products for plant protection, organic fertilizers, policy mechanisms for market access).
+ Other vegetables: Black star fruit, grapefruit (Thanh Chuong), lotus products (Nam Dan).
- Medicinal Plants
+ Con Cuong: models with no secured output consumption; Con Cuong and Anh Son: currently using improved rice varieties, local varieties need restoration.

Resources

+ New Rural Development (NRD): Support levels are based on the number of NRD communes registered. Support for road construction accounts for 30–40% of the total budget, remaining funds are drawn from other sources (community contributions, local budget adjustments).
+ Resources for OCOP: 1 billion VND in direct support/ district/ year, 50 million VND/ commune/ year
+ National target programs (NTP): NRD, poverty reduction, ethnic minorities (EM) in mountainous areas (Ethnic Affairs Committee).

Proposals

- Research the needs for drip irrigation technology and water-saving irrigation; build net houses for vegetable cultivation; clear waterways and irrigation systems; introduce scalable models to the community.

1.3. Nghe An Province Farmers' Union

Agricultural Production

- Small-scale models: (Con Cuong) medicinal herb Solanum procumbens (“cà gai leo”), (Thanh Chuong) tea, (Hung Nguyen) promoting environmentally friendly rice cultivation and waste management.
- Difficulties: Inadequate irrigation systems, lack of electricity and water sources; limited adoption of collective economic models; complicated and time-consuming registration procedures for OCOP products; weak product consumption

Resources

- The Farmers' Support Fund has a budget of over 100 billion VND, sourced from central government (CG), provincial, and district government, which aims at: 1/ Building agricultural economic model points; 2/ Investing in agricultural extension models, providing support for households to co-invest; and 3/ Providing loans. Loan amounts range from 200 million to 2 billion VND, with low interest rates, primarily aimed at revolving capital. There is a significant need for capital to invest in machinery and support professional associations.
- Inter-provincial programs, with loans from the Agricultural Bank.

Proposals

- Raise awareness and provide training on models for cooperatives and cooperative groups.
- Research the need for pumping stations and water sources to support agricultural production.
- Support training in environmentally friendly techniques that ensure productivity: alternate wetting and drying irregation (ADW), post-harvest processing, and increasing organic fertilizers.
- Facilitate coordination between the union and research centers to ensure that agricultural extension activities, models, techniques, and new varieties are scientifically applied and sustainable (North Central Agricultural Science and Technology Institute, University of Economics)

1.4. Nghe An Province Women' Union, Nghe An Province Youth Union

Issues relating to women

- Thin workforce, the majority being elderly; production and community activities are mainly led by women.

Production essentially involves machinery and equipment, which are operated by women, but their voices are limited while men hold decision-making roles in familiy life and production.
- Livelihood for rural women includes working in industrial zones (IZs), entrepreneurship (participating in building OCOP products (forestry, agriculture, and food), homestays, community tourism, and traditional cultural performances to attract tourists).
- Challenges in achieving sustainable livelihoods due to: small-scale models; limited access to information and vocational training; and constraints in collective economic models.
- Resources: Project 939 supporting women's entrepreneurship; provincial government initiatives to 1/ support women in developing OCOP products and 2/ assist in the consumption of products for women; activities aimed at 1/ guiding members to sort waste at the source and 2/ supporting women entrepreneurs through competitions and forums.
- Successful models:
+ (Mountainous areas) Community tourism; medicinal plant cultivation; traditional craft production (bamboo weaving, brocade weaving); development of nutritional products (cassava, grains, turmeric starch); small cooperative models for breeding (medicinal chickens, black pigs, and local ducks in Que Phong).
+ Waste management at the source, waste recycling; "tree-lined roads, flower roads" model; using probiotics for organic fertilizer.

Issues relating to youths

- The youth workforce consists of 700,000 individuals (females accounting for over 50%); youth volunteer teams are deployed to local areas to help guide local farmers in initiating economic activities, establish key crops and agricultural models (Tuyet San tea in Ky Son; red turmeric for starch production; expanding tea enterprise models in Thanh Chuong).
- Current situation regarding water: The locals sources drinking water directly from nearby streams and rivers. The use of pesticides (in sugarcane cultivation in Quy Hop and Nghia Dan) has affected water sources and contributed to rising cancer rates.

Proposals

- Provide loan support for the cultivation and processing of medicinal plants (Solanum procumbens and celastrus); production of environmentally friendly products: herbal shampoos, red turmeric soap, dishwashing liquid, and clean salt.
- Send experts to remote areas to assist in developing models, enhancing community knowledge for building technological capacity, creating models, accessing loans, and communication

1.5. Nghe An Province Natural Resources and Environment Department

Proposals

- Invest in monitoring sensors related to water levels, salinity, and water quality to help authorities accurately and conveniently track water conditions, facilitating planning and supporting local farmers.

1.6. Con Cuong District

Agricultural Production

- More than 100 irrigation constructions and 2 pumping stations (Chau Khe, Muong Son) built since 2000, deteriorating, are serving 152 hectares of agricultural land.
- Main crops include sugarcane (120 tons/ha), paddy rice (8-9 tons/ha), medicinal herbs (contractual production), corn, vegetable, and peanuts.
+ In Chau Khe (an area with 50% of the population being EM), livelihoods: forestry, rice, corn, vegetables, sugarcane, and medicinal herbs; frequently changing crop structures.
+ Resources: NTP for infrastructure to create livelihoods that ensure social security; sustainable poverty reduction for EM in mountainous areas (for poor and near-poor households), (NTM).
+ Limited funding and issues in allocation.
- Potential agricultural models:
+ Value chain: scattered, small-scale production.
+ Suitable land for sugarcane cultivation: 152 ha of sugarcane has now decreased to 40-50 ha due to lack of irrigation.
+ Medicinal herbs value chain (6-8 ha) is linked with a company purchasing locally, 10 OCOP products.
+ Delegated loan debt of over 288 billion VND (from the Agricultural Bank and the Policy Bank), with a loan ceiling for women starting businesses set at 100 million VND

Issues Concerning Women and Youth

- The district has a population of 78,000 people, with 18,000 households, of which 48% are female and there are over 16,000 youth. There are 55 businesses and 13 cooperatives operating, including 3 female directors.
- Women
+ Issues: 1/ Women working far from home: illegal labor migration; 2/ Over 200 women working far from home with undisclosed addresses; 3/ Domestic violence is present in all 13 communes and townships, with an increasing divorce rate; 4/ Limited livelihoods. The new community tourism model has potential to increase income by 4.5 to 6 million VND.
- Youth
+ Issues: Unstable jobs; limited agricultural land available for youth, causing many to work away from home.

+ Promising model: livestock+ forestry.
Proposal: Construct internal field roads.

1.7. Chau Khe Commune

These consultations are conducted with EM..

Agricultural Production

- One pumping station serving two hamlets (29 and Bai Gao), covering over 80 hectares of agricultural land; the pumping station lacks a canal system and sources water from the hydroelectric reservoir.
- Most agricultural production relies on rainwater, with the pumping station operating seasonally; there is a high rate of water loss, and the canal system is deteriorating.
- Crops: Corn, sweet potatoes, and cassava fields lack irrigation water during dry seasons and have no drainage during floods.
+ Rice: 28 hectares, contributing to food security.
+ Sugarcane: 9 hectares, with significant potential; area reduced due to high natural risks and high pressing costs. In good years, yields reach 70-80 tons/ha; during droughts, yields drop to 60-70 tons/ha.
+ Peanuts: 11 hectares, intercropped, with yields of 19-20 quintals/ha.
+ Solanum procumbens: Slow market demand.
+ Corn: Over 30 hectares, continuously grown on wasteland; 16 hectares are planted in the winter season on land previously used for rice.
- Model: Selling Solanum procumbens as raw material to companies, and sugarcane to factories

Proposal:

- Organize technical trainings
- Form models to ensure production input-output

1.8. Thanh Chuong District

Agricultural Production

- The irrigation system primarily serves rice (90%), besides are vegetables and aquaculture. Investments in irrigation could potentially increase yield from 630 to 700 tons/ha.
- Climate Risks: Flooding, storms, hail, drought, and pests, severely affecting 1,500 hectares.
- Resources: 3 NTPs (NRD, sustainable poverty reduction, EM); 100 billion VND per year is allocated for NRD.
+ Support from the rice program: 500,000 VND per crop per year, 1,000,000 VND for two crops per year.
+ Provincial programs are small-scale and unfocused on any specific crop.
- Potential Models:
+ 500-1,000 hectares have the potential to develop a production chain; Ardisia silvestris (Khoi nhung) needs market linkages for product output.
+ 15,500 hectares of rice are self-serving, otherwise some communes produces are purchased directly from the fields.
+ Several cooperative groups aiming toward forming cooperatives (deer, civet, and shrimp farming).

Issues Concerning Women and Youth

- Women's Livelihoods: Difficulties in establishing cooperatives; models lack output; limited financial and sales capabilities.
- Resources and Programs:
+ 1/ Project 8 (Thanh Son and Ngoc Lam communes), limited funding; 2/ activities promoting gender equality are integrated into community groups and associations; 3/ "Godmother" project aimed at orphaned children.
+ Vocational training for women mainly focuses on cooking, which has low effectiveness and demand.

Proposals

- Assist women in accessing startup capital.
- Support the development of community mindset to lay the foundation for the formation of OCOP products and cooperatives.
- Provide practical and relevant training.

1.9. Xuan Tuong Commune

Agricultural Production

- Water Infrastructure:
+ Sourcing water from the Rao Gang and Lam River; mobilize local labor to dig ditches and dredges to direct water to 2 pumping stations during peak drought months.
+ 5 pumping stations, one of which faces severe water shortages in dry seasons. These stations can only serve rice and do not support vegetable crops. Maintaining the pumping station systems is challenging due to electricity, repairs, and operation costs. The two main pumping stations only meet 50% of irrigation needs during dry seasons.
+ 18 km of irrigation canals for rice, of which 14 km are lined with bricks.
- Other crops:
+ 184 hectares of rice and 186 hectares of vegetables; short-term rice is grown to cope with flooding.
+ Potential: Other crops planted on over 20 hectares of vegetable land (squash, gourd, cucumber, corn) could be expanded to a maximum of 100 hectares if irrigation is available. Cucumber and squash have

informal purchasing agreements without contracts.

Issues Concerning Women and Youth

- 1,000 women, including 300 youths.
- Approximately 100 women are from poor and near-poor house-holds; 800 women work away from home in IZs.

Proposals

- Upgrade the pumping stations, expand 11km of irrigation ditches.
- Construct internal roads for agricultural areas.
- Introduce high-yield varieties and provide technical training.
- Pest sensors.

1.10. Hung Nguyen District

Agricultural Production

- Infrastructure: 80 pumping stations built since the 1990s, water from two large, and 480 km of primary and secondary irrigation canals for irrigation and domestic use.
- Main Crop: Predominantly rice.
- Resources: 1/ 4 billion VND per year for NRD; 2/ NTP for poverty reduction; 3/ vocational training budget of 3-4 billion VND per year; 4/ 100 million VND per product support for OCOP products.
- Potential Models: Microbial products for soil improvement and fertilizer; mushroom and lemon cultivation (Nam Anh commune).

Issues Concerning Women and Youth

- 501 poor and over 900 near-poor households, predominantly elderly, sick, and incapable of extensive labor.
- Lack of knowledge in establishing models, limited support mechanisms for startups; insufficient low-interest funding for entrepreneurship

Proposals

- Install water quality sensors.
- Invest in the irrigation system for floodplain areas; upgrade pumping stations.
- Train on the development of biological products.
- Focus irrigation on high-tech agricultural areas (green squash, cucumbers, and organic grapes).
- Provide funding for waste classification using microbial fertilizers**.**

1.11. Chau Nhan Commune

Agricultural Production

- 500 hectares of rice, 250 hectares of vegetable land, 4 pumping stations dependent on Lam River.

+ Currently, only 250 hectares of rice land are served, vegetable land is completely exposed to droughts. 150 hectares of rice are two-seasoned crops, 100 hectares of rice suffer from water shortages and salt intrusion. There is potential to increase rice area to 220 hectares after improvements.

+ Summer-autumn crop yield is about 5 tons per 500km^2; during natural disasters, yields drop to around 3 tons per 500km^2.

+ Main crops include corn (two crops), peanuts (one crop), sweet potatoes, beans, and sesame; sandworm farming (dependent on tidal movements).

- There is salt intrusion issues

Issues Concerning Women and Youth

- Livelihoods:

+ Youth: Over 400 engaged in labor export; Women: working as domestic helpers, in constructions making peanut candy, processing sandworms, pressing oil.

+ Models: Cooperative groups farming sandworm and making peanut oil

Proposals

- Provide training on scientific and technical knowledge.
- Invest in wastewater drainage ditches for sandworms fields.
- Install sensors to monitor pests, salinity, and water levels.

2. Thanh Hoa

2.1. Thanh Hoa Agriculture and Rural Development Investment and Construction Project Management Bureau

Research Issues

- The need for investment in water infrastructure and monitoring sensors; the need for training and workshops; the need for loan support
- Innovative climate change adaptation and smart agriculture models with potential for scaling

2.2. Thanh Hoa Province Department of Agriculture and Rural Development

Agricultural Production

- Collective economy

+ There are 772 cooperatives currently operating, of which 380 are in agriculture, 45 in livestock, 14 in

forestry, 12 in aquaculture, and 2 in salt production.
+ 14 district-level units meet the New Rural Development (NRD) standards, with 531 OCOP products
Resources
- Initiative for the development of agricultural cooperatives: land policy (land lease, office construction); support for new establishment (consultation, production support); capacity building and training (1 billion VND from the state budget); infrastructure development (irrigation, transportation – 22 cooperatives, with a maximum of 2.4 billion VND, each cooperative contributing 20%); trade promotion for OCOP products; building high-tech agricultural models (maximum of 650 million VND per cooperative for direct support, 100 million VND per cooperative for management support).
- Restructuring the agricultural sector: 1/ provincial resources to develop 75,000 hectares of intensive rice cultivation; 2/ concentrated land development: provincial resources of 60-70 billion VND; 3/ focused development of fruit trees: 23,000 hectares, including 12,000 hectares concentrated; 4/ support of 5 billion VND per household with over 10 hectares.
- Potential Models: Rice-shrimp and rice-fish production

Proposals

- Monitor rice pest outbreaks, set up light traps for specialty rice; introducing monitoring sensors for water quality.
- Support the expansion of rice-shrimp and rice-sandworms models.
- Invest in wind-resistant greenhouses and nets
- Build a flood warning model

2.3. Thanh Hoa Province Farmers' Union, Thanh Hoa Province Cooperative Alliance

Agricultural Production

- Collective economy
+ There are 1,331 cooperatives, of which 805 operate effectively, 845 are agricultural cooperatives; 109 OCOP products.
- Resources
+ Farmers' Union: Approximately 17 trillion VND in entrusted loans from the Policy Bank and Lien Viet Bank; 60 billion VND in rural development budget; a pilot loan ceiling of 250 million VND/ household. Farmers' capital needs are reduced, decreasing reliance on black credit.
+ Cooperative Alliance: Development support fund of 20 billion VND has been deployed; 144 cooperatives have significant needs but are currently inactive; access to bank financing is difficult due collateral requirement; people's credit funds: 64 funds are operating well; total capital is nearing 8 trillion VND
- Models: Most depend on land and water conditions; many have a potential for scaling up but face funding issues and regulatory obstacles
+ Circular rice cultivation.
+ Straw processing: mostly small-scale (the largest recent project is in Nong Cong district, covering 180 hectares); using products provided by the central Farmers' Union; investment in inorganic fertilizers reduces by 20%, ensures yield, and improves soil quality. Funding is needed to expand the model.
+ Collecting pesticide container waste: Implemented in all districts, but at uneven progress.
+ Raising awareness about waste sorting in local communities: Lacking funds, small-scale models, and support for equipment.

Proposals

- Enhance farrmers' capacity in managing and conserving land and water resources, and disposing waste.
- Support access to funding, especially for EM communities in mountainous areas

2.4. Thanh Hoa Province Women' Union, Thanh Hoa Province Youth Union

Women's Issues

- High rate of poor women (Hoang Hoa: 2%), who are significantly affected by climate change. Women tend to be intimidated; lacking the confidence to manage the cooperatives that they themselves helped setting up..
- Resources: 1/ Initiatives to support women's entrepreneurship, support cooperatives managed by women; 2/ enhance access to loans, including discount loans; 3/ women support fund of 18-20 billion VND.

Youth Issues

- 1 million youths, accounting for 30% of the province population and 50% of the provincial workforce; 700,000 of which reside locally.
- Resources:
+ Startup loans: Loans of over 100 million VND require collateral, and involve many procedures; a youth startup support fund has disbursed 71 billion VND by June 2024; the National Fund for Employment of the Central Youth Union has allocated 2.3 billion VND for 27 projects; the Policy Bank has entrusted 1.610 trillion VND, 2,000 households are borrowing.
+ Programs: 1/ Youth economic development, youth entrepreneurship; 2/ competitions, and startup projects; 3/ advising on documents to create mechanisms supporting youth

Proposals

+ Support Youth Union branch secretaries to stay locally, enhance livelihoods.

+ Help to diversify loan sources, simplify procedures, and increase the loan ceiling.
+ Connect cooperatives producing shrimp paste with output commitments

2.5. Hoang Hoa District

Agricultural Production

- Aquaculture: 2,800-3,000 hectares of 1/ extensive farming, fluctuating yield (giant tiger prawn, clams, fish, etc.); 2/ farming of whiteleg shrimp with a yield of 30-40 tons/ha (using greenhouses and nets).
- Rice: 6,000-7,600 hectares, depending on the crop.
+ Previously cultivated hybrid F1 rice, with output commitments.
- Vegetables: 3,000-4,000 hectares per year (mainly in western communes) of 1/ Potato processing (Orion and PepsiCo purchase), fresh potato processing and 2/ VietGAP vegetables.
- The sector is significantly affected by climate change and price fluctuations; there is no food processing. Prodcution linkages are mostly spontaneous.
- Models: 1/ Potato chain and 2/ Lê Gia fish sauce company.
- Resources: 1/ Sustainable poverty reduction and NRD; 2/ support of 75 million VND per 3-star OCOP product drawn from provincial budget, with difficulties in disbursement; 3/ Pre-crop training for cooperatives, twice a year.
- Models:
+ Crop Production: 38 cooperatives; Livestock: 2 cooperatives; Aquaculture: 3 cooperatives; 3 cooperatives have OCOP products, and 23 have crop production linkages.
+ Issues regarding governance, communication, and IT; operations are stagnant, without active business engagement

Proposals

- Establish value chain linkages.
- Implement drip irrigation and smart irrigation systems; invest in automatic spraying systems for potatoes; develop waste management systems.
- Enhance the value of organically produced products.
- Invest in water quality sensors for aquaculture, salinity sensors in rivers, and disease outbreak alerts for aquaculture.

2.6. Hoang Phu Commune

Agriculture Production

- Primarily focused on fish sauce production.

Proposals

- Provide gender integration and gender equality training for women and youths.
- Enhance management capacity for cooperatives; ensure output commitments for cooperatives (businesses agreeing to purchase, but delaying disbursements).
- Invest in environmental treatment and improve water quality.

2.7. Ha Trung District

Agricultural Production

- Over 30 pumping stations, 20 of which is managed by Bac Song Ma Irrigation Company, while the remaining are managed by cooperatives; 20 reservoirs, including 1 large reservoir.
- 17,000 hectares of agricultural land, including 10,000 hectares of rice, 6,000 hectares of seasonal crops; over 1,000 hectares of fruit trees (750 hectares of pineapple and 150 hectares of guava concentrated in Ha Long commune); 500-600 hectares of various vegetables, and over 100 hectares of floodplain corn.
- Over 600 hectares of freshwater aquaculture ponds; 1,600 hectares of rice-fish farming; 50 hectares for raising giant snails and apple snails. Frequent saltwater intrusions and drainage issues.
- Resources
+ Local Resources: 1/ 1.2 billion VND per household with snail farming models; 2/ 70 million VND per kilometer of drainage ditches in residential areas/lighting for rice cultivation; 3/ introducing seedlings for rice-fish models (Ha Linh commune).
+ Investment from international NGOs: Projects funded by ADB (for road construction) and WB (for upgrading reservoirs)

Issues Concerning Women

- 2 female directors/ 30 cooperatives.
- Successful Models:
+ Cooperatives for aquaculture farming, organic vegetable production.
+ OCOP leaf cakes (Ha Lai commune); shrimp paste cooperative.
+ Waste sorting and home waste incineration.
+ Using Excess fruits and vegetables to produce microbial products and reduce odors in animal husbandry.

Proposals

- Monitor salinity levels in the Lèn River; monitor water levels and quality in the Hoạt River (20 km, passing through 8 communes).
- Upgrade dikes and embankments.
- Invest in efficient irrigation systems for guava.

- Training on food safety; e-commerce and promotion for cooperatives and groups.
- Provide support for seedlings

2.8. Ha Son Commune

Agricultural Production

- Nearly 1,400 hectares of natural land, over 400 hectares of agricultural land, including:
+ 340 hectares currently in use, comprising 150 hectares for rice, 190 hectares for fruit trees and vegetables.
- 1 pumping station serving the area, built over 40 years ago. Water shortage mainly in the spring-summer crop (fish, snails, and rice); and in the winter.
- No drainage system, leading to flooding issues.
- Thong Nhat Cooperative: rice, farms (lily and giant snails).
- The majority grow rice in two seasons; vegetable production primarily shifts to fish/rice or snails farming due to low efficiency

Issues Concerning Women and Youth

- 15 poor households, 12 females, 6 people with disabilities. Poor and near-poor households mainly consist of elderly singles.
- Livelihoods: rice cultivation and farming in cooperatives.
+ Youth: Wholesaling lilies to other pronvinces; raising giant snails, growing jackfruit, independently arranging small-scale sales

Proposals

- Training and Workshops:
+ Presentation skills and PowerPoint for women; management skills for cooperatives;
+ Technical knowledge focusing on organic practices and carbon reduction; e-commerce, product promotion, and branding for giant snails and rice.
- Link models' outputs with producers to form value chains.
- Invest in soil and water quality testing; seedling; equipments (transplanters, harvesters, pesticide sprayers, and rice dryers; greenhouses for lilies).

Annex 7. List of people consulted

Concept Note stage

No	Name	Address/Position
Department of Agriculture and Rural Development (DARD) – 8/11/2023		
1	Nguyen Hao	DART Deputy Director
2	Nguyen Tien Duc	Director of Plant Protection Bureau
3	Dang Van Quyen	Deputy Director of Irrigation Bureau
4	Tran Quoc Hoan	Deputy Head of Works Construction Investment Project Management Board
5	Nguyen Thi Ha	Head of Planning and Finance Division, Bureau of Rural Development
6	Tran Xuan Binh	Deputy Head of Irrigation Works Management Division, Irrigation Bureau
7	Nguyen Tien Duc	Director of Crop Production and Plant Protection Bureau
8	Vu Quy Phat	Deputy Head of Works Construction Management Bureau
9	Tran Dai Nghia	PMU Official
10	Ho Anh Tuan	National Assembly Delegation, Agri Exhibition
11	Nguyen Viet Cuong	Project Management Unit
People's Committee of Anh Son District - 10/11/2023		
1	Hoang Xuan Cuong	Member of District Party Committee - Vice Chairperson of District People's Committee
2	Dang Ba Ky	Head of Economics & Infrastructure Division
3	Nguyen Cong Tuan	Director of Statistics Office
4	Nguyen Van Thai	Deputy Head of Agriculture & Rural Development Bureau
5	Ngo Thi Thu Ha	Deputy Head of Cultural Affairs and Information Bureau
6	Luong Thi Thu	Deputy Head of Labour, War Invalids and Social Affairs Bureau
7	Nguyen Ngoc Hong	Deputy Head of Economics & Infrastructure Division
8	Dang Huyen Sam	Vice Chairperson of District Women's Union
9	Nguyen Ngoc Giang	Vice Chairperson of District Farmers' Union
10	Nguyen Huong Lien	Deputy Secretary of District Youth Union
11	Nguyen Huu Danh	Expert of Agriculture & Rural Development Bureau
12	Truong Thi Tra My	Expert of Natural Resources and Environment Bureau
13	Nguyen Dang Chien	Vice Director of FL Tay Nam Company
14	Dang Xuan Anh	Expert of District Committee of Ethnic Minority Affairs
15	Phan Ba Khanh	Vice Chairperson of Vinh Son Commune People's Committee
People's Committee of Thanh Chuong District – 14/11/2023		
1	Nguyen Manh Hao	Deputy Head of Agriculture Bureau
2	Nguyen Canh Hong	Expert of Agriculture Bureau
People's Committee of Nam Dan District – 15/11/2023		
1	Mr. Hue	Head of Bureau of Agriculture & Rural Development (BARD)
2	Vo Thi Hien	Official of BARD
3	Mr. Linh	Deputy Head of BOLISA
People's Committee of Chau Khe Commune – 9/11/2024		
1	Kha Van Chuong	Chairperson of Commune People's Committee
2	Vi Thi Kham	Vice Chairperson of Commune People's Committee
3	Hoang Thi My	Chairwoman of Commune Women's Union

No	Name	Address/Position
	Hanh	
4	Loc Thi Xuan	Official, Cultural and Social Affairs Division
5	Nguyen Thi Mai	Official, Cultural and Social Affairs Division
6	Vi Van Thang	Secretary of Commune Youth Union
7	Phan Thi Van	Bureau of Agriculture
8	Nguyen Duy Hoang	Cadastral Bureau
People's Committee of Do Luong District -11/11/2023		
1	Tran Van Hien	Vice Chairperson of District People's Committee
2	Tran Ngoc Thuan	Head of Bureau of Agriculture & Rural Dev.
3	Nguyen Thi Hanh (84)	Deputy Head of Bureau of Agriculture & Rural Dev.
4	Nguyen Thi Hanh (77)	Deputy Head of Bureau of Agriculture & Rural Dev.
5	Phung Van Trong	Official of Bureau of Agriculture & Rural Dev.
6	Nguyen Ba Chan	Deputy Head of Bureau of Agriculture & Rural Dev.
7	Pham Thi Bich Thuy	Head of Bureau of Labour, War Invalids and Social Affairs (BOLISA)
8	Nguyen Tat Tay	Head of Bureau of Education & Training (BOET)
9	Phai Thi Hien	Chairwoman of Women's Union
10	Nguyen Van Hai	Deputy Head of Bureau of Natural Resources and Environment
11	Nguyen Dinh Quang	Officer-in-charge of Bureau of Health
12	Nguyen Trung Tan	Deputy Secretary of District Youth Union
13	Nguyen Duc Toan	Director of Statistics Office
14	Phai Doan Sy	Vice Chairperson of Farmers' Union
15	Nguyen Quoc Cuong	Chairperson of Da Son Commune People's Committee
16	Nguyen Dinh Phong	Chairperson of Trang Son Commune People's Committee
17	Nguyen Van Hoi	Chairperson of Thuan Son Commune People's Committee
18	Nguyen Tat Ha	Vice Chairperson of Boi Son Commune People's Committee
19	Bui Nguyen Hai	Vice Chairperson of Dang Son Commune People's Committee
20	Nguyen Dinh Giap	Chairperson of Luu Son Commune People's Committee

Commune Ha Son - District Ha Trung - Province Thanh Hoa 27/5/2024 Women Group

No.	Full name	Age	Gender	Occupation	Agricultural land (m2)	No. of livestock and cattle	Crop
1	Tong Thi Thong	65	F	farmer	2500	chicken	Rice, jackfruit
2	Cao Thi Huong	63	F	farmer	2500	Chicken: 30; pig: 2	Rice, banana, Solanum procumbens
3	Nguyen Thi Hang	54	F	farmer	3000	Chicken: 20	Rice, jackfruit
4	Le Thi Hoa	57	F	farmer	3500	Cow: 1; chicken: 20	Rice, corn
5	Nguyen Thi Huong	50	F	farmer	1500	Chicken: 50	Rice
6	Dang Thi Ly	64	F	farmer	4000	Chicken: 15, duck: 20	Rice, sugarcane, potatoes
7	Nguyen Thi Can	70	F	farmer	1500	Chicken: 50	Rice, banana
8	Vu Thi Tam	70	F	farmer	1500	Chicken: 100	Rice, jackfruit, pine, Custard apple
9	Vu Thi Dam	64	F	farmer	3500	Cow: 2; chicken: 50; duck: 10	Rice, corn, banana, cassava, jackfruit, eucalyptus
10	Tran Thi Thu	70	F	farmer	3000	Cow: 2; chicken: 40; duck: 50; fish	Rice, vegetable
11	Vu Thi Xuan	58	F	farmer	1750	Chicken: 40	Rice
12	Tran Thi Thuy	63	F	farmer	2500	Cow: 1; chicken: 40	Rice, jackfruit, pomelo, peach
13	Vu Thi Thu	61	F	farmer	2000	Dog: 11; chicken:16, duck: 12	Rice, jackfruit, mango, banana
14	Le Thi Hue	70	F	farmer	2000	Dog: 5; chicken: 50, duck: 50	Rice, corn, peanut, bean
15	Tran Thi Thu	59	F	farmer	4000	2 cows 40 chickens 10 geese	rice, banana, sugarcane, corn, peanuts
16	Bui Thi Hoai	45	F	farmer	1000	N/A	rice
17	Le Thi Bay	40	F	farmer	1000	N/A	rice
18	Nguyen Thi Sinh	64	F	farmer	1650	1 pig	rice, corn, potatoes
19	Nguyen Thi Huong	67	F	farmer	750	Chicken	rice
20	Cao Thi Thu	75	F	farmer	5000	10 geese 50 chickens	acacia, melaleuca, rice
21	Nguyen Thi Hue	64	F	farmer	3000	Fish	rice, peanuts, potatoes, and potatoes
22	Cao Thi Hanh	65	F	farmer	1000	3 cows	rice
23	Le Thi Luyen	56	F	farmer	16000	30 chickens 2 cows	rice, lily, grapefruit, guava
24	Le Thi Loan	53	F	farmer	2000	20 chicken and snails	rice, luffa, vegetables
25	Le Thi Mien	56	F	farmer	2000	2 cows and chickens	rice
26	Nguyen Thi Ha	50	F	farmer	3000	fish	peanut rice
27	Tran Thi Thuan	65	F	farmer	52500	3 cows 20 goats and fish	rice, corn, and eggplant
28	Cao Thi Huong	60	F	farmer	3000	fish	rice and corn

Commune Ha Son - District Ha Trung - Province Thanh Hoa 27/5/2024 Men Group

No.	Full name	Age	Gender	Occupation	Agricultural land (m2)	No. of livestock and cattle	Crop
29	Tran Quang Khoi	62	M	Farmer	3000	20 chickens and 7 cows	rice, corn, peanuts
30	Tran Van Ut	59	M	Farmer	2000	30 chickens and 3 cows	rice
31	Vu Van Luan	63	M	Farmer	3000	30 chickens 2 cows	rice and corn
32	Nguyen Van Quang	50	M	Farmer	2250	50 Chickens 3 cows 6 pigs	rice
33	Le Da Nang	50	M	Farmer	2500	50 chickens and ducks, 4 pigs	rice, lily, corn
34	Cao Van Nham	42	M	Farmer	2500	30 chickens 2 cows	rice, lily, and peanuts
35	Nguyen Ngoc Thach	50	M	Farmer	2500	50 chickens	lilly, peanuts, rice and corn
36	Tran Van Tan	52	M	Farmer	3000	30 chickens and 3 cows	rice and corn
37	Nguyen Van Vuong	55	M	Farmer	2750	40 chickens and ducks, 3 cows	rice and corn
38	Le Van Viet	60	M	Farmer	3000	30 chickens 4 cows	rice, lilly, corn
39	Cao Xuan thap	68	M	Farmer	2250	30 chickens and ducks, 2 cows	rice, corn, vegetables
40	Le Minh Thai	54	M	Farmer	2500	50 chickens and ducks	rice, corn, flowers and vegetables
41	Le Van gioi	67	M	Farmer	3000	70 chickens and ducks, 3 cows	rice, corn, flowers
42	Pham Van Phuc	69	M	Farmer	4000	70 chickens	rice and fruit
43	Nguyen Dinh Chu	72	M	Farmer	3500	30 chickens and 3 pigs	rice, flowers, and fruit
44	Tran Van Que	74	M	Farmer	500	2 cows	rice, corn, bananas
45	Nguyen Van Luu	69	M	Farmer	3000	50 chickens 1 pig	rice and corn
46	Nguyen Dinh Chi	72	M	Farmer	N/A	20 goats 50 chickens	N/A
47	Tran Ba Ich	66	M	Farmer	4000	Fish and snails	rice
48	Nguyen Huy truong	60	M	Farmer	3500	4 cows 80 chickens	rice, pomelo, pineapple
49	Pham Van Luc	58	M	Farmer	4000	50 chickens	corn, rice and peanuts
50	Tran Duc hop	64	M	Farmer	2500	50 chickens	corn, rice and peanuts
51	Tran Xuan Thuy	63	M	Farmer	3000	50 chickens and 8 cows	corn, rice and peanuts
52	Cao Xuan Long	75	M	Farmer	2000	60 chickens 2 cows	rice and corn
53	Pham Van Vinh	76	M	Farmer	2500	30 chickens and ducks	rice

Commune Hoang Phu - District Hoang Hoa - Province Thanh Hoa 28/5/2024 Women Group

No.	Full name	Age	Gender	Occupation	Agricultural land (m2)	No. of livestock and cattle	Crop
1	Pham Thi Nhung	49	F	fish sauce production	N/A	10 tonnes/year	fish sauce
2	Truong Thi Nuong	49	F	fish sauce production	N/A	6 tonnes/year	fish sauce
3	Nguyen Thi Nga	52	F	fish sauce production	N/A	10 tonnes/year	fish sauce
4	Nguyen Thi Luyen	50	F	fish sauce production	N/A	6 tonnes/year	fish sauce
5	Nguyen Thi Lien	65	F	fish sauce production	N/A	20 tonnes/year	fish sauce
6	Nguyen Thi Loan	70	F	fish sauce production	N/A	6 tonnes/year	fish sauce
7	Nguyen Thi Khanh	63	F	fish sauce production	N/A	10 tonnes/year	fish sauce
8	Le Thi Ninh	60	F	fish sauce production	N/A	5 tonnes/year	fish sauce
9	Chu Thi Gioi	62	F	fish sauce production	N/A	50 tonnes/year	fish sauce
10	Cao Thi Trung	68	F	farmer	1500	50 poultry	rice
11	Le Thi Thoa	68	F	farmer	2500	N/A	rice, corn
12	Cao Thi Huong	37	F	fish sauce production	N/A	10 tonnes/year	fish sauce
13	Do Thi Kia	69	F	fish sauce production	N/A	10 tonnes/year	fish sauce
14	Truong Thi Thuoc	68	F	farmer	3000	30 poultry	rice, vegetables
15	Nguyen Thi Phuong	75	F	farmer	1000	20 poultry	rice
16	Nguyen Thi Toan	68	F	farmer	1000	10 poultry	rice
17	Le Thi Thang	64	F	farmer	1500	50 poultry	corn, sweet potato
18	Truong Thi Tenh	70	F	fish farming	1000	N/A	prawn, crab
19	Truong Thi Son	60	F	farmer	1000	20 poultry	rice, corn
20	Phung Thi Van	42	F	fish sauce production	N/A	20 tonnes/year & 50 poultry	fish sauce
21	Do Thi Duyen	42	F	fish farming	10000	N/A	prawn, crab
22	Le Thi Tuyen	60	F	fish sauce production	N/A	10 tonnes/year	fish sauce
23	Le Thi Hanh	45	F	fish sauce production	N/A	20 tonnes/year	fish sauce
24	Nguyen Thi Quyen	55	F	fish sauce production	N/A	20 tonnes/year	fish sauce
25	Nguyen Thi Vinh	75	F	fish sauce production	N/A	20 tonnes/year	fish sauce
26	Le Thi Binh	57	F	farmer	1000	poultry	rice
27	Truong Thi Hai	59	F	farmer	1500	30 chickens	rice, corn
28	Nguyen Thi Canh	61	F	fish farming	10000	prawn, crab	N/A
29	Le Thi Quyen	51	F	fish sauce production	N/A	fish sauce	N/A
30	Nguyen Thi Cu	74	F	fish sauce production	N/A	fish sauce	N/A
31	Le Thi Hieu	51	F	fish sauce production	N/A	fish sauce	N/A
32	Le Thi Nhan	79	F	pensioner	N/A	N/A	N/A
33	Nguyen Thi Hanh	58	F	fish sauce production	N/A	20 tonnes/year	N/A
34	Cao Thi Xuan	51	F	farmer	500	50 chickens	rice
35	Chu Thi Thieu	66	F	fish sauce production	N/A	3 tonnes/year	N/A
36	Le Thi Hoa	51	F	farmer	500	20 chickens	rice
37	Phung Thi Lan	60	F	fish sauce production	N/A	10 tonnes/year	N/A
38	Le Thi Lan	68	F	fish sauce production	N/A	10 tonnes/year	N/A

Commune Hoang Phu - District Hoang Hoa - Province Thanh Hoa 28/5/2024 Men Group

No.	Full name	Age	Gender	Occupation	Agricultural land (m2)	No. of livestock and cattle	Crop
39	Phung Xuan Thu	74	M	business owner	none	N/A	N/A
40	Le Hong Huyen	70	M	business owner	none	N/A	N/A
41	Nguyen Thanh Hoa	67	M	farmer	2500	prawn	rice
42	Le Van Suong	70	M	farmer	2000	30 chickens 30 ducks	rice, peanut
43	Cao Xuan Nam	76	M	farmer	750	N/A	rice, peanut
44	Le Xuan Thanh	60	M	farmer	1750	chicken	rice
45	Cao Trong Thuy	56	M	fishing	none	N/A	inshore fishing
46	Nguyen Van Hai	45	M	fish farming	5000	N/A	prawn
47	Nguyen Van Dinh	70	M	pensioner	none	N/A	fishing
48	Nguyen Van Dung	70	M	pensioner	none	N/A	N/A
49	Truong Van Dai	65	M	farmer	3000	3 cows 40 chickens	rice, peanut
50	Truong Van Muoi	65	M	farmer	2000	N/A	rice, sweet potato
51	Nguyen Van Thong	70	M	farmer	2250	12 chickens	rice
52	Bui Van Mieng	72	M	farmer	1000	N/A	rice
53	Nguyen Xuan Thuy	61	M	fish farming	30000	N/A	prawn

Commune Chau Khe - District Con Cuong - Nghe An 29/5/2024 Thai Ethnic Minority Women Group

No.	Full name	Age	Gender	Occupation	Agricultural land (m2)	No. of livestock and cattle	Crop
1	Phung Thi Luan	60	F	farmer	3500	3 cows 60 chickens 2 pigs	rice, Solanum procumbens
2	Tran Thi Minh	59	F	farmer	5500	3 cows 50 chickens	rice, corn, sugarcane, peanut
3	Pham Thi Hoa	43	F	farmer	5000	3 cows 5 pigs	rice, corn
4	Lo Thi Hoa	51	F	farmer	2500	4 cows 5 pigs	rice, corn
5	Loc Thi Hai	45	F	farmer	1200	3 pigs 50 chickens	rice, corn
6	Quang Thi Nam	44	F	farmer	1200	2 buffalos 1 pig & chickens	rice, corn, peanut, Solanum procumbens
7	Vi Thi Tam	49	F	farmer	5000	2 cows 2 pigs 40 chickens	rice, corn, peanut
8	Quang Thi Ha	60	F	farmer	2000	1 cow 1 pig 13 chickens	rice, corn, peanut
9	Dao Tieu Quyen	44	F	farmer	1500	2 cows 4 pigs & chickens	rice, corn, peanut, cassava
10	Luong Thi Xuyen	32	F	farmer	4500	2 cows 2 pigs & chickens	rice, corn, peanut, sesame
11	Vi Thi Xuyen	41	F	farmer	3800	3 cows 2 pigs & chickens	rice, corn, peanut
12	Lo Thi Quy	51	F	farmer	2000	1 cow 4 pigs & chickens	rice, corn, cassava
13	Tran Thi Thanh	51	F	farmer	5000	4 cows & chickens	rice, corn, Solanum procumbens
14	Vi Thi Binh	36	F	farmer	4500	cows pigs chickens	rice, corn, peanut, sesame
15	Le Thi Hoai	48	F	farmer	5000	4 cows, fish, chickens	rice, corn, peanut, sesame
16	Nguyen Thi Hien	38	F	farmer	2500	2 cows 1 pig	rice, corn, cassava, Solanum procumbens
17	Ngo Thi Lieu	54	F	farmer	5000	4 pigs 3 cows 40 chickens	rice, corn, sugarcane, Solanum procumbens
18	Bui Thi Huong	50	F	farmer	2000	3 buffalos 6 pigs	rice, corn
19	Vi Thi Dang	42	F	farmer	1000	pigs and chickens	rice, corn

Commune Chau Khe - District Con Cuong - Nghe An 29/5/2024 Thai Ethnic Minority Men Group

No.	Full name	Age	Gender	Occupation	Agricultural land (m2)	No. of livestock and cattle	Crop
20	Phan Dinh Quan	48	M	farmer	N/A	N/A	N/A
21	Nguyen Dinh Tam	68	M	farmer	1500	40 chickens 4 cows	rice
22	Nguyen Van Hai	60	M	farmer	1500	90 chickens 4 cows	rice, Solanum procumbens
23	Phung Xuan Thanh	70	M	farmer	2000	50 chickens	rice, corn
24	Nguyen Trong Doan	55	M	farmer	1000	100 chickens 3 cows	rice, corn, cassava
25	Tran Van Toan	56	M	farmer	1500	50 chickens 3 cows	rice, cassava
26	Nguyen Nhu Thanh	63	M	farmer	1000	30 chickens 3 cows	rice, corn, cassava
27	Tran Xuan Linh	73	M	farmer	1500	40 chickens 1 cow	rice, corn
28	Nguyen Van Dao	68	M	farmer	1300	100 chickens 14 pigs	rice, Solanum procumbens
29	Nguyen The Dung	65	M	farmer	2500	50 chickens 2 cows	rice, Solanum procumbens
30	Nguyen Trong Nam	60	M	farmer	1500	20 chickens 2 cows	rice, Solanum procumbens, sugarcane
31	Nguyen Song Hap	55	M	farmer	1500	100 chickens 5 cows	rice, sugarcane
32	Loc Van Tuan	41	M	farmer	1150	cows, chickens, ducks, muscovy duck	rice, corn, cassava
33	Kha Van Trinh	60	M	farmer	1500	2 buffalos 50 chickens	rice, corn
34	Kha Van Ngo	56	M	farmer	2000	2 buffalos 5 pigs	rice, corn
35	Loc Van Ngoan	34	M	farmer	3000	7 pigs	rice, corn
36	Lo Duc Hanh	52	M	farmer	1500	300 chickens	rice, corn
37	Lo Van Dung	40	M	farmer	2000	3 cows 13 pigs 50 chickens	rice, corn

Commune Thanh Ha - District Thanh Chuong - Nghe An 30/5/2024 Mixed Gender Group

No.	Full name	Age	Gender	Occupation	Agricultural land (m2)	No. of livestock and cattle	Crop
1	Tran Thoai Khanh	38	F	farmer	5000	N/A	rice
2	Bien Thi Loc	59	F	farmer	3500	2 buffalos 100 chickens	rice, corn
3	Pham Thi Long	63	F	farmer	3000	1 buffalo 50 chickens	rice, corn
4	Tran Thi Le	51	F	farmer	3800	2 buffalos 70 chickens	rice, corn
5	Nguyen Thi Oanh	45	F	farmer	2000	1 buffalo 50 chickens	rice, corn
6	Nguyen Thi Anh	35	F	farmer	2500	100 chickesn	rice, corn
7	Phan Van Tinh	74	M	farmer	4500	1 buffalo	rice, corn
8	Hoang Van Ninh	58	M	farmer	2700	30 chickens	rice, corn, peanuts
9	Pham Kien Quyet	57	M	farmer	2200	1 cow	rice, corn
10	Tran Van Thin	58	M	farmer	8200	2 pigs 40 chickens	rice, corn
11	Bien Huu Dai	71	M	farmer	5000	1 buffalo 1 cow 3 pigs	rice, corn
12	Hoang Dinh Lam	68	M	farmer	7250	3 pigs 3 buffalos	rice, corn
13	Lam Van Kha	78	M	farmer	5000	none	rice, corn
14	Pham Duc Vuong	70	M	farmer	4100	3 pigs 1 buffalo	rice, corn, peanuts
15	Dang Van Ky	47	M	farmer	5500	20 chickens	rice, corn, sweet potato
16	Doan Van Chinh	62	M	farmer	5000	4 buffalos 60 chickens	rice, corn, sweet potato
17	Pham Van Long	64	M	farmer	4000	1 buffalo 11 goats 60 chickens	rice, corn, peanuts
18	Dang Van Khiem	51	M	farmer	2500	1 buffalo 2 pigs	rice, corn
19	Bien Huu Hai	57	M	farmer	10500	5 pigs	rice, corn, peanuts
20	Tran Trong Anh	73	M	farmer	4500	30 chickens	rice, corn
21	Dang Van Thuan	73	M	farmer	3500	1 buffalo 30 chickens 5 pigs	rice, corn, peanuts
22	Tran Van Que	64	M	farmer	3700	3 buffalos 4 pigs 7 goats 100 chickens	rice, corn, sweet potato

Commune Xuan Truong – District Thanh Chuong - Nghe An 30/5/2024 Mixed Gender Group

No.	Full name	Age	Gender	Occupation	Agricultural land (m2)	No. of livestock and cattle	Crop
1	Le Thi Nhan	42	F	farmer	1500	20 chickens 4 pigs 1 cow	rice, corn
2	Nguyen Thi Lien	35	F	farmer	2500	50 chickens 6 cows	rice, corn
3	Nguyen Thi Thao	50	F	farmer	3000	2 cows 50 chickens 10 pigs	rice, corn, bean
4	Nguyen Thi Hue	58	F	farmer	3000	50 chickens 3 cows	rice, corn, bean, peanut
5	Nguyen Thi Mai	40	F	farmer	4500	3 cows 50 chickens	rice, corn, bean, peanut
6	Phan Van Hong	67	M	farmer	5000	30 chickens 5 cows	rice, corn, banana
7	Nguyen Ba Chinh	60	M	farmer	2000	55 chickens 1 cow	rice, corn
8	Nguyen Quang Truong	76	M	farmer	1500	54 chickens	rice, corn
9	Nguyen Ba Thang	64	M	farmer	2500	45 chickens 1 cow	rice, corn, bean
10	Pham Van Chuyen	72	M	farmer	3000	52 chickens 1 cow	rice, corn
11	Dinh Bat Thanh	62	M	farmer	3000	60 chickens 1 cow	rice, corn
12	Dinh Bat Hung	54	M	farmer	3000	70 chickens 1 cow	rice, corn
13	Nguyen Ba Hanh	52	M	farmer	2500	60 chickens 1 cow	rice, corn, bean
14	Dinh Bat Ha	62	M	farmer	2000	50 chickens 1 cow	rice, corn
15	Nguyen Phung Nam	57	M	farmer	2500	80 chickens	rice, corn
16	Nguyen Dinh Hoang	54	M	farmer	650	110 chickens 2 buffalos	rice, corn
17	Nguyen Phung Lam	64	M	farmer	2750	61 chickens 6 cows	rice, corn
18	Phan Van Thuan	70	M	farmer	1500	65 chickens 2 cows	rice, corn
19	Phan Van Oanh	55	M	farmer	2000	72 chickens 2 cows	rice, corn
20	Nguyen Van Tien	50	M	farmer	2500	57 chickens 1 cow	rice, corn

List of People met during the Detailed Design

No.	Full name	Position/ Occupation	Gender
Nghe An Agriculture and Rural Development Investment and Construction Project Management Bureau, Monday – 23/09/2024			
1	Nguyễn Đình Hưng	Head of Project Management Bureau	Male
2	Trần Đại Nghĩa	Official of Procurement Plan Division	Male
3	Bùi Đức Điệp	Official of Technical Division	Male
Nghe An Province Department of Agriculture and Rural Development – 24/09/2024			
1	Phan Thanh Tùng	Head of Plant Protection Division, Bureau of Plantation & Plant Protection	Male
2	Nguyễn Thị Hà	Head of Finance Division, Bureau of Economic Cooperation & Rural Development	Female
3	Nguyễn Kim Hùng	Head of Technology Development Division, Agricultural Extension Center	Male
4	Lê Hữu Bắc	Deputy Director of Cultivar Center	Male
5	Lê Thế Toại	Official of Planning Division, Office for New Countryside Coordination	Male
6	Nguyễn Tuấn Anh	Official of Finance & Accounting Division, Office for New Countryside Coordination	Male
Nghe An Province Farmers' Union – 24/09/2024			
1	Nguyễn Hồng Sơn	Permanent Deputy Chairman	Male
2	Trần Văn Đức	Head of Economic Board	Male
3	Nguyễn Anh Trường	Official of Economic Board	Male
Nghe An Province Women's Union, Nghe An Province Youth Union – 24/09/2024			
1	Hoàng Thị Thu Hiền	Deputy Chairman of Women's Union	Female
2	Lê Thị Thanh Hải	Head of Board for Women's Economic Development Support, Women's Union	Female
3	Hoàng Văn Đông	Commander of Pioneering Youth Force, Youth Union	Male
4	Lô Thị Trung Hiếu	Deputy Head of Movement Board, Youth Union	Female
Nghe An Province Natural Rssouces and Environment Department – 24/09/2024			
1	Lê Đức Cương	Deputy Director of Centre for Hydro - Meteorological Forecasting, North Central Branch	Male
2	Đào Duy Tâm	Head of Water Resources Management Bureau, Natural Rssouces and Environment Department	Male
3	Dương Bá Hùng	Vice Head of Water Resources Management Bureau, Natural Rssouces and Environment Department	Male
4	Trần Xuân Bình	Deputy Head of Irrigation Construction Management Division, Irrigation Bureau, Natural Rssouces and Environment Department	Male
5	Mr. Hậu	Deputy Director of Center for Environmental Monitoring, Natural Rssouces and Environment Department	Male
Field survey – 25/09/2024			
1	Lê Văn Dương	BOD Chairman, Southwest Nghe An Irrigation Single Member LLC	Male
2	Mr Quảng	Manager of Chau Khe Pumping Station	Male

3	Hoàng Tuấn Anh	Representative of Technical Planning Division, Thanh Chuong Irrigation Co.	Male
4	Nguyễn Trọng Mạnh	Representative of Administration Division, Thanh Chuong Irrigation Co.	Male
Con Cuong District People's Committee – 25/09/2024			
1	Trần Anh Tuấn	Deputy Chairman of District People's Committee	Male
2	Nguyễn Phúc Sỹ	Chairman of District Farmers' Union	Male
3	Trần Thị Hạnh	Deputy Chairman of District Women's Union	Female
4	Nguyễn Văn Đạt	Deputy Manager of Statistics Division	Male
5	Phạm Thị Hồng Kiên	Head of Weather Station	Female
6	Nguyễn Thị Hòa	Head of Gauging Station	Female
7	Lô Văn Lý	Head of Agriculture and Rural Development Division	Male
8	Lương Văn Nông	Official of District Youth Union	Male
9	Lang Anh Hưng	Official of Agriculture and Rural Development Division	Male
10	Lô Thị Tâm	Official of Agriculture and Rural Development Division	Female
11	Nguyễn Thế Lộc	Official of Natural Resources & Environment Division	Male
12	Vi Xuân Yên	Official of Economic Infrastructure Division	Male
Chau Khe Commune People's Committee – 25/09/2024 – These consultations are with EM			
1	Kha Văn Trương	Chairman of Commune People's Committee	Male
2	Vi Thị Khằm	Deputy Chairman of Commune People's Committee	Female
3	Hoàng Thị Mỹ Hạnh	Chairman of Commune Women's Union	Female
4	Vi Văn Thăng	Secretary of Commune Youth Union	Male
5	Cầm Thị Nam	Chairman of Commune Farmers' Union	Female
6	Nguyễn Thị Mai	Socio-Cultural Officer	Female
7	Phan Đình Hải	Land Administration and Agiculture Officer	Male
Bai Gao Village Cultural House – 25/09/2024			
1	Lô Thị Xo	Farmer	Female
2	Lữ Thị Thủy	Farmer	Female
3	Lộc Thị Dung	Farmer	Female
4	Lộc Thị Hải	Farmer	Female
5	Phi Thị Dặng	Farmer	Female
6	Lang Thị Nhật	Farmer	Female
7	Hà Thị Cảnh	Farmer	Female
8	Vi Thị Ngân	Farmer	Female
9	Lộc Thị Khoa	Farmer	Female
10	Lô Thị Quý	Farmer	Female
11	Hà Thị Mơ	Farmer	Female

12	Kha Thị Năm	Farmer	Female
13	Kha Đình Thắng	Farmer	Male
14	Kha Văn Thái	Farmer	Male
15	Quảng Văn Thuận	Farmer	Male
16	Kha Văn Thành	Farmer	Male
17	Lộc Minh Đức	Farmer	Male
18	Kha Văn Tiên	Farmer	Male
19	Lộc Văn Luyến	Farmer	Male
20	Lộc Văn Tuấn	Farmer	Male
Thanh Chuong District People's Committee – 26/09/2024			
1	Trần Phi Hùng	Head of Agriculture and Rural Development Division	Male
2	Nguyễn Trọng Khánh	Chairman of District Farmers' Union	Male
3	Hoàng Tuấn Anh	Representative of Thanh Chuong Irrigation LLC	Male
4	Nguyễn Thị Ngọc Anh	Official of District Women's Union	Female
5	Trần Huy Thảo	Head of Yen Thuong Weather and Gauging Station	Male
6	Nguyễn Việt Đức	Official of District Youth Union	Male
7	Nguyễn Thị Lương	Official of Natural Resources & Environment Division	Female
8	Nguyễn Mạnh Hảo	Official of Agriculture and Rural Development Division	Male
9	Phạm Quốc Anh	Official of Economic Infrastructure Division	Male
Xuan Tuong Commune People's Committee – 26/09/2024			
1	Nguyễn Phùng Hoà	Chairman of Commune People's Committee	Male
2	Nguyễn Trung Thành	Deputy Chairman of Commune People's Committee	Male
3	Trần Thị Lưu	Chairman of Commune Women's Union	Female
4	Nguyễn Thị Đào	Deputy Chairman of Commune People's Council	Female
5	Nguyễn Phùng Lâm	Cooperative Manager	Male
6	Đinh Thị Tố Vi	Agriculture Officer	Female
7	Lê Thế Anh	Land Administration Officer	Male
9	Phạm Văn Tuyên	Farmer	Male
10	Nguyễn Quang Trường	Farmer	Male
11	Trần Thị Lưu	Farmer	Female
12	Phan Văn Hồng	Farmer	Male
13	Nguyễn Bá Chính	Farmer	Male
14	Nguyễn Trọng Lịch	Farmer	Male
15	Nguyễn Phùng Nam	Farmer	Male
16	Phan Thanh Kỳ	Farmer	Male

17	Nguyễn Đình Hoàng	Farmer	Male
18	Nguyễn Phùng Lâm	Farmer	Male
19	Hoàng Văn Hoan	Farmer	Male
20	Nguyễn Phùng Đồng	Farmer	Male
21	Lê Thị Nhân	Farmer	Female
22	Hoàng Thị Minh	Farmer	Female
23	Phan Văn Thuận	Farmer	Male
24	Nguyễn Thị Nga	Farmer	Female
25	Nguyễn Đình Hoàn	Farmer	Male
26	Nguyễn Thị Tí	Farmer	Female
27	Hoàng Văn Thuận	Farmer	Male
Hung Nguyen District People's Committee – 27/09/2024			
1	Hoàng Đức Ân	Head of Agriculture and Rural Development Division	Male
2	Phạm Ngọc Cừ	Head of Natural Resources and Environment Division	Male
3	Nguyễn Văn Hiệp	Head of Labour, War Invalids and Social Affairs Division	Male
4	Hồ Thị Hạnh	Chairman of District Farmers' Union	Female
5	Trần Văn Đường	Head of Health Division	Male
6	Hoàng Văn Dũng	Deputy Head of Economic Infrastructure Division	Male
7	Phạm Quốc Hoàng	Representative of Youth Union	Male
8	Lê Thu Hà	Representative of Women's Union	Female
9	Nguyễn Đình Kính	Official of Agriculture and Rural Development Division	Male
Chau Nhan Commune People's Committee – 27/09/2024			
1	Trần Công Hoan	Secretary of Communist Party, Chairman of Commune People's Council	Male
2	Lê Khánh Quang	Chairman of Commune People's Committee	Male
3	Phan Đình Hoàn	Deputy Chairman of Commune People's Committee	Male
4	Nguyễn Thị Thu	Deputy Chairman of Commune People's Committee	Female
4	Đinh Như Khoa	Cooperative Manager	Male
5	Nguyễn Công Hoan	Chairman of Commune Farmers' Union	Male
6	Khoa Thị Thủy	Chairman of Commune Women's Union	Female
9	Nguyễn Minh Khai	Land Administration and Agriculture Officer	Male
10	Võ Văn Tiến	Chief of Phu Xuan Village	Male
11	Phạm Văn Tâm	Secretary of Phu Xuan Communist Party Cell	Male
12	Phạm Thị Thường	Head of Phu Xuan Fatherland Front	Female
Phu Xuan Village Cultural House – 27/09/2024			
1	Phạm Thị Bích	Farmer	Female

2	Cao Văn Dũng	Farmer	Male
3	Nguyễn Thị Bưởi	Farmer	Female
4	Phạm Thị Tí	Farmer	Female
5	Phạm Thị Liên	Farmer	Female
6	Trần Thị Hoài	Farmer	Female
7	Phạm Văn Châu	Farmer	Male
8	Phạm Thị Liên Ân	Farmer	Female
9	Lê Văn Tiến	Farmer	Male
10	Đinh Như Khoa	Farmer	Male
11	Phạm Văn Ân	Farmer	Male
12	Phạm Thị Liên	Farmer	Female
13	Phạm Thị Tú	Farmer	Female
14	Phạm Thị Thành	Farmer	Female
15	Phạm Văn Tâm	Farmer	Male
16	Phạm Thị Thuận	Farmer	Female
17	Phạm Thị Hà	Farmer	Female
18	Phạm Thị Nga	Farmer	Female
19	Phạm Thị Thường	Farmer	Female
Nghe An Irrigation Service Consulting Firm – 28/09/2024			
1	Lương Văn Minh	Director	Male
Nghe An Agriculture anh Rural Development Investment and Construction Project Management Bureau – 30/09/2024			
1	Nguyễn Đình Hưng	Head of Project Management Bureau	Male
2	Trần Đại Nghĩa	Official of Procurement Plan Sub-Division	Male
3	Bùi Đức Điệp	Official of Technical Sub-Division	Male
4	Lương Văn Minh	Local Advisor	Male
Thanh Hoa Province Agriculture anh Rural Development Investment and Construction Project Management Board – 01/10/2024			
1	Lê Anh Đức	Deputy Director	Male
2	Nguyễn Xuân Quang	Head of Planning & General Affairs Bureau	Male
3	Nguyễn Văn Tùng	Deputy Head of Planning & General Affairs Bureau	Male
4	Đinh Quốc Khánh	Official	Male
Thanh Hoa Province Agriculture & Rural Development Department – 01/10/2024			
1	Trịnh Thị Hà	Head of Plantation & Forestry Division, Agricultural Extension Center	Female
2	Vũ Văn Hà	Deputy Director of Agricultural Extension Center	Male
3	Trịnh Văn Chấp	Head of Plantation Division, Bureau of Plantation & Plant Protection	Male
4	Nguyễn Huy Thành	Deputy Head of Rural Development Bureau	Male

5	Lê Thị Trung	Official of Rural Development Bureau	Female
6	Lê Thị Lệ Dung	Deputy Head of Financial Planning Bureau	Female
7	Trịnh Duy Long	Official of Office for New Countryside Coordination	Male
8	Nguyễn Trọng Dũng	Deputy Director of Center for Clean Water & Rural Environment Hygiene	Male
9	Triệu Thị Bình	Official of Center for Clean Water & Rural Environment Hygiene	Female
10	Nguyễn Việt Linh	Official of Irrigation Bureau	Male
Thanh Hoa Province Natural Resources and Environment Department – 01/10/2024			
1	Trịnh Thế Thành	Deputy Director, Center for Hydro - Meteorological Forecasting	Male
2	Nguyễn Thị Thủy	Officer of Center for Hydro - Meteorological Forecasting	Female
3	Đỗ Thị Thu	Officer of Center for Hydro - Meteorological Forecasting	Female
4	Đào Việt Dũng	Official of Water Resource Bureau, Natural Resources and Environment Department	Male
5	Nguyễn Thị Vi	Vice Head of Sea and Islands Bureau, Natural Resources and Environment Department	Female
Thanh Hoa Province Cooperative Alliance, Thanh Hoa Province Farmers' Union– 01/10/2024			
1	Trương Ngọc Ninh	Chief of Cooperative Alliance	Male
2	Nguyễn Thị Mai Ngân	Deputy Chief of Cooperative Alliance	Female
3	Vũ Tiến Dũng	Deputy Chairman of Farmers' Union	Male
4	Hoàng Bùi Đồng	Deputy Head of Farmers' Union Board	Male
Thanh Hoa Province Youth Union, Thanh Hoa Province Women's Union – 01/10/2024			
1	Phùng Tố Linh	Deputy Secretary of Youth Union	Female
2	Trần Hải Đăng	Official of Youth Union	Male
3	Đồng Thị Thu Nga	Official of Women's Union	Female
Hoang Hoa District People's Committee – 02/10/2024			
1	Nguyễn Thị Thu Hà	Deputy Chairman of District People's Committee	
1	Lê Trọng Hoà	Head of Agriculture & Rural Development Division	Male
2	Lê Doãn Phương	Head of Natural Resources & Environment Division	Female
3	Đinh Xuân Ánh	Director of Center for Agricultural Services	Female
4	Trương Thanh Quế	Deputy Head of Labour, War Invalids and Social Affairs Division	Female
5	Lê Xuân Nhất	Official of Natural Resources & Environment Division	Male
6	Lê Bá Duy	Official of Agriculture & Rural Development Division	Male
7	Hoàng Thị Hoa	Official of Labour, War Invalids and Social Affairs Division	Female
8	Nguyễn Đức Gia	Official of Statistics Division	Male
Bac Song Ma Co. – 02/10/2024			
1	Lương Quốc Luận	Deputy Director	Male
2	Trần Hưng	Hoang Hoa Branch Director	Male

Hoang Phu Commune People's Committee – 02/10/2024			
1	Trương Hùng Thế	Deputy Chairman of Commune People's Committee	Male
2	Nguyễn Thị Lý	Chairwomen of Commune Women's Union	Female
3	Trương Văn Lĩnh	Secretary of Commune Youth Union	Male
4	Trương Văn Độ	Chairman of Commune Farmers' Union	Male
5	Lê Trần Quỳnh	Agriculture Cooperative Director	Male
6	Lê Thị Mão	Official of Commune People's Committee	Female
7	Trương Văn Đại	Farmer	Male
8	Lê Văn Sương	Farmer	Male
9	Trương Thị Thược	Farmer	Female
10	Lê Thị Ngân	Farmer	Female
11	Nguyễn Thị Ly	Farmer	Female
12	Ngô Thị Nga	Farmer	Female
13	Lê Thị Nở	Farmer	Female
14	Nguyễn Thị Tâm	Farmer	Female
15	Nguyễn Văn Dính	Farmer	Male
16	Nguyễn Văn Dũng	Farmer	Male
17	Nguyễn Thị Phương	Farmer	Female
18	Cao Trịnh Thủy	Farmer	Female
19	Nguyễn Thị Hới	Farmer	Female
20	Trần Văn Khải	Farmer	Male
21	Lê Thị Hương	Farmer	Female
22	Nguyễn Thị Kiều	Farmer	Female
23	Nguyễn Thị Lan	Farmer	Female
24	Cao Thị Tý	Farmer	Female
25	Lê Thị Lan	Farmer	Female
26	Trương Thị Thao	Farmer	Female
Ha Trung District People's Committee – 03/10/2024			
1	Hoàng Văn Long	Deputy Chairman of District People's Committee	Male
2	Nguyễn Văn Thịnh	Head of Agriculture & Rural Development Division	Male
3	Nguyễn Ngọc Chung	Deputy Head of Office, District People's Committee	Male
4	Trương Thị Tâm	Chairwoman of District Women's Union	Female
5	Nguyễn Thế Phương	Deputy Head of Labour, War Invalids and Social Affairs Division	Male
6	Trần Trung Kiên	Chief Official of Agriculture & Rural Development Division	Male
7	Đỗ Quốc Oai	Deputy Head of Natural Resources and Environment Division	Male

Ha Son Commune People's Committee – 03/10/2024			
1	Hoàng Đình Dưỡng	Secretary of Commune Communist Party, Chairman of Commune People's Council	Male
2	Nguyễn Minh Tân	Chairman of Commune People's Committee	Male
3	Trần Bá Hữu	Deputy Chairman of Commune People's Council	Male
4	Nguyễn Văn Ngọ	Deputy Chairman of People's Committee	Male
5	Bùi Văn Hạ	Chairman of Commune Fatherfront Alliance	Male
6	Nguyễn Xuân Trường	Chairman of Commune Commune Union	Male
7	Lê Thị Thanh	Chairman of Commune Women's Union	Female
8	Lưu Thị Liên	Secretary of Commune Youth Union	Female
9	Nguyễn Viết Quyền	Chairman of Commune Veteran Organization	Male
10	Đỗ Hồng Quân	Cooperative Director	Male
11	Đặng Văn Thanh	Cooperative Deputy Director	Male
12	Lê Văn Việt	Cooperative Controller	Male
13	Vũ Thị Việt Anh	Cooperative Accountant	Female
14	Nguyễn Thị Trang	Cooperative Treasurer	Female
15	Trần Xuân Thủy	Farmer	Male
16	Phạm Văn Vinh	Farmer	Male
17	Lê Thành Nhân	Farmer	Male
18	Trần Quang Khởi	Farmer	Male
19	Nguyễn Văn Quảng	Farmer	Male
20	Lê Thị Loan	Farmer	Female
21	Trần Thị Bình	Farmer	Female
22	Lê Thị Hương	Farmer	Female
23	Nguyễn Huy Trường	Farmer	Male
24	Vũ Thị Loan	Farmer	Female
25	Vũ Thị Thái	Farmer	Female
26	Trần Thị Sáu	Farmer	Female
27	Vũ Thị Minh	Farmer	Female
Thanh Hoa Province Agriculture and Rural Development Investment and Construction Project Management Board – 07/10/2024			
1	Lê Anh Đức	Deputy Director	Male
2	Nguyễn Xuân Quang	Head of Planning & General Affairs Bureau	Male
3	Nguyễn Văn Tùng	Deputy Head of Planning & General Affairs Bureau	Male
4	Đinh Quốc Khánh	Official	Male