ADAPTATION FUND

PROGRAMME ON INNOVATION:
SMALL GRANTS PROJECTS THROUGH DIRECT ACCESS MODALITY

REQUEST FOR PROJECT FUNDING FROM THE ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project must be fully prepared when the request is submitted.

Complete documentation should be sent to:

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN P4-400
Washington, D.C., 20433
U.S.A
Fax: +1 (202) 522-3240/5
Email: afbsec@adaptation-fund.org

ADAPTATION FUND

PROGRAMME ON INNOVATION: SMALL GRANT PROJECT PROPOSAL

PART I: PROJECT INFORMATION

Country: Bhutan

Title of Project: *Building Adaptive Capacity through Innovative Management of Pests/Disease and Invasive Alien Species (IAS) in Bhutan to Enhance Sustainable Agro-Biodiversity and Livelihoods.*

National Implementing Entity: **Bhutan Trust Fund for Environmental Conservation (BTFEC)**

Executing Entity/ies: National Environment Commission Secretariat (NECS)
Bhutan Agriculture and Food Regulatory Authority (BAFRA)

Amount of Financing Requested: 250,000 (in U.S Dollars Equivalent)

Project Background and Context:

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

The Himalayan country of Bhutan is typically an agrarian country with more than half of the population depending on agriculture. However, farming has been constrained by the mountainous topography and rapid changes in environmental variability. With climate change, agricultural production and food security face one of the biggest challenges of the twenty-first century. The country has already been experiencing several impacts of climate change, such as erratic rainfalls, winds and hail storms, crop loss to unusual outbreaks of diseases and pests, flash floods and landslides annually. Most villages across Bhutan are highly vulnerable to climate change impacts, and have low adaptive capacity attributed to their limited resource base and precarious socio-economic status.

In order to address some of the issues of climate change impacts on the agriculture sector; Bhutan has been successful in securing support from the Green Climate Fund (GCF) through the project “Supporting climate resilience and transformational change in the agriculture sector in Bhutan”. The GCF approved project aims to promote climate resilient agricultural practices, integrate climate change risk data into water and land management to support smallholders and reduce the risk and impact of climate change-induced landslides during extreme events that disrupt market access.

This AF innovation project will complement the GCF project in terms of addressing other climate change impacts that affect agriculture and pose a threat to the livelihoods of the

people due to the unusual outbreak of diseases, pests and invasive alien species. This small grant project will in fact play a role in raising the importance of comprehensively addressing climate change impacts on the agriculture sector by looking at all issues related to agriculture such as water availability, crops resilience, disasters and pest and diseases. The issues of pest and diseases have largely been omitted primarily due to lack of data and support. This project could also take advantage of the tailored climate information generated from the GCF project that will be disseminated to the farmers if available within the project time frame to determine the probability of GALS spread and distribution to the areas targeted by the GCF project.

One of the main issues and threats to agro-biodiversity in Bhutan due to change in climate that are reducing the productivity of the crops and affecting livelihood is the emergence and spread of pests/diseases and Invasive Alien Species (IAS) and lack of preparedness, technology and capacity to implement adaptation measures for these threats. Some of the reported pest and disease incidents in Bhutan include the epidemics of rice blast disease in 1995 and 1996 which caused 80-90% yield loss and is correlated to persistent wet, humid and cloudy weather conditions during the cropping season (SNC 2011). In 2006, *Turcicum* leaf blight and gray leaf spot disease of maize due to prolonged wet conditions resulted in harvest loss by more than 50% (NAPA: Update of Projects and Profiles 2012). In May 2013, an armyworm outbreak was reported from 7 dzongkhags (Districts) eating away all the paddy saplings and maize, which are one of the main staple diets of Bhutanese. These are now recurrent pest and diseases that impact the agricultural sector on an annual basis.

Similarly, the frequent outbreak of the invasive Giant African Land Snails (GALS) in Gyelpozhing under Mongar District since 2010 has had major impact on the livelihood of the communities in the area. The snail feeds on a wide range of vegetation such as trees, vegetables, and crops and also calcareous substances such as concrete and is of great concern to the farmers. Its length can reach 20 cm or more, and in a year it lays around 1,000 to 1,200 eggs with a life expectancy of up to 10 years. GALS is listed as one of the top 100 invasive species in the world, and can adapt to wide-ranging climatic conditions from sub-tropic to temperate regions. In the presence of abundant vegetations it can multiply very fast. The snails are also known to harbor nematodes that cause meningitis, if it is not handled properly and is a great concern for human health. Even without climate change, the GALS have shown devastating impacts on the ecosystem and environment. They are known to feed on over 500 varieties of plants. In Bhutan some of the crops affected by GALS are mangoes, papaya, cabbage, tomatoes, sweet potato, and bananas etc which are some of the major cash crops for farmers in the country and this does not include the natural vegetation. Due to its high productivity rate, the pest grows and multiplies quickly thereby making their management challenging.

Invasive alien species act synergistically with climate change and it is expected to expedite the colonization of some areas by invasive species which will have severe ramifications on native species. The increase in temperature and precipitation due to climate change is the major influencing factor for distribution and the outbreak of this

species. The highest infestation takes place with the onset of monsoon (June) and remains active throughout the rainy season and starts declining gradually from mid-November. The maximum invasion risk occurs between June and November during which Bhutan receives monsoon and is the peak agriculture season.

As per the Second National Communication of Bhutan (SNC 2011), the mean total annual precipitation is projected to increase by ~6% in the 2010-2039 periods and by ~20-25% in the 2040-2069 periods. Both periods are expected to have wetter monsoon season and drier winter seasons. Subsequently, the mean annual temperature is projected to increase by ~0.8°-1.0°C for the 2010-2039 periods and an increase by ~2-2.4°C in the 2040-2069 period. The projected changes in the temperature and rainfall are favorable for the GALS to multiply and impact the agriculture and environment. Further the SNC also notes that there could be a northward migration of such species in light of the northward migration of forest types in the future under a changing climate. This indicates the probability of GALS dispersing over a wider area at different agro-ecological zones. A study (Sharma et al. 2015) in India have also shown that GALS will spread over many cities with future projected climate and one particular city in India that will see GALS invasion is Assam which shares open border with Bhutan. Therefore, future threats of GALS from climate change are pertinent and pressing and must be addressed at the earliest.

Farmers are challenged with this pest affecting their livelihood and current measures to control or eradicate the pest have been futile. The farmers have limited capacity to manage the pest and the technical agencies lack the technology and resources to eradicate the pest. There is also lack of information and assessments to understand how pests/diseases and IAS can change with changing climate scenarios and this knowledge needs to be built and disseminated.

This project will address these impediments and challenges through innovative and adaptive technology in pest management (particularly eradicating the invasive Giant African Land Snails (GALS) in Gyelpozhing under Mongar district) using trapping systems. This will be further supported by putting in place protocols and guides for pest outbreaks. Subsequently, strategies/frameworks for pest, diseases and IAS management as well as models and systems will be developed for up scaling the initiatives and outreach and awareness programs for building capacity in managing and control of pests/disease and IAS will be implemented.

Project Objectives:

The objective of the project is to promote agro-biodiversity activities through efficient and effective management of pests/diseases and invasive alien species (IAS).

Specifically, the proposed project will address the following objectives:

i) Validate trapping systems as tools adapted to eradicate pests in Bhutan (specifically Giant African Land Snails)
ii) Develop strategies and models for sustainable management of pest/diseases and IAS.
iii) Awareness generation, capacity building of farmers and other stakeholders on the problems and management of pests/diseases and IAS.

Project Components and Financing

Project Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
1. Reduce and eradicate pests and invasive alien species to save crops and biodiversity	Trapping systems adapted to Bhutan for GALS management. Protocols and response guide developed. Technology up-scaled to other areas.	Adaptation to pests and invasive alien species for climate resilient farms.	131,000
2. Develop strategy and models for pest management	Strategies, data and models generated for pest management.	Strategies and models available for up scaling innovation	57,000
3. Outreach and awareness on the impact of pests, diseases and IAS on the agriculture and environment	Innovative ideas and knowledge sharing in managing pests/diseases and IAS promoted. Community involved and trained.	Adaptive capacity of communities strengthened and innovative solutions from public encouraged.	35,000
6. Project Execution cost			20,000
7. Total Project Cost			243,000
8. Project Cycle Management Fee charged by the Implementing Entity (if applicable)			7,000
Amount of Financing Requested			250,000

Projected Calendar:

Milestones	Expected Dates
Start of Project Implementation	January 2022
Project Closing	January 2027
Terminal Evaluation	August 2026

PART II: PROJECT JUSTIFICATION [1]

A. Describe the project components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience.

Component 1: Reduce and eradicate pests and invasive alien species to save crops and biodiversity

Output 1.1: Trapping systems for GALS management

The existing method of using salt/hand picking has only been able to contain the issue but not eradicate the pests which are only going to see an increase with changing climate. The targeted interventions for applying adaptive trapping systems will be focused on managing Giant African Land Snails (GALS) problem in Gyalpozhing, Mongar District.

The project will engage 150 farmers (60 male and 90 female) for the application of the technology. They are the direct targeted beneficiaries of the project. Existing Farmer groups in Gyalpozing will be taken into consideration to start with for taking part in the capacity building and application of the technology and the groups will be further reviewed to ensure it adequately covers all affected household and gender will be given due consideration. During the first year, the technical agencies (BAFRA in collaboration with National Plant Protection Centre and Department of Agriculture) will test and apply the technology to make it adaptive to conditions in Bhutan. They will demonstrate the use of the technology to the communities and brief them on the various traps that are being used. In the following year, communities will be provided with the traps that were most successful in the first year for application. By the third year, findings will be reaffirmed and the project has plans to eradicate the pest by the fourth year.

Output 1.2: Develop diagnostic protocols for pest outbreak and response guide

Based on Output 1.1, protocols will be developed to prevent future Giant African Land Snails (GALS) and an outbreak and response guideline will ensure a coordinated containment for pest management. Key lessons learned will be captured from the technologies used in Output 1.1 and shared for up scaling the innovation. The protocol will also highlight the importance of developing an early warning system for identification and reporting of an outbreak. It will include the engagement of the Agriculture Extension Officers and local communities as part of the early warning system as they are critical in being the first line of defense in reporting signs of snail infestation. The extension officers work at the Gewog (local block) level and play a critical role in providing the basic technical support directly to the farmers and also currently play a role in reporting outbreaks.

[1] Parts II and III should jointly not exceed 10 pages.

The Bhutan Agriculture and Food Regulatory Authority (BAFRA) has recently developed a Plant Bio-security Contingency plan (2021) whereby it has put in the requirement for the establishment of a National Emergency Response Management Committee (NERMC) to coordinate and provide guidance during an outbreak of pest and disease in the country. The NERMC comprises of members as follows:

i) Hon'ble Secretary, Ministry of Agriculture and Forest (Chair)
ii) Director, National Environment Commission
iii) Head, Department of Disaster Management, Ministry of Home and Cultural
iv) Head, Department of National Budget
v) Head, Bhutan Agriculture and Food Regulatory Authority (BAFRA)
vi) Head, Department of Agriculture
vii) Head, Department of Forest and Park Services
viii) Head, National Biodiversity Center
ix) Representative of private sector and/or government body affected by the pest

The committee will be responsible for providing directives and recommendations of pest management. They will provide guidance to the people in the field such as the local government, extension agents of agriculture, district environment officer and representative of the Agriculture and Research Development Center. Together they will review risk assessments in case of reported outbreaks, review monitoring reports from the fields on GALS management, recommend domestic quarantining where required and recommend phytosanitary measures and GALS management tools and methods. They will work with the local government and extension agents to brief the communities on the recommendations and directives of the NERMC.

Output 1.3: Scaling up of tests and best practices to other communities on pest management

The projected timeframe for testing is two years as it will give 2 summer seasons to test different methods and traps as the highest infestation takes place in the summer. The remaining two and half years will be used for reaffirming findings and up scaling to other potential areas of infestation.

Although the selected site for the project interventions are at Gyalpozhing, Mongar as this was the first and highly infested area, other nearby areas (Chali, Saling, Limithang) in Mongar have also reported infestation since 2015. Sharing knowledge and best practices will be carried out among local communities through field trips to sites and participating in application of traps.

Component 2: Develop strategies/framework and models for pest management

Output 2.1: Agro-biodiversity protected through the development of strategies/ framework and institutional capacity building for the management of pest/diseases and invasive alien species.

Currently there is no proper management strategy or plan for the pest/diseases and invasive alien species (IAS) which makes the management and control challenging for the implementing agencies. Subsequently, there is a lack of technical capacity of institutions in this area thereby increasing the vulnerability as farmers are not receiving the required technical support. The experiences from the field and the information from the diagnostic protocol, response guideline under Component 1 and population dynamics and niche modeling under component 2 will provide adequate information for development of a strategy/framework on pest management.

This strategy or framework will provide guidance in terms of:

1. Prevention
2. Early Detection and Rapid Response
3. Control and Management
4. Restoration and Rehabilitation.

Specific capacity building will be carried out for the technical agencies so that they are able to assist the farming communities while dealing with such issues. This will help reduce threat to health and food security and build adaptive capacity of the climate vulnerable rural communities in Bhutan.

Output 2.2: Data and models generated for pest management under changing climate scenarios.

2.2.1 Study population dynamics of GALS for effective pest management:

An in-depth survey and studies are necessary to generate scientific data to understand the population dynamics of the GALS population in Bhutan, their area expansion and damages caused by GALS and their subsequent economic impact. As reported by Raut and Ghose (1984), GALS has been present in Bhutan possibly for many decades in the warmer lowlands of Bhutan. These pests are now spotted in other districts such as Samdrupjongkhar, Gelephu and Mongar. Pest population and information are crucial to take appropriate phytosanitary measures based on the degree of pest severity. Therefore, a validation study is required to understand the population dynamics across the country which will serve as baseline information to project changes in population and areas that may become affected under different climate projections. The Agriculture and Research Development Centres (ARDC) at Wengkhar, Mongar and Ugyen Wangchuk Institute for Conservation and Environment Research (UWICER) and the Royal University of Bhutan (College of Natural Resources) will be engaged for the study. This will help build preparedness and targeted measures for specific locations.

2.2.2 Environmental niche modelling for spread of GLAS will be conducted under different climate change scenarios:

With information generated from the Output 2.2.1 on the population of GALS, niche modelling to forecast GALS outbreak will be developed to assist regulatory authorities with inspection and monitoring of potential risk areas. Ecological niche modelling is a cost effective, easy and early warning system that allows the identification of areas at risk from a potential invasion thus giving the opportunity to prioritize the region and target management actions for those areas (Sharma et al. 2015). In order to carry out niche modelling, local research-based institutions under the Royal University of Bhutan and the Ugyen Wangchuk Institute for Conservation and Environment Research (UWICER) will be engaged. Subsequently, they will also work with the Agriculture and Research Development Centres (ARDC) at Mongar. The expected time frame is 3-4 years. Based on the pest projections developed through the modelling, regulatory measures will be implemented to effectively manage GALS populations in the focused potential areas.

Component 3: Outreach and awareness on the impact of pests/diseases and IAS on the agriculture and environment

Output 3.1: Promote innovative solutions on pest/diseases and IAS management

Activities to promote innovative ideas will be carried out in the education sector (universities and research community) in identifying new ways of managing pest/diseases and IAS. This will be done in the form of competitions that will support innovative ideas. The competition will be held at the national level and invitations will be extended to all universities across the country. It will target over 100 university students giving equal opportunity to both genders. The proposed preliminary criteria for the competition are:

- Application of technology,
- Innovativeness
- Environmentally friendly
- Cost effectiveness
- Using local raw material

This preliminary criterion for the competition will be finalized based on a discussion with the sectoral experts from the agriculture, education and forest sectors. Some ideas that the project targets to see are those related to reporting of outbreaks or locating and identifying areas that see new infestations through platforms such as apps or GIS coordinates etc or eradicating the pests. Three winners will be selected and based on the proposed cost of the idea, one of the three winners will be selected to implement the innovative proposal under this project. Symposiums and seminars could also be held to further discuss the innovative solutions.

Output 3.2: Raising awareness on impacts of pests/diseases and IAS due to changing climate

This output will be focused on increasing awareness at all levels ensuring different groups (men, women, children/youth) have targeted awareness programs. Some of the activities proposed under this output are:

- Design and implement awareness campaigns specifically targeting different groups of people (farmers, children/youth etc) focusing on climate change adaptation. A total of 250 people (60% female and 40% male) from the communities will be part of the outreach programs. This includes the 150 direct beneficiaries and the remaining 100 are the indirect beneficiaries. This will include communities from nearby areas Chali, Saling and Limithang which are also in the Mongar District as well as other districts reporting the pests.
- Develop field reports and policy briefs promoting the innovative technology supported through this project for wider distribution.
- Outreach to a larger audience through various means using appropriate mediums (social media, television, websites, printed media).

B. Describe how the project provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project will avoid or mitigate negative impacts, in line with the Environmental and Social Policy of the Adaptation Fund.

As per the Population and Housing Census of Bhutan 2017, Gyalpozhing town has a population of 2629 with 1374 males and 1255 females. There are no indigenous people living in the project sites. In Mongar 63.2% of the population depend on agriculture which is higher than the population engaged in agriculture at the national level which is 51.1% (Labor Force Survey 2019). The interventions from this project will safeguard the crops of the farming communities of Gyalpozhing and other areas in Mongar during the up-scaling process.

Although no gender assessment has been done for this project, a research study on “Equitable and meaningful participation in climate change adaptation and water governance in rural Bhutan” carried out by Tarayana Foundation; a local CSO in Bhutan under the auspices of the NAPA project provides relevant information that can be adapted for this project. The study was conducted based on the recommendation from the National Environment Commission who was then managing the NAPA II Program. In the research study, there is an indication that men’s participation in project related meetings was low in Mongar and Tsirang from an assessment of 4 targeted districts. This has been mainly attributed to the fact that women remain at home while men engage in wage labor that take them out of the community (TF 2018). While this may indicate the probability of having more women from Gyalpozhing, Mongar to participate; Tarayana Foundation will be engaged as they have expertise in community mobilization have experience with gender assessment. Also, the proportion of females (51.7%)

working in the agriculture sector is higher than that of males (41.8%). Therefore, more women will be engaged in the trainings and technology will be made available to them. In order to affirm that women are engaged in the trainings as well as have access to the technology, the local leaders will be guided to encourage the participation of women.

Through the management of GALS, the local ecosystem especially the plant varieties in the forest will be protected. Subsequently, health of the people is also protected with the removal of GALS as they are known to carry several pathogens and including a parasitic nematode capable of causing meningitis.

C. Describe how the project encourages or accelerates development of innovative adaptation practices, tools or technologies and/or describe how the project helps generate evidence base of effective, efficient adaptation practices, products or technologies, as a basis for potential scaling up.

This project will apply innovative methods in two forms by:

i) application of an innovative technology that will be adapted to suit Bhutan's conditions for pest management in particular Giant African Land Snails (GALS)

The current practice of GALS containment and eradication management in Bhutan are hand collection, salt and pesticide application which has not been effective in managing the issue and innovative measure are required to change the way things are being done. These management practices will now be replaced with trapping systems in the targeted area. Some of the commercially available traps are bait and barrier technology which could include Snailer Snail and Slug Trap, Snail Buster, and slug math among others. The baits used for these traps is generally banana/papaya fruit or commercially produced snail buster bait. Other methods being used are the Corry's slug and snail killer pellets and the Corry's slug and snail easy kill gel. They use sodium ferric and iron-phosphate as baits, both of which are safe to use around pets and wildlife and the uneaten baits degrade naturally. Different tests will be used and adapted to determine the most viable option for Bhutan that will take into consideration effectiveness, economic and environmentally friendly parameters that will not only eradicate the pests but also ensure that it has no other environmental and health impacts. These options will undergo several processes of testing, learning and scaling up. An initial assessment of existing native species will be carried out to generate a baseline of existing flora and fauna. The fact that the National Environment Commission and BAFRA are working on this together ensures that while BAFRA will implement the core of the activities, the NEC as the national agency on environmental management will monitor and review the activities so that they adhere to the environmental safeguards of the country.

An assessment on trapping GALS has been conducted in South Florida (Roda et al. 2018) and this project will use some of the key lessons from that study. The study showed that:

a) Traps can capture snails even when pesticide application and hand collection did not uncover snails until subsequent days.

b) Snail traps functioned to detect residual populations which are essential to successful eradication programs.

Similarly, a study on the comparative efficacy of bait traps in India (Vanitha et al. 2008) have shown that snails can be more efficiently managed by lacing traps during or just after the onset of monsoon prior to their mating and egg laying which will favor population reduction. The study also shows that their best bait was a combination of yeast and sugar which indicates that cheap and easily available baits can be used.

The proposal to use traps in Bhutan is because it can be field tested in targeted farms and based on the study in India there is also possibility of using simple, cheap and locally available baits that would play a key role in the sustainability of the technology. Since farm holdings in Bhutan are small, the use of traps should be more efficient than in large farms. The project will also give due consideration to the types of baits/chemical used to ensure that they are not harmful to the domestic and wild species nor to the environment.

Communities in the area will be engaged prior to the process, during the process and training on the most viable options will be imparted to them. The testing of the traps will be implemented by BAFRA as the technical agency who in turn will engage the community through stakeholder consultation workshops and field work while rolling out the traps. The input from the communities will be in terms of affordability, ease of application and access to the traps as they will have to be imported. The projected timeframe for testing is two years as it will give 2 summer seasons to test different methods and traps as the highest infestation takes place in the summer. The remaining two and half years will be used for reaffirming findings and up scaling to other potential areas of infestation.

ii) These methods will be documented in the form of field reports, Pest management Protocols and guidelines and disseminated to wider stakeholders for up-scaling. Through process and social development changes by developing strategies or a framework for pest management and promoting innovative ideas from diverse groups on pest/disease and Invasive Alien Species management.

Without a framework or a strategy for pest/disease and IAS management; most of the management practices are ad-hoc and need based. Through this project, a strategy or framework will be developed for management of pest/diseases and IAS. This will provide guidance to the regulatory and enforcement agencies in ensuring the smooth implementation of outbreaks, containment and eradication of pests & IAS. Subsequently; the various awareness interventions will bring about a social change in making communities, youth and the general public, partners in management of pests and IAS. The capacity building of local communities, Civil Society Organizations and governmental institutions will help promote best practices and exchange of lessons learned which could lead to institutional growths that will make it possible for replicating and up scaling the initiatives beyond the project period.

D. Please confirm whether the project meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and is in line with the Environmental and Social Policy of the Adaptation Fund.

The project is in line with the national technical standards and the ESP of the Adaptation fund as stated below:

Principle 1: Projects/programmes supported by the Fund shall be in compliance with all applicable domestic and international law.

The National Environment Commission Secretariat, who will serve as the overall coordinating agency of this project, is also the agency that enforces and monitors environmental compliance and as such will ensure that this project meets all relevant national standards. An initial assessment of existing native species will be carried out to generate a baseline of existing flora and fauna. The selection of traps will consider all environmental safeguards. The proposed interventions will be implemented by the BAFRA who ensures food safety and an integrated biosecurity system to safeguard the environment from biosecurity threats. Lastly, BTFEC; the National Implementing Entity through its vast experience in management of resources will ensure that the project meets the highest fiduciary standards.

Additionally, the activities of this project are aligned with:

- Policy goals of the **Food and Nutrition Security Policy of the Kingdom of Bhutan (2014)** that includes "Ensure availability of safe and adequate varieties of food to meet food requirements of the population at all times".
- **Plant Quarantine Act of Bhutan, 1993** prevents the introduction of pests into the country through regulation of import and export of plants and plant products.
- **Bio-security Policy of the Kingdom of Bhutan, 2010** promulgates protection of agricultural production systems form pests and diseases.
- Bhutan's **Nationally Determined Contribution (NDC)** particularly states "Promote climate resilient agriculture to contribute towards achieving food and nutrition security through:
    - Developing and institutionalize surveillance of crop pests and diseases.
    - Enhancement of national capacity to develop and implement emergency response to agricultural pest and disease outbreaks/epidemics.

Principle 2: Access and Equity.

The project has already stated that the farmers that are most affected (project sites) will be given the priority in terms of access to project tools, technologies, training and resources. In order to ensure the affected farmers are given priority, the local government and the field staff will be consulted for confirmation of affected members. Thereafter, other infested areas will be given preference for sharing of knowledge and technology transfer.

Principle 3: Marginalized Vulnerable Groups.

As per the Population and Housing Census (2017); Gyalposhing has 921 children (below 15 years) and 53 elder (65 years and above). Since the number of children is substantial, the advocacy programs under this project will ensure that they have targeted programs designed for children to understand the implications of GALS and to avoid playing, keeping them as pets or moving them from place to place.

Principle 4: Human Rights

Not applicable

Principle 5: Gender Equality and Women's Empowerment

As the proportion of females (51.7%) working in the agriculture sector is higher than that of males (41.8%), women will be engaged in the trainings and technology will be made available to both men and women. In order to affirm that women are engaged in the trainings as well as have access to the technology, the local leaders will be guided to encourage the participation of women. The project will also use expertise of local CSO like Tarayana Foundation who are experienced in community mobilization and women empowerment to ensure gender equality in project activities.

Principle 6: Core Labour Rights

Not relevant

Principle 7: Indigenous Peoples.

No indigenous people in the project sites

Principle 8: Involuntary resettlement

Not relevant

Principle 9: Protection of Natural Habitats

The snail feeds on a wide range of vegetation such as trees, vegetables, and crops and also calcareous substances such as concrete and is of great concern to the farmers. Through the management of GALS, the local ecosystem especially the plant varieties in the forest will be protected. The removal of GALS through this project will protect the natural habitats as they are known to infest the forest and farm lands and destroy ecosystems.

Principle 10: Conservation of biological diversity

An initial assessment of existing native species will be carried out to generate a baseline of existing flora and fauna. This is to assess if the traps will trap other species and to take measures if the baits and traps affect local biodiversity.

Principle 11: Climate Change

The project will not emit any greenhouse gas emissions or other drivers of climate change

Principle 12: Pollution Prevention and resource efficiency

Not applicable

Principle 13: Public Health

The GALS are known to carry several pathogens including a parasitic nematode capable of causing meningitis. The removal of the GALs will result in a positive impact on human health of the people in the area.

Principle 14: Physical and Cultural Heritage

Not relevant

Principle 15: Lands and Soil Conservation

Initially the use of salt for removing the GALS had negative impacts on the soil and land. By reducing the use of salt, soil quality will be enhanced. Also, for the traps being used, careful consideration will be given to choose baits/chemicals that do not have any harmful impacts to the soil and land.

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

The project includes a specific component on knowledge management and enhancement of capacities (component 3), at various levels targeting different groups. The knowledge management and dissemination of lessons learnt will be conducted as follows:

a) For local communities, engagement during the application of the technology and transfer of knowledge to the farmers. Capacity building of communities in the identification and reporting of outbreaks will also be carried out. The lessons learnt will be captured through monitoring, evaluation and field reports and shared with all stakeholders.

b) Local research communities from the Royal University of Bhutan, ARDC and UWICE will be on board to collect data, carry out environmental niche modeling of pests and their population dynamics in the face of climate change which will be shared at research seminars and be openly available.
c) Competitions at universities will be undertaken, which will be shared through various media platforms (videos, social media etc). The competition will be held for all universities at the national level and the criteria for the competition will be finalized based on a discussion with sectoral experts from the agriculture, education and forest sectors. Some key criteria that may be used are application of technology, innovativeness, environmentally friendly and cost effectiveness. Three winners will be selected. Based on the budget proposed and available, one or more of the winners will be selected to implement the idea.

F. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project. Describe how the project will engage, empower and/or benefit the most vulnerable communities and social groups, including gender considerations, in line with the Environmental and Social Policy of the Adaptation Fund.

Environmental and Social screening and Risk Assessment

	Potential Environmental and Social Risk	**Level of significance (Low, Medium, High)**	**Risk Management Measures**
1.	Human Rights	Low	The project does not foresee any risk to human rights. It will consider affected communities that are impacted by GALS infestation.
2.	Gender Equality and Women Empowerment	Low	Women will especially benefit from crop being protected from pest/diseases and IAS given their major role in manually removing them during cropping season. Women participation will be considered and encouraged through involvement of local leaders and Tarayana Foundation (CSO)
3.	Environmental sustainability	Medium	The application of commercial traps will need to further undergo impact assessment on the surrounding environment and native species. An initial assessment of existing native species will be carried out to generate a baseline of existing flora and fauna. The selection of traps will consider all environmental safeguards.

4.	Community health	Low	GLAS are known to carry several plant and animal pathogens including a parasitic nematode capable of causing meningitis in humans. The project will be removing GALS which in turn have a positive impact on the health of the communities.
5.	Cultural heritage and displacement/resettlement	Low	There are no foreseen impacts on culture nor any displacement or resettlement is required
6.	Indigenous People	Low	There are no indigenous people in the project site.
7.	Institutional sustainability and compliance with law	Low	The implementation arrangement of NECS and BAFRA working together as partners will strengthen coordination efforts and also bring more sectors on board to address the impacts of climate change and build institutional capacities at various agencies. The program conforms with all national laws, policies and strategies as listed under Part II, section D.

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

Rural communities are highly dependent on natural resources and Bhutanese farmers only engage in subsistence farming. With socio economic development leading to rural urban migration, the farming communities are already under a lot of stress trying to sustain themselves. In addition to this; the increasing impacts of climate change are causing even more pressure on the livelihoods of the farmers. The adaptive capacity of these communities is low, which is largely attributable to high poverty levels. Poverty limits the ability of communities to change present behavior and adopt new approaches to overcome climate change impacts. The farmers invest all their resources into procuring seeds, livestock, irrigation etc and therefore lack the additional investment required to deal with climate change impacts.

This adaptation proposal will bear the cost incurred by farmers in managing pests/diseases and invasive alien species that are increasing due to the changing climate. The project will bear the cost of new technologies and also raise awareness and share knowledge and information. Without the additional fund and technologies, farmers are unable to eradicate the Giant African Land Snails (GALS) from their farm which pose the risk of not only losing their crops but are also exposed to health hazards that can be caused by GALS. With the test and application of the traps through the

project, the government will be in the position to continue with the best practices as it earlier did not have the capacity or resources to explore innovative solutions for the management of the pest. Also, with the development of protocols and guidelines, there will be an integrated flow of information and recommendation for action on the ground and vice versa to make informed decisions.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

The National Environment Commission Secretariat (NECS) as the focal agency for UNFCCC will take the coordination role and implement the activities that are targeted towards development of national strategy, awareness and advocacy programs, knowledge products, in collaboration with all stakeholders. The NECS will work closely with Bhutan Agriculture and Food Regulatory Authority (BAFRA) who will implement the core activities.

The oversight of the project will be done by the BTFEC as the NIE and the project managers will report physical and financial reporting to the NIE as per the requirements. As it is a fairly small grant, a project board will not be formed. However, all management decisions including but not limited to project monitoring and evaluation, accountability of deliverables and oversight will be done jointly with the head of the agencies (NECS,BAFRA,NIE). The management will approve annual work plans, review periodical reports as well approve any deviations from the approved plans.

For the implementation, the project will be managed by a **Project Manager (PM)** each, both at BAFRA and at the NECS. A **Project Director** at NECS will oversee the coordination of the activities at both BAFRA and NECS. The roles of the project manager and Director will be taken up by regular officials at the NECS and BAFRA.

B. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

The primary responsibility for day-to-day project monitoring and implementation rests with the Project Managers. The Project Manager will develop semi-annual status report to ensure the efficient implementation of the project which will be submitted at the end of every 6 months to the NIE. The Project Manager will inform the management any delays or difficulties during implementation, so that the appropriate support and corrective measures can be adopted. The Project Manager will also ensure that all project activities maintain a high level of transparency, responsibility and accountability in monitoring and reporting project results. Based on the periodic financial statements, an audit report will be prepared at the end of the project period. The AF project will comply with formal guidelines, protocols and toolkits issued by the AF as well as follow the monitoring and evaluation plan of the government in terms of reporting annually through the Annual Performance Agreement. Periodic monitoring will be conducted through visits to the intervention sites undertaken by relevant staff.

Deliverables	Responsible Entity	Cost
Semi-Annual Status reports	Project Manager(s)	USD 2,000
Audit Report	Auditors	USD 1,500

C. Include a simple results framework for the project proposal, including milestones, targets and indicators.

Result	Indicator(s)	Baseline	Milestone	Means of verification
Reduce and eradicate pests and invasive alien species to save crops and biodiversity.	Types of trapping systems adapted and used.	0	2	Field reports
	Protocols and response guide developed	0	1	Document
	Farmers and communities with access to traps.	0	150 farmers (90 Female and 60 male) with access to traps	Field reports and list of beneficiaries
Develop strategy and models for pest management	Strategy/framework developed.	0	1	Document
	No. of officials trained to respond to pest & IAS management (gender disaggregated)	0	15	Training reports
	Models and assessments on climate change impacts on pests	0	1	Report
Outreach and awareness on the impact of pests/diseases and IAS on the agriculture and environment	Number of innovative solutions on pest/diseases and IAS management received	0	3	Competition results
	Opportunity given to youth through universities for innovative solutions competition.	0	100	Competition terms and conditions
	Number of awareness programs	0	2	Program documents
	Communities engaged in outreach program	0	250 (60% female and 40% male)	Field reports

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

Project Objective(s)[2]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Validate trapping systems as innovative tools adapted to eradicate pests in Bhutan	Innovative tools for eradicating pests in place. Protocols and response guide developed Up-scale to other communities	8. Support the development and diffusion of innovative adaptation practices, tools and technologies 3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	8. Innovative adaptation practices are rolled out, scaled up, encouraged and/or accelerated at regional, national and/or subnational level. 3.1 Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	131,000
Develop strategy and models for sustainable management of pest/diseases and IAS.	Strategies, data and models generated for pest management.	7. Improved policies and regulations that promote and enforce resilience measures.	7. Climate Change priorities are integrated into national development strategy	57,000
Awareness generation, capacity building of farmers and other stakeholders on the problems and management of pests/diseases and IAS.	Innovative ideas and knowledge sharing in managing pests/diseases and IAS to promoted Community involved and trained	3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1 Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	35,000
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)**
Component 1: Reduce and eradicate pests and invasive alien species to save crops and biodiversity	trapping systems used Protocols and response guide developed Up-scale to to other communities	8. Viable innovations are rolled out, scaled up, encouraged and/or accelerated 3.2 Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	8.1 No. of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated. 3.2.2 No. of tools and guidelines developed (thematic, sectoral, institutional) and shared with relevant stakeholders	131,000

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

Component 2: Develop strategy/framework and models for pest management	Strategy/framework and models for pest/diseases and invasive alien species management developed.	7. Improved integration of climate resilience strategies into country development plans	7.2 No. of targeted development strategies with incorporated climate change priorities enforced.	57,000
Component 3: Outreach and awareness on the impact of pests/diseases and IAS on the agriculture and environment	Number of innovative solutions on pest/diseases and IAS management received Number of awareness programs	3.1 Targeted population groups participating in adaptation and risk reduction awareness activities	3.1.1 No. of news outlets in the local press and media that have covered the topic.	35,000

E. Include a budget, including a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

Project Outcome	Output	Activity	Cost (USD)	Total
Component 1: Reduce and eradicate pests and invasive alien species to save crops and biodiversity	trapping systems used	Field visits & Stakeholders consultations	12,000	131,000
		Collaborative meeting with technical department (NPPC, NBC etc)	10,000	
		Tools and equipments (Sample/tests & Traps)	50,000	
	Protocols and response guide developed	Consultancy tender (Local)	15,000	
		Stakeholders consultation	7,000	
		Sensitization/Training workshop	17,000	
		Print & Publication	4,000	
	Up scale to other communities	Tools and equipments	10,000	
		Sensitization/training	6,000	
Component 2: Develop systems and models for pest management	Strategy/framework for pest/diseases and invasive alien species management developed.	Contractual Services	9,000	57,000
		Stakeholder workshops	3,000	
		Institutional capacity building	10,000	
		Field verification	9,500	
		Print & Audio Visual	1,500	
	Models and assessments on climate change impacts	Contractual Services	15,000	
		Information Technology	5,500	

	on pests/diseases & IAS	Equipment Workshops/Meetings	 3,500	
Component 3: Outreach and awareness on the impact of pests/diseases and IAS on the agriculture and environment	Number of innovative solutions on pest/diseases and IAS management received Number of awareness programs	Media expenses (Advertisements, etc) Workshop (programs with communities) Competition (education institutes etc) Print & Publication, Audio Visual	2,000 12,000 12,000 9,000	35,000
Project Management	Progress Reporting Meetings Reports print & Publication Supplies IT Equipment Field gear/equipment Audit Office equipment		8,000 2,000 1,000 2,500 3,500 1,500 1,500	20,000
Project Implementing Entity Fee			7,000	7,000
TOTAL				250,000

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

Disbursement Schedule	**Upon Signing Agreement**	**Inception workshop**	**6 months after project starts**	**1 year after project starts**	**2 years after project starts**	**Total**
Schedule Date	January 2022	March 2022	June 2022	January 2023	January 2024	
Project Funds (Component 1-3)	0	$50,000	$60,000	$58,000	$55,000	$223,000
Project Execution cost	$5,000	$5,000	$5,000	$5,000	0	$20,000
Project Implementing Entity fee	$2,000	$2,500	$2,500	0	0	$7,000
TOTAL	**$7,000**	**$57,500**	**$67,500**	**$63,000**	**$55,000**	**$250,000**

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

A. Record of endorsement on behalf of the government[3] *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:*

Mr.Rinchen Wangdi Director Gross National Happiness Secretariat	Date*: January 17, 2021*

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, Food and Nutrition Security Policy of the Kingdom of Bhutan (2014), Plant Quarantine Act of Bhutan, 1993, Bio-security Policy of the Kingdom of Bhutan, 2010, National Adaptation Programme of Action (NAPA), the Second and Third National Communications and Bhutan's Nationally Determined Contribution (NDC) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social 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.	
 *Singye Dorji* Implementing Entity Coordinator	
Date: *4th August,2021*	Tel.*+975 (02) 339861/62* email: *singye@bhutantrustfund.bt*
Project Contact Person: *Mr. Singye Dorji*	
Tel.*+975(02)339861/62 and email: singye@bhutantrustfund.bt*	

[6] Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

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Royal Government of Bhutan
Gross National Happiness Commission

GNHC/DCD/AF/2021/*Lockdown-Nil*

January 17, 2021

To:

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN P4-400
Washington, D.C., 20433
U.S.A
Fax: +1 (202) 522-3240/5
Email: afbsec@adaptation-fund.org

Subject: *Endorsement for Building Adaptive Capacity through Innovative Management of Pests/Disease and Invasive Alien Species (IAS) in Bhutan to Enhance Sustainable Agro-biodiversity and Livelihoods.*

In my capacity as designated authority for the Adaptation Fund in Bhutan, I confirm that the above national project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Bhutan.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by Bhutan Trust Fund for Environmental Conservation and executed by National Environment Commission Secretariat (NECS) and Bhutan Agriculture and Food Regulatory Authority (BAFRA)

Sincerely,

Rinchen Wangdi
Designated Authority for AF in Bhutan and
Director, Gross National Happiness Commission