



ADAPTATION FUND

AFB/PPRC.38/Inf82
20-21 October 2026

Adaptation Fund Board
Project and Programme Review Committee
Thirty-eighth Meeting
Bonn, Germany

PROPOSAL FOR LARGE INNOVATION PROJECT FOR ARMENIA



ADAPTATION FUND

ADAPTATION FUND BOARD SECRETARIAT
TECHNICAL REVIEW OF PROJECT PROPOSAL FOR
"REWATER ARMENIA (RECLAIMING EVAPORATED WATER FOR CLIMATE RESILIENCE IN
ARMENIA)"

Project Title	REWater Armenia (Reclaiming Evaporated Water for Climate Resilience in Armenia)
Project ID	AF00000560
Category	Innovation large project
Type	Single country project
Stage	Concept
Country	Armenia
Implementing Entity	EPIU
Financing Requested	USD 4,460,000.00
Reviewer	Rywon Mayang
Co-reviewer(s)	Timileyin Tobi Oyebade
IE Contact Person	Margarita Gasparyan, Milena Kiramijyan

Secretariat's Overall Comment

A Project Formulation Grant (PFG) of US\$ 100,000 is requested. The initial technical review raises several issues, such as clarification on the technical information of the proposed technology, the justification for the site selection, beneficiary information and the identification of vulnerable and marginalized groups, gender considerations, duplication with other initiatives, the environmental and social screening, and the alignment with the AF Strategic Results Framework, as is discussed in the number of Clarification Requests (CRs) and Corrective Action Requests (CARs) raised in the review.

Country Eligibility

Is/are the beneficiary country/countries a developing country/countries Party/Parties to the Kyoto Protocol?

Response: Yes

Secretariat: Yes. Armenia is a party to both international climate treaties. It acceded to the Kyoto Protocol in 2003 and ratified the Paris Agreement in 2017.

Is the participating country / are all participating countries developing countries particularly vulnerable to the adverse effects of climate change?

Response: No

Secretariat: The proposal presents a justification that Armenia is highly vulnerable to the adverse effects of climate change, particularly in the water sector, due to climate-induced reductions in river runoff, declining snowfall, earlier snowmelt, increasing evaporation losses from reservoirs, groundwater stress, and rising drought risk. It also demonstrates the resulting impacts on agriculture, rural livelihoods, hydropower generation, ecosystems, and vulnerable groups such as women farmers and water-dependent communities. As per pages 4–8 CR1: Please elaborate on quantitative climate projections for Armenia and Marmarik Reservoir–specific climate vulnerability data.

Project Eligibility

Has the designated government authority for the Adaptation Fund / Have the governments' designated authorities for the Adaptation Fund endorsed the project?

Response: Yes

Secretariat: As per the Endorsement letter dated 19 June 2026.

Does the project/programme support concrete adaptation actions to assist the country or countries in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience? In

case of regional project/programme, is there added value using the regional approach, compared to implementing similar activities in each country individually?

Response: Not Cleared

Secretariat: The proposal presents a coherent set of climate adaptation activities that directly address identified climate vulnerabilities associated with increasing evaporation losses, water scarcity, drought risk, and declining water security in Armenia. Activities are aligned with project objectives and Adaptation Fund strategic objectives. Pages 9 - 11. The proposal also highlights that further clarification will be provided on site-specific additional quantitative evidence on evaporation losses, expected water recovery rates during full proposal development. CR 2: The pilot primarily focuses on water losses from evaporation while also providing background on other water management challenges in the country. It would be useful to clarify the relative significance of evaporative losses within the national water system compared with other loss pathways. A brief data-driven narrative would help strengthen this point. CR 3: Although the proposal notes that further details will be provided at the full proposal stage, it would be useful to clarify the rationale for selecting Marmarik Reservoir as the pilot site, including whether it was chosen based on specific criteria or through a more general selection process. Further, while the project identifies evaporation-driven water scarcity and envisages using the recovered water to improve community water security, it does not quantify the expected contribution of the pilot to reservoir- or community-level water needs (pp. 9–20). The proposal identifies several potential uses, including integration into reservoir operations and supply for irrigation, domestic/community services and livestock, but does not yet specify the expected recovery volume, priority end uses, allocation among users, or the criteria through which these decisions will be made. Please clarify. CR 4: Please clarify how the findings from the site-specific assessments would be reconciled with the proposal's overall rationale if they do not confirm significant evaporative losses. It may also be useful to assess several potential sites first and base the final site selection on those findings, thereby strengthening the justification for the selected pilot site and providing more substantive evidence. CR 5: Please consider including a diagram on the Theory of Change. CR 6: Component 2 develops community distribution infrastructure to deliver the water recovered under Component 1, and the volume that the pilot system will recover is not yet established at this stage. It would help to understand how Component 2 would proceed if the recovered volume turns out to be lower than expected. Please describe the contingency arrangements, including whether any alternative or supplementary water source would be drawn on. Further, Output 3.5 introduces a US\$300,000 national innovation platform, innovation challenge and catalytic support mechanism that is not adequately connected to validation and scaling of the core evaporation-recovery technology (pp. 12–13 and 19–20). Its selection, financing and accountability arrangements are undefined. Please include these details.

Does the project/programme help spread innovative adaptation practices, tools and technologies that have demonstrated success in one country to another country, countries or regions; and/or Does the project/programme pilot at larger scale innovative adaptation practices, tools or technologies generated that have demonstrated viability at a small scale?

Response: Not Cleared

Secretariat: The proposal presents an innovative solution that seeks to address climate-induced water scarcity through the recovery of water lost to reservoir evaporation. The climate adaptation problem, innovation rationale, and pathway to scaling are generally well articulated. The proposal demonstrates strong alignment with the objectives of the Adaptation Fund Innovation window. However, additional information is required: CR 7: The proposal notes that the approach builds on an existing concept and know-how developed by the technology provider. Please clarify whether it has previously been tested in other countries or through small-scale projects. If it has been tested elsewhere, please summarise the relevant results and lessons learned. If the

approach remains largely theoretical, please explain the underlying physical principle and the basis for expecting it to work under field conditions. CR 8: Please provide (i) the technology readiness level and any bench-scale or prototype test data, including the scale tested and the operating hours over which it was run; and (ii) the intended scale of the installation at Marmarik Reservoir, including indicative capture area, capacity, expected water-recovery volume and the timeframe over which it is expected. Where information is commercially sensitive, please indicate how it can be made available for technical assessment. CR 9: Please include a schematic or conceptual diagram of the system, as the concept note does not currently contain one, showing what drives the airflow through the system and how the temperature difference needed for condensation is obtained, given that the reservoir is described both as the source of evaporation and as the cooling medium. Please also clarify the role of the turbine-generator units and battery storage referred to on p.15, since the described mechanism relies on natural airflow rather than powered circulation. CR 10: Please clarify the relationship between the Technology Owner/Licensors and the Executing Entity (HOVAK), including whether they are the same or affiliated entities, how each was selected given that this is a proprietary, sole-source technology, and the nature of the licensing arrangement, so that the technical capacity, intellectual-property control and any conflict-of-interest implications can be assessed. CR 11: What is the comparative advantage of this innovation relative to alternative adaptation measures?

Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?

Response: Not Cleared

Secretariat: The proposal is expected to generate economic, social, and environmental benefits through improved water security, enhanced adaptive capacity, reduced pressure on water resources, and strengthened climate resilience. The proposal demonstrates awareness of gender considerations and vulnerable communities and is supported by a Preliminary Gender Assessment and stakeholder consultations. Nevertheless, additional information is needed: CAR 1: The proposal refers to gender considerations in the initial gender assessment; however, these should be further elaborated in the proposal itself. Please clarify how diverse stakeholder perspectives were considered and integrated into the project design, and provide context on the disproportionate impacts of water management challenges on different groups. This should include, where available, information on the number of men, women, and youth in the target region or communities, how they are affected differently, and the specific benefits expected for each group rather than presenting benefits in general terms. CR 12: While this is a pilot project, please provide additional context on the potential community beneficiaries. For example, the proposal states that the project would increase water resilience in nearby communities; elaborating on who these communities are, how they would benefit, and how recovered water would be distributed would help demonstrate the project's potential impact at scale. The proposal could also be strengthened by explaining how gender and inclusion considerations informed the selection of pilot beneficiaries, governance arrangements, and innovation platform structures. CR 13: Please clarify how communities will participate in the innovation process, including whether local stakeholders will help shape design modifications and whether communities will serve as active innovators rather than only as end users. CR 14: It would be useful to quantify the expected benefits, such as estimated agricultural losses linked to water loss, livelihoods affected, and potential economic losses, to better illustrate the gains or avoided losses that could result from project implementation. CAR 2: The proposal does not yet identify Indigenous Peoples, persons with disabilities, ultra-poor households, or other potentially marginalized groups. Please elaborate on whether and how these groups have been considered in the project design, including the potential benefits expected for them.

Does the project engage, empower and/or benefit the most vulnerable communities and social groups?

Response: Not Cleared

Secretariat: The proposal demonstrates a commitment to engaging and benefiting vulnerable communities affected by climate-induced water scarcity, particularly rural households, farmers, and women. However, at present, communities appear primarily as beneficiaries and consultees, rather than co-designers of the innovation. Please refer to CR 11. CR 15: The proposal largely focuses on validating the chosen innovation rather than demonstrating that a broad innovation-scouting process was conducted. Please clarify why this innovation was selected over alternatives. Were the alternative solutions assessed and how did stakeholders influence that selection? CR 16: Please clarify the alignment of Component 3.5 in relation to the project objectives. While it suggests continued engagement with social groups and institutions, the proposed activities appear somewhat disconnected from the project's outcome. For example, the proposal refers to an innovation facility intended to support the testing of innovative ideas; please clarify whether this facility would be financed under the project. Strengthening the link between this sub-component and the overall project objectives would improve coherence. Page 23, paragraph 2 provides a clearer framing of this connection. CR 17: As the catalytic support mechanism and the innovation challenge under Output 3.5 would provide support to early-stage initiatives that are not yet identified, with eligibility and selection procedures to be developed at the full proposal stage (footnote 1, p.19), this arrangement appears to fall under the Unidentified Sub-Project approach. It would help to acknowledge this in the proposal and to outline how the Adaptation Fund's USP guidance and environmental and social screening would be applied as the sub-projects are identified.

Does the project advance gender equality and the empowerment of women and girls?

Response: Not Cleared

Secretariat: The proposal demonstrates reasonable alignment with the Adaptation Fund Gender Policy and is supported by a dedicated Preliminary Gender Assessment. The proposal however needs to better elaborate on the disproportionate impact of the water scarcity on gender vulnerabilities. Please refer to previous sections. CR 18: The proposal includes activities related to Innovation ecosystem development, adaptation innovation platforms, capacity building, knowledge sharing and replication. However, there is limited information demonstrating how these initiatives will specifically promote women-led adaptation enterprises, support women innovators or create leadership opportunities for women within the innovation ecosystem. Please clarify. CAR 3: The proposal does not include quantified gender targets. Please include some estimates on beneficiaries in the proposal for all groups even if further assessment will be carried out at the Full Proposal development stage.

Is the project/programme cost-effective? In the case of regional project/ programmes, does the regional approach support cost effectiveness? Does the project engage, empower and/or benefit the most vulnerable communities and social groups?

Response: Not Cleared

Secretariat: The proposal provides a reasonable qualitative justification for why the selected approach may be cost-effective, but it does not yet provide sufficient quantitative evidence to conclusively demonstrate cost-effectiveness. It however commits to providing more details on the cost-effectiveness and comparison with alternative approaches at the Full Proposal stage. CR 19: Please provide some comparison at this stage, possibly in a tabular format, even if it's largely qualitative, on why this could be a considerably better approach essentially to demonstrate why this innovation is worth testing. CR 20: Is the time-frame for implementation sufficient to

provide concrete evidence on the cost-effectiveness especially considering the solar systems Operation and Maintenance over a longer period of time.

Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?

Response: Not Cleared

Secretariat: The proposal aligns with the Water Code, the National Water Policy, the NDC and NAP water-sector priorities, the Third National Communication, the National DRR Strategy and basin management plans. Consistency with Armenia's Technology Needs Assessment is not addressed. CR 21: Kindly include the identified plans/strategies in a table-listing, including at least: (i) Specific name of the plan/strategy and years of implementation, (ii) Main objective, (iii) Explain the relevance to the proposed project, including its alignment with the existing plan or strategy. A suggested structure could be: 'The proposed project is aligned with [Plan XX], under [Specific Action XX], CR 22: Please review the project's consistency with Armenia's Technology Needs Assessment and Technology Action Plan, as applicable, given the project's technology-centred nature.

Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?

Response: Not Cleared

Secretariat: The proposal refers to national construction codes, seismic and safety requirements and reservoir-zone permitting in categorical terms, and states that environmental screening will be consistent with national EIA requirement where required. CR 23: Kindly provide a comprehensive table listing of all specific technical standards applicable to the proposed project, including agricultural codes/regulations and water quality standards The table should be: (i) specific name/number of the standard/regulation, and goals/objectives, (ii) how it is related to the proposed project and the project's compliance status. In the case that compliance is required, please include the steps needed to comply with it and include the name of the competent authority.

Is there duplication of project / programme with other funding sources?

Response: Not Cleared

Secretariat: The proposal states that a review of national initiatives, donor-funded programmes and ongoing investments confirms there is no duplication, but the specific initiatives reviewed are not identified. CAR4: Kindly include a comprehensive table listing all projects that are or have been implemented previously in the region or at national scale and that are complementary to the proposed project. For each project, please indicate the following: (i) Project title (ii) Donors/Funding Entity (iii) Main project interventions (iv) Timeline and specific location within country (v) Target population (vi) Implementing Entity (vii) Lesson learned, where applicable (viii) Overlaps and synergies with the proposed project, including how the proposed project will build upon interventions of existing and previous projects. The no duplication statement should be clearly justified (e.g. by indicating the distinct geographic locations and/or types of interventions) for each related project identified.

Does the project / programme have a learning and knowledge management component to capture and feedback lessons?

Response: Not Cleared

Secretariat: Knowledge management is a core pillar of the project (MRV system, national demonstration site, technical guidelines, regional exchange, an innovation platform and a small-scale innovation challenge). However, the proposal also describes the detailed technical materials as commercially sensitive and to be shared only on a restricted, need-to-know basis (page19), while elsewhere indicating that engineering manuals would remain publicly accessible; this leaves an unresolved tension with the Adaptation Fund's learning and replication purpose. CR 24: The proposal should explain how monitoring results, stakeholder feedback, and technical performance data will be used to reassess project assumptions and modify the intervention during implementation. This is especially important because the project is testing an innovative technology whose performance, cost-effectiveness, and adaptation benefits are not yet fully proven. CR 25: Please clarify the intellectual-property arrangement with the technology provider and reconcile it with the project's knowledge-sharing and replication commitments, specifying which knowledge products will be publicly available. CR 26: Please clarify whether traditional or local water-management knowledge is drawn upon in the project, or confirm and justify that it is not relevant in this context.

Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations in compliance with the Environmental and Social Policy and Gender Policy of the Fund?

Response: Not Cleared

Secretariat: The proposal demonstrates that an initial consultative process has been undertaken involving a diverse range of stakeholders, including national institutions, water-sector actors, local communities, civil society organizations, technical experts, and women stakeholders. Further clarification is required: CR 27: The proposal does not elaborate on the how consultative process informed the ideation, design or intended implementation of the project. Most of these information are being left for post-approval stage. It would be good to understand how the consultative processes informed the proposal design. The participant list does not identify participation by vulnerability status, and the signed attendance sheets and photographs are stated to be held by the Implementing Entity and available only on request. CR 28: Please summarise the consultations in the proposal text and provide the participant-level evidence, including the attendance records, and indicate the composition of participants by sex and by vulnerability status.

Is the requested financing justified on the basis of full cost of adaptation reasoning?

Response: Not Cleared

Secretariat: The proposal demonstrates that an initial consultative process has been undertaken involving a diverse range of stakeholders, including national institutions, water-sector actors, local communities, civil society organizations, technical experts, and women stakeholders. Further clarification is required: CR 29: The proposal does not elaborate on the how consultative process informed the ideation, design or intended implementation of the project. Most of these information are being left for post-approval stage. It would be good to understand how the consultative processes informed the proposal design. The participant list does not identify participation by vulnerability status, and the signed attendance sheets and photographs are stated to be held by the Implementing Entity and available only on request. CR 30: Please summarise the consultations in the proposal

text and provide the participant-level evidence, including the attendance records, and indicate the composition of participants by sex and by vulnerability status.

Is the project / program aligned with AF's results framework?

Response: Not Cleared

Secretariat: The proposal demonstrates general alignment with the Adaptation Fund Strategic Results Framework in its narrative through its focus on increasing adaptive capacity, improving water security, strengthening institutional capacity, and promoting adaptation innovation and learning. However, it remains insufficiently quantified and would benefit from clearer adaptation outcome indicators, explicit SRF alignment, gender-responsive targets, and measurable innovation-performance indicators. The Full Proposal should provide a more comprehensive results framework with baselines, targets, and sex-disaggregated indicators, as well as a clearer articulation of how project outcomes contribute to AF strategic results. CAR 5: Please include a results framework and the project's alignment with the Adaptation Fund Strategic Results Framework as updated in September 2025 (AFB/B.45/8), including at least the core impact indicator "Number of beneficiaries" and the revised Outcome 8 innovation indicators (Indicators 8.1 and 8.2, and Outputs 8.1.1, 8.1.2 and 8.2.1 on innovations identified, piloted and scaled that demonstrate local innovation participation and/or benefit).

Has the sustainability of the project/programme outcomes been taken into account when designing the project?

Response: Not Cleared

Secretariat: The proposal demonstrates that sustainability considerations have been incorporated into project design through a strong emphasis on capacity building, institutional strengthening, innovation ecosystem development, knowledge generation, learning, and replication. CAR 6: Additional information is needed regarding the long-term operation and maintenance of the pilot infrastructure, financial sustainability, ownership arrangements, and the viability of the innovation without continued grant support.

Does the project / programme provide an overview of environmental and social impacts / risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?

Response: Not Cleared

Secretariat: The project is classified as Category B, and the ES checklist assesses most principles as low to moderate risk with mitigation, an ESMP and a grievance mechanism committed (pages 36-39). Four principles — Indigenous Peoples, Involuntary Resettlement, Physical and Cultural Heritage, and Lands and Soil Conservation — are marked only with a check, apparently as not requiring further assessment, but without the justification given for the other principles. Given that the project involves civil works at a reservoir, the basis for screening out Lands and Soil Conservation, and Physical and Cultural Heritage, is not evident. In addition, the checklist does not address the risks specific to the evaporation-recovery mechanism, such as effects on local microclimate and humidity, the quality of the recovered water, and downstream flows, which the project itself lists among its monitoring indicators (page 15). CAR 7: For the four principles marked only with a check (Indigenous Peoples, Involuntary Resettlement, Physical and Cultural Heritage, and Lands and Soil Conservation), please provide the justification for concluding that no further assessment is required, and reassess this conclusion for the principles most likely to be engaged by civil works at a reservoir, in particular Lands and Soil Conservation. CR 31: Please

clarify whether the risks specific to the evaporation-recovery mechanism — including effects on local microclimate and humidity, the quality of the recovered water, and downstream flows — were considered in arriving at the Category B classification, or indicate how they will be addressed in the ESMP at the full proposal stage.

Resource Availability

Is the requested project funding within the parameters for large grants set by the Board?

Response: Cleared

Secretariat: Yes, the requested funding is US \$4,460,000 and within the project size for the funding window. However, please correct the US\$4.3 million funding reference in Section L (p. 37) to reconcile it with the US\$4.46 million request;

Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project budget before the fee? Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget (including the fee)? For regional projects/programmes, are the administrative costs (Implementing Entity Management Fee and Project/ Programme Execution Costs) at or below 10 per cent of the project/programme for implementing entity (IE) fees and at or below 10 per cent of the project/programme cost for the execution costs?

Response: Not Cleared

Secretariat: IE Fee is 8.49% and EE cost is at 8.54%. However, EPIU is designated both as the Implementing Entity and as an Executing Entity. Under the Adaptation Fund policy (OPG Annex 7; Board decisions B.17/17(f) and B.18/30), execution services carried out by the same entity that implements the project are capped at 1.5% of the project cost and may be provided only on an exceptional basis, with a written request and a letter of endorsement from the designated authority, and, above 1.5%, a demonstration of comparative advantage (decision B.38/42). CAR 8: Please clarify the share of execution services and associated costs to be carried out by EPIU in its capacity as Executing Entity (as distinct from HOVAK), confirm whether this falls within the 1.5% cap applicable where the same entity implements and executes, and, if it exceeds that cap, provide the required endorsement and justification of comparative advantage.

Eligibility of IE

Is the project submitted through an Implementing Entity accredited by the Board?

Response: Cleared

Secretariat: Accreditation Expiration Date: 29 February 2028



SINGLE COUNTRY INNOVATION PROJECT PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

Title of Project/Programme:	REWater Armenia (Reclaiming Evaporated Water for Climate Resilience in Armenia)
Country:	Republic of Armenia
Thematic Focal Area:	Water Management
Type of Implementing Entity:	NIE
Implementing Entity:	“Environmental Project Implementation Unit” State Agency of the Ministry of Environment of the Republic of Armenia (“EPIU” SA of MoE, RoA)
Executing Entities:	“EPIU” SA of MoE, RoA HOVAK – Social & Environmental Innovative Technologies Development NGO
Amount of Financing Requested:	4,460,000 (in U.S Dollars Equivalent)

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Project / Programme Background and Context:

The Republic of Armenia is a mountainous, landlocked country situated in the Southern Caucasus region, sharing borders with Azerbaijan to the east, Georgia to the north, the Islamic Republic of Iran to the south, and Turkey to the west. Despite its relatively small territory of approximately 30,000 km², Armenia exhibits diverse geographical and climatic features due to its complex topography. Nearly 76.5% of the country lies at elevations between 1,000 and 2,500 meters above sea level, resulting in significant spatial variation in temperature, precipitation, and hydrological patterns. The lowest point of the country is located in the Ararat Valley at around 800 meters, while the highest peak, Mount Aragats, reaches 4,090 meters.

Armenia's population stands at roughly 3 million people, with a settlement pattern concentrated in urban areas, particularly Yerevan, the capital city. The climate is predominantly continental, characterized by hot, dry summers and cold, often harsh winters. Due to the country's mountainous structure and elevation differences, microclimates are common, influencing agricultural production, water availability, and ecosystem distribution. The terrain consists largely of volcanic plateaus, deep river valleys, and mountain ranges, separated by limited lowland plains. These natural features shape both economic activities and the overall resource management framework, particularly in the water sector. Armenia's geographic and climatic conditions create a high dependence on effective water resource management, making the sustainable use of rivers, lakes, and reservoirs critical for national development, agriculture, hydropower generation, and climate resilience.

Armenia's water resources are defined by its mountainous terrain, continental climate, and complex patterns of surface and groundwater circulation. Although the country benefits from a relatively dense hydrological network for its size, water availability is uneven across regions and highly sensitive to seasonal and interannual climate variability. The country's surface waters (comprising lakes, rivers, streams, and artificial reservoirs) form the backbone of national water supply, supporting irrigation, energy generation, drinking water, fisheries, and the ecological integrity of natural systems. At the same time, groundwater aquifers supply a significant portion of drinking water needs and serve as critical buffers against drought in regions where surface water is insufficient.

Armenia's hydrological system is divided between two major transboundary basins (the Aras Basin and the Kura Basin) linking national water flows to regional hydro-political dynamics. Within these basins, Armenia hosts more than 9,500 rivers and streams with a total length exceeding 23,000 km, though the majority are small mountain rivers dependent on snowmelt and precipitation. Seasonal flow fluctuations are considerable: spring floods supply the bulk of annual discharge, while summer and early autumn often bring low-flow conditions, especially in drought-prone regions such as Ararat, Vayots Dzor, and Syunik.

The water balance of Armenia is highly influenced by climatic conditions, including rising temperatures, decreased snowfall, earlier snowmelt, and intensifying evaporation. Recent decades have shown a decline in river runoff and a growing mismatch between peak water availability and peak agricultural demand. These trends highlight the country's increasing vulnerability to climate change, particularly in water-dependent sectors such as agriculture, hydropower, and ecosystems. Artificial reservoirs play an essential role in stabilizing water supply across seasons, storing water for irrigation, municipal use, and energy production. However, evaporation losses from reservoirs have grown significantly under recent warming conditions, making water retention efficiency a central challenge for national water security. At the core of Armenia's water resource system stands Lake Sevan, the country's largest freshwater lake and most strategic natural reservoir. It plays a decisive

role in regulating surface water availability across the entire Sevan–Hrazdan system and remains one of the most climate-sensitive components of the national water network.

Groundwater resources, although more stable, also face increasing pressure from over-extraction, reduced recharge due to declining snowfall, and contamination risks in some regions. These issues reinforce the need for integrated water management approaches that incorporate climate resilience and protection of aquifer systems. Armenia's water resources form a connected yet climate-sensitive network in which changes in one system (such as reduced inflow to Lake Sevan or increased evaporation from reservoirs) reverberate across the national water economy. Strengthening water security therefore requires a comprehensive understanding of each key component of the hydrological system.

Quantitative climate outlook and implications for water resources

Quantitative climate projections reinforce the direction and magnitude of Armenia's water-security challenge. Under the RCP8.5 scenario, relative to the 1961–1990 baseline, average temperature is projected to increase by approximately 1.6°C by 2040, 3.3°C by 2070 and 4.7°C by 2100, while precipitation is projected to decline by approximately 2.7%, 5.4% and 8.3%, respectively. The Fourth National Communication further projects a decline in total river flow from approximately 6,279.9 million m³ to 3,832.0 million m³ by 2071–2100, equivalent to a reduction of about 39%. For Lake Sevan, annual evaporation is projected to increase from approximately 1,074.5 million m³ to approximately 1,467 million m³, an increase of around 37%. Observed conditions already demonstrate the scale of the evaporation challenge: in June 2021, approximately 12 cm of Lake Sevan level was estimated to have been lost to evaporation in one month, while cumulative evaporation during June–December 2021 reached approximately 953.4 million m³.

These national figures establish the climate-water trend that motivates the proposed innovation. They are not presented as measurements of evaporation at Marmarik Reservoir. Marmarik is located in Kotayk Marz within the Hrazdan basin and has a total storage capacity of approximately 24.2 million m³, of which approximately 23 million m³ is active storage. The dam is approximately 55.5 m high; the reservoir was commissioned in 1974 and rehabilitated in 2011 and regulates a snowmelt-dependent tributary supporting downstream irrigation. Its hydrological characteristics indicate exposure to the same mechanisms of declining snow recharge, summer low-flow pressure and warming-driven evaporation. Site-specific evaporation rates, humidity conditions and the reservoir water-balance baseline will therefore be established during project formulation using PFG resources before the final pilot design is confirmed.

Lake Sevan

Lake Sevan is the largest and most strategically significant freshwater body in Armenia and a central component of the country's hydrological stability. Located at approximately 1,900 meters above sea level, the lake covers about 1,240 km² and serves as one of the highest freshwater alpine lakes in the world. Its watershed receives inflow from 28 rivers and streams, including important tributaries such as the Masrik, Gavaraget, Dzknaget, and Argitchi Rivers. Outflow is largely regulated through the Hrazdan River, which connects Sevan to a cascade of hydropower plants and supports extensive irrigation systems in the Ararat Valley.

Hydrologically, Lake Sevan functions as Armenia's primary long-term water reserve, supporting irrigation, hydropower production, municipal water supply, fisheries, and biodiversity conservation.

Its ecological importance includes hosting endemic fish species, providing wetland habitats, and regulating regional microclimates. The lake's water balance is highly sensitive to climatic variability and anthropogenic pressures. During the Soviet period, large-scale withdrawals for hydropower significantly lowered the lake's levels. Although restoration efforts since the 2000s stabilized the lake and led to a partial recovery, climate change has once again intensified pressures.

In recent decades, increasing air temperatures, declining snowfall, earlier snowmelt, and prolonged dry seasons have contributed to reduced inflow and elevated evaporation rates. According to State Water Cadastre records, 2021 marked a critical year when abnormally high temperatures led to historic evaporation losses: in June 2021 alone the lake level dropped by an estimated 12 cm due solely to evaporation. Between June and December 2021, cumulative evaporation reached approximately 953.4 million m³, significantly exceeding the long-term climatological norm. This trend is expected to worsen under projected climate change scenarios, where higher summer temperatures may increase annual evaporation by an additional 5–10%.

Fluctuations in water level also exacerbate eutrophication, as reduced water volume and higher temperatures promote algal blooms and degrade water quality. These ecological shifts threaten fisheries, tourism, and the broader integrity of the lake's ecosystem. The strong dependence of irrigation and hydropower sectors on Sevan's regulated outflows means that changes in its water balance directly influence Armenia's economic resilience, agricultural productivity, and national water security. The growing mismatch between evaporation losses and natural inflow highlights the urgent need for adaptive water management strategies, including innovative approaches for recovering or reducing evaporative losses from major reservoirs.

Rivers and the Surface Water Network

Armenia's dense but highly variable river and stream network forms the foundation of its surface water resources. The country hosts over 9,500 rivers and streams with a combined length exceeding 23,000 km. Despite this extensive network, most rivers are relatively short, steep, and hydrologically dependent on snowmelt and seasonal precipitation. This results in pronounced flow variability: spring snowmelt produces peak discharges, while summer and early autumn often bring critically low flows, particularly in regions experiencing persistent drought.

Armenia's rivers belong predominantly to two major international basins: the Aras Basin and the Kura Basin, both of which link national water flows to transboundary water systems shared with Azerbaijan, Iran, Turkey, and Georgia. Major rivers include the Aras (bordering Iran and Turkey), the Hrazdan, Debed, Aghstev, Akhuryan, Vorotan, and Voghji Rivers. The Debed and Aghstev rivers drain northern Armenia toward Georgia, while the Aras River and its tributaries drain central and southern Armenia.

These rivers support critical national functions such as irrigation, drinking water supply, and hydropower generation. The Hrazdan River alone hosts a cascade of seven hydropower plants, contributing significantly to Armenia's electricity generation. However, climate-induced reductions in river runoff (combined with increasing water demand in agriculture) are straining river ecosystems and reducing the reliability of surface water supply. In some years, flows in semi-arid regions fall below ecological thresholds, threatening aquatic biodiversity and diminishing water availability for downstream irrigation. These hydrological changes reinforce the need for improved basin-level management, flow monitoring, and climate-resilient water infrastructure.

River Basin Management Structure

Armenia manages its hydrological system through six officially designated Basin Management Areas, each representing a distinct hydrological and ecological region: Sevan, Hrazdan, Ararat, Akhuryan,

Debed, and Voghji-Meghri. Each basin varies in its water availability, ecological pressures, population density, and climate vulnerabilities.

- The Sevan Basin centers on Lake Sevan and its tributaries, with water resources highly dependent on snowmelt and precipitation within a limited catchment. Climate change, reduced snowfall, and rising evaporation pose increasing risks to the basin's hydrological balance.
- The Hrazdan Basin plays a critical role due to the hydropower cascade and its provision of water to Yerevan and surrounding regions. Water demand in this basin is high, and flow regulation depends heavily on Lake Sevan releases.
- The Ararat Basin is the most water-stressed basin, encompassing Armenia's agricultural heartland. Intensive groundwater use, declining artesian pressures, and the expansion of irrigated agriculture have placed substantial strain on both surface and subsurface water resources.
- The Akhuryan Basin, shared with Turkey, relies on the Akhuryan Reservoir for irrigation water. Variability in upstream inflow and climate-driven reductions in reservoir recharge directly affect agricultural output.
- The Debed Basin in the north is heavily influenced by transboundary inflows and industrial activities, and is sensitive to extreme rainfall events and flood risks.
- The Voghji-Meghri Basin in the south includes high-mountain river systems with significant hydropower potential, but is vulnerable to reduced snowmelt and increased drought frequency.

Across all basins, climate change impacts (such as reduced runoff, higher evaporation, and increased hydrological variability) intensify existing pressures related to agriculture, hydropower, urban demand, and ecological degradation. Effective basin-level management is therefore central to enhancing Armenia's water security and resilience.

Reservoir System

Armenia's reservoir network is a core component of national water management, designed to regulate seasonal flows and ensure water availability for irrigation, municipal supply, and hydropower generation. The country hosts more than 80 artificial reservoirs, with total storage capacity exceeding 1.4 billion m³. The largest reservoirs include Akhuryan, Spandaryan, Kechut, Kaps, Azat, Aparan, and Tatev, many of which serve both irrigation and energy functions.

The reservoir system compensates for the highly seasonal nature of Armenia's rivers, capturing spring meltwater for use during the dry summer months. However, the efficiency of these reservoirs is increasingly compromised by climate-induced evaporation losses, sedimentation, aging infrastructure, and reduced inflow. Evaporation from reservoir surfaces has become one of the most significant sources of water loss, particularly in hot and dry regions such as Ararat and Vayots Dzor. In some years, evaporation rates from major reservoirs exceed 1,000 mm per year, leading to substantial declines in usable water volume.

Operational challenges are compounded by the mismatch between reservoir storage cycles and shifting precipitation patterns. Earlier snowmelt and reduced spring runoff limit the ability to fill reservoirs, while increased summer temperatures elevate evaporation during peak demand periods. Sedimentation further reduces storage capacity, especially in older reservoirs such as Akhuryan and Azat. These dynamics underscore the importance of modernizing reservoir management, improving monitoring systems, and exploring innovative evaporation-reduction technologies, such as the pilot method proposed under this project, aimed at recovering evaporated water and enhancing effective storage.

Groundwater Resources

Groundwater represents one of Armenia's most reliable and high-quality water sources, supplying approximately 96% of the country's drinking water. The most significant groundwater resources are located in the Ararat Artesian Basin, where confined aquifers historically offered abundant artesian flow. Additional groundwater systems exist in Shirak, Lori, Tavush, Syunik, and Vayots Dzor regions. Despite their importance, groundwater resources face increasing challenges. Over-extraction (especially for irrigation and fish farming in the Ararat Valley) has led to declining artesian pressure, reduced free-flowing wells, and increasing energy costs for pumping. Climate change further reduces aquifer recharge by decreasing winter snowfall and altering seasonal runoff patterns. In some areas, declining groundwater levels have been accompanied by salinization, nitrate contamination, and loss of shallow wells.

Monitoring of groundwater quantity and quality remains limited, with many observation wells not functioning or lacking continuous data. This creates uncertainty regarding long-term trends and complicates sustainable water management planning.

Groundwater's central role in drinking water supply makes its protection essential for Armenia's public health and national resilience. Strengthening integrated management between surface and groundwater resources, reducing over-extraction, and improving monitoring systems are priority actions for ensuring long-term sustainability.

Economic, Social, Development and Environmental Context

Armenia's water sector operates within a complex economic, social, and environmental landscape that has made water scarcity one of the country's most urgent development challenges. As a lower middle-income country with an economy strongly dependent on agriculture, hydropower, and natural resources, the country's socio-economic stability is directly tied to the reliability of its water systems. Agriculture remains a major source of rural employment and income, yet it is highly vulnerable to seasonal water shortages, drought, extreme temperatures, and climate variability. Irrigation is essential for sustaining agricultural productivity, particularly in semi-arid regions; however, the increasing unreliability of surface water and declining groundwater reserves have intensified production risks, reduced crop yields, and increased the financial burden on rural households. In this context, water scarcity is not only an environmental issue but also a direct constraint on economic growth, food security, and rural livelihoods.

Socially, water availability is a critical determinant of community resilience. Rural and water-stressed regions (such as Ararat, Armavir, Vayots Dzor, and Syunik) face disproportionate impacts from reduced river flows, declining reservoir levels, and groundwater over-extraction. Many households rely exclusively on agriculture and depend on irrigation supplied through reservoirs and river systems. When water availability decreases, households face reduced income opportunities, seasonal unemployment, and higher vulnerability to climate shocks. Water scarcity has also contributed to internal migration and the depopulation of rural areas. Women farmers, who already have limited access to land, credit, and irrigation infrastructure, are among the most affected. In some communities, even drinking water supply has become unreliable due to the overuse and depletion of groundwater sources. Ensuring stable and continuous access to water is therefore a matter of social equity, public health, and community well-being.

From a development perspective, Armenia has identified water management as a key national priority. Government strategies and basin management plans emphasize the need to expand water storage capacity, rehabilitate aging reservoir infrastructure, regulate water use more efficiently, and

adopt modern technological solutions to reduce losses. Hydropower remains a significant component of the national energy mix, but it is increasingly sensitive to declining flows and fluctuating reservoir levels. Economic reforms and climate adaptation strategies both highlight the importance of strengthening water infrastructure, integrating innovative climate-resilient technologies, and improving long-term water security as essential components of sustainable development.

The environmental context reinforces the urgency of these actions. Armenia is experiencing rising temperatures, declining precipitation, reduced snowpack, and accelerated evaporation (all of which have contributed to measurable reductions in river runoff, reservoir recharge, and groundwater replenishment). Water-dependent ecosystems such as Lake Sevan, high-mountain river systems, and wetland habitats are under stress from fluctuating water levels, degraded ecological flows, and increased eutrophication risks. Reservoirs across the country are losing substantial volumes of water due to evaporation, in some cases reaching tens of millions of cubic meters per year, while sedimentation and outdated infrastructure further reduce usable storage. Climate projections indicate increasing frequency and intensity of drought, heatwaves, and extreme weather events, threatening not only water supply but also ecosystem stability and resilience.

Against this backdrop, the proposed project directly addresses one of the most critical vulnerabilities in Armenia's water system: the loss of stored water through evaporation from reservoirs. By introducing an innovative pilot approach that captures and returns evaporated water back into the reservoir system, the project seeks to enhance effective water storage, improve irrigation reliability, and strengthen resilience to climate-induced water scarcity. This solution aligns with national strategies that call for modernization of water infrastructure, expansion of storage capacity, and adoption of advanced climate-resilient technologies. If successful, the pilot will offer a scalable model that can be replicated across Armenia's extensive reservoir network, contributing to long-term sustainable development, improved water security, and enhanced resilience for communities, ecosystems, and the national economy.

Project Problem: the gap between the current situation and the desired future

Current situation:

Armenia is experiencing accelerating water scarcity driven by rising temperatures, declining snowfall, earlier snowmelt, and rapidly increasing evaporation from major reservoirs. Reservoirs – critical for irrigation, hydropower, municipal supply, and ecosystem stability – are losing tens to hundreds of millions of cubic meters of water annually to evaporation, at exactly the time when demand is highest. This loss undermines agricultural productivity, hydropower reliability, drinking water security, and the resilience of water-dependent ecosystems such as Lake Sevan.

Desired future:

A climate-resilient water system in which reservoirs retain more of their stored water, communities have reliable year-round access to water, agricultural production becomes more resilient to drought and seasonal variability, and ecosystems remain stable under rising temperatures. Innovation should enable Armenia to augment water availability even under worsening climate conditions.

The gap:

Armenia currently lacks effective, scalable, and climate-resilient technological solutions for reducing or recovering evaporative losses from reservoirs. Existing infrastructure was not designed to address warming-driven hydrological shifts, and no mechanisms exist for harnessing solar energy or naturally occurring processes to generate additional freshwater from evaporation. Without intervention,

evaporation losses will continue to outpace inflow, exacerbating water scarcity, increasing socio-economic vulnerability, and reducing national resilience.

Evaporation is one among several important water-loss and water-security challenges in Armenia. The project does not assume that it is currently the largest absolute loss pathway. Its adaptation relevance arises from the fact that it is directly intensified by warming, represents a consumptive loss from the basin water balance, and is not currently addressed through a dedicated recovery intervention. The project therefore complements, rather than substitutes for, ongoing investments in network and irrigation efficiency.

Table 1. Comparison of Key Water-Loss and Water-Security Pathways Relevant to REWater

Water-loss / pressure pathway	Indicative evidence	Main characteristic	Existing response	Relevance to REWater
Irrigation conveyance losses	>50% in the Hrazdan basin district	Infrastructure and operational efficiency loss	Irrigation rehabilitation and efficiency programmes	Complementary; REWater does not replace conveyance-efficiency investment
Drinking-water network losses	Approx. 74% of 350.5 million m ³ abstracted in the referenced 2017 data	Distribution/network efficiency loss	Utility and network rehabilitation programmes	Complementary
Groundwater over-extraction	Significant in stressed basins	Depletes stored groundwater and increases pumping requirements	Monitoring, abstraction management and efficiency measures	Additional surface-water supply may reduce pressure where relevant
Reservoir evaporation	>1,000 mm/year from reservoir surfaces in hotter areas; Lake Sevan lost approx. 953.4 million m ³ during June–December 2021	Consumptive loss directly intensified by warming	No dedicated evaporation-recovery intervention identified	Direct focus of the proposed innovation

Preferred pilot site: Marmarik Reservoir

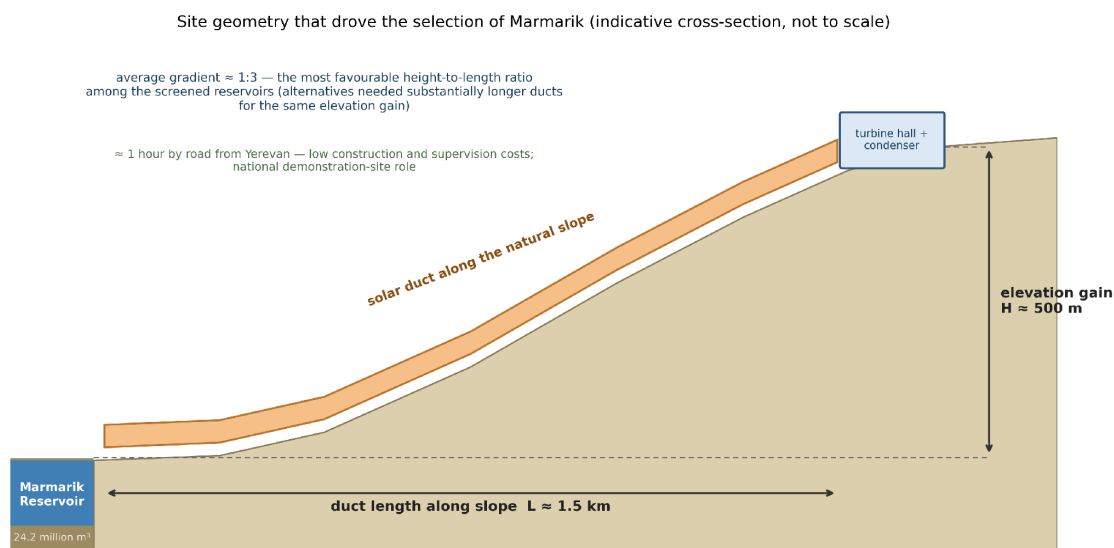
Marmarik Reservoir has been identified as the preferred pilot location through preliminary criteria-based screening. The selection was informed by six considerations. First, its topography provides approximately 500 m of elevation gain within approximately 1.5 km of slope, corresponding to an indicative gradient of about 1:3 and providing a favourable height-to-length ratio for the natural-draft

concept. Preliminary comparison indicated that alternative screened reservoirs would require substantially longer routes to obtain a similar elevation gain. Second, the reservoir's approximately 24.2 million m³ scale is considered suitable for a measurable pilot while avoiding the environmental and operational sensitivities associated with testing directly at Lake Sevan. Third, community consultations identified continuing constraints in water access within the wider reservoir service area. Fourth, the reservoir and potential installation corridor are expected to enable the necessary public-sector access and permitting arrangements, subject to verification during formulation. Fifth, the site is approximately one hour from Yerevan, facilitating construction supervision, technical monitoring and its future function as a national demonstration site. Sixth, the Hrazdan basin district has substantial irrigation demand, with more than 13,000 ha irrigated and more than 2,100 ha reported idle because of insufficient water, demonstrating broader basin-level water stress.

Marmarik remains subject to detailed PFG-supported validation before the Full Proposal. Site-specific hydrology, evaporation, humidity, solar exposure, environmental conditions, technical yield and cost-effectiveness will be confirmed before the construction investment is committed. If Marmarik does not meet the minimum thresholds, construction will not proceed there; the next-ranked eligible site will be considered or the design will be re-scoped before submission of the Full Proposal.

At concept stage, the anticipated priority uses of recovered water are: (i) supplementary domestic and livestock water for communities in the Marmarik valley; (ii) supplementary downstream irrigation support; and (iii) return to storage as an additional drought buffer. Final allocation will be determined through the participatory mechanism under Output 2.1, using transparent criteria and an accessible grievance mechanism.

Figure 1. Indicative site geometry supporting preliminary selection of Marmarik Reservoir



Concept-stage schematic; not to scale. Final alignment and dimensions will be confirmed during PFG-supported design and site validation.

Problem Focus for the Innovation:

This project targets the increasingly severe evaporation losses from Armenia's reservoirs, which represent a major but under-addressed source of climate-induced water scarcity. The proposed innovative solution – a solar-powered atmospheric water recovery system integrated with reservoir environments – aims to test whether evaporated water can be captured, condensed, and returned to

the end users, thereby increasing effective storage and strengthening national water security. If successful, the approach could offer a potentially transformative, scalable model for reducing evaporation-related water losses not only in Armenia but also across the drought-prone Southern Caucasus region.

Regional Perspective and Replicability:

While the pilot will be implemented in Armenia, the underlying challenge it addresses is shared across the wider South Caucasus and neighboring semi-arid high-mountain regions (including parts of Georgia, Türkiye, and the Islamic Republic of Iran). These countries rely heavily on high-altitude reservoirs and hydropower cascades, face similar trends of rising temperatures and declining snow- and glacier-fed inflows, and already experience substantial evaporative losses from large open-surface reservoirs and lakes. However, there are currently no widespread climate-resilient solutions in the region that recover this evaporated water or transform it into an additional, clean water source. By demonstrating a low-carbon, solar-powered solution for capturing and condensing water vapor above reservoirs, the project will generate operational evidence, cost data and institutional learning that can inform replication across other basins in Armenia and in neighboring countries facing comparable climate-induced water security risks.

Project / Programme Objectives:

The overall goal of the project is to enhance Armenia's climate resilience and water security by piloting, validating, and enabling the uptake of an innovative evaporation-recovery solution that reduces climate-induced water losses from reservoirs, strengthens adaptive capacity of vulnerable communities, and establishes potentially scalable, evidence-based pathways for climate-resilient water management under increasing temperature and drought conditions.

Objective 1: Test and validate an innovative solar-powered evaporation recovery technology at the Marmarik Reservoir to increase effective water storage under climate change.

This includes designing, installing, and operating a pilot-scale water distillation/condensation system that captures evaporated water, condenses it using reservoir cooling, and returns it as usable freshwater. The objective is to generate empirical evidence on performance, water recovery rates, cost-efficiency, energy needs, and operational feasibility in Armenia's climatic and topographic conditions.

Objective 2: Reduce climate-related vulnerabilities linked to water scarcity, agricultural instability, and hydropower variability in the Marmarik Basin.

By improving water reliability and reducing losses from evaporation, the project aims to increase adaptive capacity for farmers, households, and local ecosystems that depend on the Marmarik Reservoir and its downstream systems.

Objective 3: Strengthen climate-resilient water security for adjacent communities through improved access to the recovered water.

This includes assessing local water needs, developing small-scale distribution or pipeline systems where needed, and enhancing existing community water infrastructure to ensure that the additional water generated by the innovation can directly support households, agriculture, or community

services. The aim is to increase local resilience to droughts, seasonal shortages, and groundwater decline.

Objective 4: Build institutional and technical capacity within national and local stakeholders to understand, operate, and scale innovative water-generation technologies.

Capacity building will target water management agencies, basin authorities, local governments, and community water user associations. Training will focus on system operation, maintenance, safety, performance monitoring, climate vulnerability analysis, and integration of innovative technologies into long-term water planning.

Objective 5: Generate evidence, learning, and operational models to inform national scaling and regional replication of evaporation recovery solutions.

Through rigorous monitoring, evaluation, environmental and social assessment, and knowledge documentation, the project will develop guidelines, cost curves, operational manuals, and policy recommendations that support the integration of evaporation-recovery technologies into Armenia's wider reservoir network and inform potential adoption in the South Caucasus region.

Objective 6: Strengthen the enabling environment for innovative climate-resilient water management solutions in Armenia.

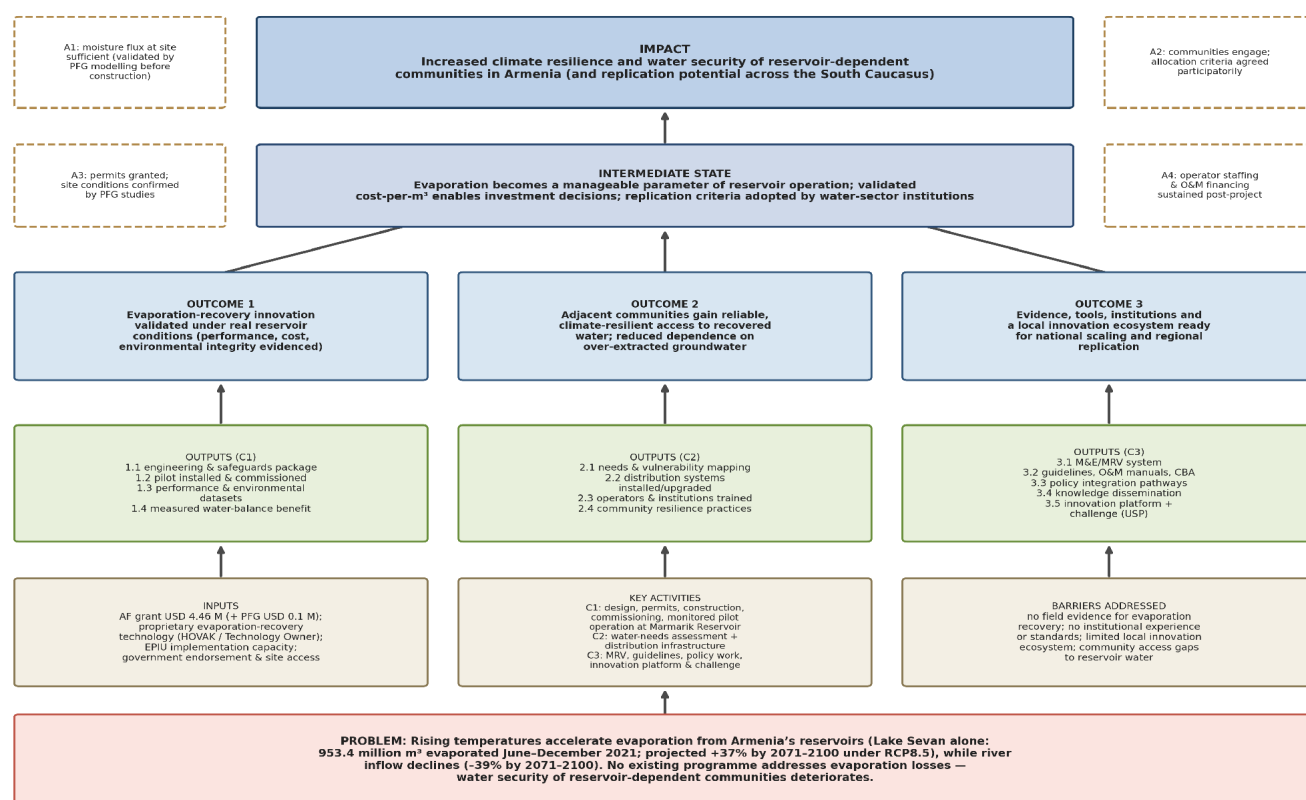
This includes developing policy insights, incorporating the innovation into basin management planning processes, facilitating stakeholder engagement, and supporting dialogue among regulators, utilities, research institutions, civil society organizations, and community groups. The project will also strengthen Armenia's broader climate adaptation innovation ecosystem through a collaborative innovation platform, targeted capacity building, and catalytic support for early-stage locally led adaptation initiatives relevant, inter alia, to water security and climate resilience. The goal is to create favourable conditions for future investment, replication, locally driven innovation, and private-sector or climate-finance-supported scale-up.

Theory of Change

The Theory of Change is subject to four principal assumptions that will be tested or secured during project formulation and implementation: A1: site moisture flux and technical suitability are confirmed through PFG-supported modelling and validation before construction; A2: participating communities support the pilot and agree transparent arrangements for allocation and use of recovered water; A3: all required national permits and approvals can be secured; and A4: a viable institutional and financing arrangement for post-project operation and maintenance is formalized before project closure.

Figure 2. REWater Armenia – Theory of Change

REWater Armenia – Theory of Change



Project / Programme Components and Financing:

Fill in the table presenting the relationships among project components, outcomes, outputs, and countries in which activities would be executed, and the corresponding budgets.

Table 2. Project Scope

Project/Programme Components	Expected Outcomes	Expected Outputs	Amount (US\$)
1. Pilot Testing of the Innovative Evaporation-Recovery System at Marmarik Reservoir	1. A potentially validated and operational evaporation-recovery pilot system installed at Marmarik Reservoir that increases effective water availability and demonstrated a	1.1 Detailed technical design, engineering specifications, safeguard instruments, and site readiness package prepared.	400,000
		1.2 Evaporation-recovery installed, integrated, and	2,000,000

	potentially scalable climate adaptation solution for reservoir systems.	commissioned for pilot operation.	
		1.3 Operational data and evidence on water recovery, system performance, and environmental integrity generated.	100,000
		1.4 Improved reservoir-level water balance demonstrated as a measurable climate adaptation benefit.	150,000
2. Strengthening Community Water Security Through Climate-Resilient Infrastructure & Capacity Building	2. Adjacent communities have improved, reliable, and climate-resilient access to recovered water, reducing vulnerability to drought, seasonal shortages, and unsustainable groundwater dependence.	2.1 Water needs assessment and climate vulnerability mapping for target communities completed.	100,000
		2.2 Community-level water distribution systems installed or upgraded to utilize recovered water.	200,000
		2.3 Institutional and local capacities strengthened for climate-resilient water management.	50,000
		2.4 Enhanced community resilience through strengthened water security and reduced dependence on over-extracted groundwater.	30,000
3. Knowledge Generation, Learning, and Scaling Pathways for Evaporation-Recovery Solutions	3. Evidence, tools, and institutional mechanisms established for national scaling and regional replication of evaporation-recovery technologies as a climate adaptation measure.	3.1 Comprehensive monitoring, reporting, and evaluation (M&E) system established.	200,000
		3.2 Technical guidelines, O&M manuals, and cost-benefit analyses prepared to inform scaling decisions.	50,000
		3.3 Institutional pathways established for integrating evaporation-recovery into	30,000

		water sector policy and planning.	
		3.4 Knowledge dissemination at national, regional, and global levels.	150,000
		3.5 Civil society innovation capacities and collaborative platforms strengthened to promote locally led climate adaptation innovation.	300,000
6. Project/Programme Execution cost			351,000
7. Total Project/Programme Cost			4,111,000
8. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)			349,000
Amount of Financing Requested			4,460,000

Projected Calendar:

Table 3 Project's Anticipated Calendar

Milestones	Expected Dates
Start of Project/Programme Implementation	3rd quarter of 2027
Mid-term Review (if planned)	2029
Project/Programme Closing	2031
Terminal Evaluation	2031

The four-year project period is intended to provide at least 24 months of monitored integrated-system operation across two full seasonal cycles. Long-term lifecycle conclusions will combine measured O&M and degradation data with engineering service-life assumptions and sensitivity analysis under Output 3.2. The demonstration site is intended to remain an operational reference point for research, training and evaluation beyond grant closure.

Table 4. Indicative implementation and evidence-generation sequence

Phase	Indicative timing	Main purpose
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Detailed design, site validation, safeguards and permitting	Project Year 1	Confirm final design, site suitability, safeguards and approvals
Procurement, installation and commissioning	Year 1 – first half of Year 2	Establish operational pilot
Monitored pilot operation	From Year 2	Generate continuous technical, water, energy and environmental performance data
First full seasonal review	After first complete operating cycle	Optimize operation and assess early performance
Mid-term review and go/adjust/re-scope decision	2029	Review performance and confirm/adjust Component 2 sizing and project strategy
Continued monitoring	Through Project Year 4	Achieve at least 24 months of monitored operation spanning two seasonal cycles
Lifecycle and cost-effectiveness assessment	Final implementation period	Extrapolate measured O&M/reliability data over design life with sensitivity analysis

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Describe the project / programme components, particularly focusing on the concrete adaptation activities, how these activities would contribute to climate resilience. For regional projects describe also how they would build added value through the regional approach, compared to implementing similar activities in each country individually. For the case of a programme, show how the combination of individual projects would contribute to the overall increase in resilience.

Component 1. Pilot Testing of the Innovative Evaporation-Recovery System at Marmarik Reservoir

Component 1 introduces, constructs, and operationalizes the project's core innovation: a solar-powered evaporation-recovery system designed to capture atmospheric moisture generated through reservoir evaporation, condense it, and return it as usable freshwater to the water system. Under rising temperatures, longer dry seasons, and increasing climate variability in Armenia, reservoir evaporation represents a growing threat to water security, irrigation reliability, ecosystem resilience, and hydropower performance. By piloting this solution under real operating conditions at Marmarik Reservoir, the project will test an innovative adaptation technology capable of reducing climate-induced water losses and increasing effective storage availability.

This component covers the full cycle of pilot implementation, including feasibility validation, detailed engineering design, permitting, construction, commissioning, operational monitoring, and performance optimization. It will generate empirical evidence on water recovery rates, technical reliability, lifecycle costs, environmental performance, and replicability across Armenia's wider reservoir network. As the first deployment of its kind in Armenia and the South Caucasus, this component serves as the project's innovation and demonstration platform.

Outcome 1: A validated and operational evaporation-recovery pilot system installed at Marmarik Reservoir that increases effective water availability and demonstrated a scalable climate adaptation solution for reservoir systems.

Output 1.1: Detailed technical design, engineering specifications, safeguard instruments, and site readiness package prepared.

Activities:

- Conduct hydrometeorological and evaporation-rate, solar radiation, and seasonal climate analysis to optimize system sizing and expected performance under local present and future climate scenarios.
- Undertake topographic, geodetic, slope stability, terrain access, and site condition surveys for precise route alignment and infrastructure placement.
- Develop detailed engineering drawings, structural calculations, hydraulic layouts, electrical schematics, and 3D models adapted to reservoir terrain and operating conditions.
- Prepare bills of quantities, procurement specifications, installation plans, and construction sequencing schedules.
- Prepare, disclose, and operationalize the Environmental and Social Management Plan (ESMP), including occupational health and safety provisions, biodiversity safeguards, construction waste management, and community risk mitigation measures.
- Document and incorporate relevant local knowledge on seasonal water behaviour, snow and icing conditions, slope access, terrain hazards and practical reservoir operating conditions into site assessment and detailed design, alongside scientific and engineering evidence.
- Secure all relevant permits, clearances, land-use approvals, utility connections, and construction authorizations.

Output 1.2: Evaporation-recovery system installed, integrated, and commissioned for pilot operation.

Activities:

- Procure materials, machinery, sensors, electric equipment, and civil work inputs in line with national standards and AF safeguards.
- Prepare access routes, work platforms, drainage systems, and installation corridors required for safe construction in mountainous terrain.
- Construct foundations, anchor blocks, structural supports, protective frames, and elevated installation platforms.
- Install the solar-heated air conduit / capture chamber, steel casing systems, load-bearing cable systems, inlet portal, and heat-absorbing surfaces.
- Install condensation units, heat exchange loops, pumps, filters, sterilization systems, condensate piping, storage tanks, and water return systems.
- Install turbine-generator units, battery storage, inverters, control panels, backup systems, and grounding infrastructure to ensure energy self-sufficiency and resilience.
- Install fencing, lighting, anti-icing systems, avalanche/rockfall protection, surveillance equipment, and worker safety infrastructure.
- Conduct trial runs, pressure tests, electrical safety checks, calibration, and final commissioning procedures.

Output 1.3: Operational data and evidence on water recovery, system performance, and environmental integrity generated.

Activities:

- Install an integrated monitoring system with sensors for temperature, humidity, airflow, pressure, solar radiation, water flow, and condensate volumes.
- Establish SCADA-based remote monitoring, telemetry, data storage, dashboards, and backup communications systems.

- Establish pre-construction and operating-period temperature and humidity monitoring, including appropriate transects around the installation, to identify and manage any localized microclimate effects.
- Monitor vertical reservoir temperature profiles and the temperature of cooling water returned to the reservoir and establish operational thresholds designed to avoid material disruption of seasonal thermal stratification.
- Treat recovered condensate as an untreated project water stream until physical, chemical and microbiological testing confirms its suitability for the intended use. Any domestic use will be conditional on appropriate conditioning, including remineralization and/or disinfection where required, and certification against applicable national standards; irrigation or livestock use will be subject to the relevant conformity requirements.
- Verify through Output 1.4 water-balance monitoring that the cooling circuit returns the abstracted reservoir water and that project operation does not adversely alter the reservoir outlet regime or downstream water availability.
- Monitor water recovery volumes, conversion efficiency, operating hours, seasonal variability, and cost-per-cubic-meter of recovered water.
- Analyse energy balance, battery performance, self-generation capacity, and operational optimization opportunities.
- Track environmental indicators including shoreline disturbance, vegetation response, noise, and ecosystem integrity.
- Prepare periodic technical performance reports and lessons learned documentation.

Output 1.4: Improved reservoir-level water balance demonstrated as a measurable climate adaptation benefit.

Activities:

- Monitor the reservoir water balance and downstream operating regime to confirm that the cooling-water circuit does not create a consumptive withdrawal and that recovered condensate represents an additional water input rather than a diversion of existing reservoir supply.
- Integrate recovered water into reservoir operations or downstream beneficial use systems.
- Compare effective water availability against baseline evaporation-loss scenarios and climate-adjusted projections.
- Quantify adaptation benefits in terms of additional water retained, drought-period buffering capacity, irrigation reliability, and reduced seasonal stress.
- Produce evidence-based recommendations for integrating evaporation-recovery solutions into reservoir management policies and future investment planning in Armenia.

Develop preliminary scale-up scenarios for application across other reservoirs in Armenia and the wider South Caucasus region.

Component 2. Strengthening Community Water Security Through Climate-Resilient Infrastructure and Capacity Building

Component 2 ensures that the benefits generated by the pilot evaporation-recovery system are translated into direct and measurable resilience gains for communities adjacent to Marmarik Reservoir. Many settlements in the surrounding basin face recurring water shortages, declining groundwater tables, seasonal service interruptions, and reduced irrigation reliability as a result of increasing drought frequency, changing precipitation patterns, and rising temperatures in Armenia. While Component 1 focuses on generating additional usable water, Component 2 ensures that this water can be safely delivered, equitably managed, and strategically used to reduce climate vulnerability.

The component combines targeted infrastructure investments with institutional strengthening and community engagement. It includes water needs assessments, hydraulic design of small-scale conveyance systems, installation of distribution infrastructure, operational training, community water governance support, and gender-responsive adaptation planning. By linking innovation with local service delivery, the component aims to increase adaptive capacity, reduce drought-related risks, and strengthen long-term ownership of the pilot solution.

Outcome 2: Adjacent communities have improved, reliable, and climate-resilient access to recovered water, reducing vulnerability to drought, seasonal shortages, and unsustainable groundwater dependence.

Output 2.1: Water needs assessment and climate vulnerability mapping for target communities completed.

Activities:

- Conduct participatory consultations with municipalities, households, women farmers, community leaders, irrigation users, and water-user associations to identify priority water security challenges.
- Assess current domestic, agricultural, and seasonal water demand patterns in communities surrounding Marmarik Reservoir.
- Map existing water infrastructure gaps, intermittent supply zones, groundwater stress areas, irrigation constraints, and climate-related livelihood risks.
- Analyse projected climate impacts on local water availability, agricultural productivity, and drought exposure.
- Identify priority settlements, beneficiary groups, and technically feasible delivery corridors for recovered water supply.
- Document local knowledge on historical water shortages, seasonal water-sharing arrangements, irrigation scheduling and household/livestock water-use practices and use this information to inform allocation criteria and infrastructure planning.
- Determine indicative water allocation scenarios for domestic, productive, and resilience-buffer uses.

Output 2.2: Community-level water distribution systems installed or upgraded to utilize recovered water.¹

Activities:

- Prepare detailed hydraulic engineering designs for local water conveyance systems, including route alignment, pipe sizing, elevation profiling, pressure management, and node design.
- Undertake topographic surveys and construction setting-out for distribution routes and service points.
- Procure and install HDPE pipelines, valves, connectors, fittings, and pressure control systems.
- Construct storage and distribution nodes, including water tanks, manifolds, chambers, and public access taps where appropriate.

¹ Output 2.1 will begin before pilot commissioning to map water needs, vulnerable users, existing infrastructure and technically feasible distribution options. However, the final sizing and capital commitment under Output 2.2 will be stage-gated against validated pilot performance and the volume of recovered water reasonably available for community use. Distribution infrastructure will therefore be modular and sized against measured or conservatively validated water availability rather than assumed maximum production. Where recovered volumes are lower than anticipated, the participatory allocation criteria developed under Output 2.1 will prioritize the highest-need users and settlements. Where technically appropriate, distribution infrastructure may be designed to allow recovered water to be blended with existing reservoir offtake so that the infrastructure retains community resilience value even where recovered-water volumes vary seasonally.

- Install pressure breaker / reducer chambers along steep-gradient sections to ensure safe and efficient operation.
- Install flow meters, consumption monitoring devices, and basic telemetry links for water accounting and operational control.
- Connect recovered water to irrigation networks, community supply systems, livestock watering points, or blended service systems as locally appropriate.
- Conduct pressure testing, leakage control, system disinfection, and final commissioning of distribution assets.
- Ensure all works comply with Armenian technical, environmental, and public health standards.
- Where pumping is required, assess the technically and economically feasible use of surplus electricity generated by the pilot to support community water-distribution functions.

Output 2.3: Institutional and local capacities strengthened for climate-resilient water management.

Activities:

- Train reservoir operators and technical staff on operation, routine maintenance, troubleshooting, and monitoring of the evaporation-recovery system and associated distribution infrastructure.
- Train municipal authorities, basin organizations, and community water committees on climate-resilient water planning and drought contingency management.
- Build local capacity on equitable allocation mechanisms, demand management, seasonal scheduling, and conflict-sensitive water governance.
- Deliver targeted training for women-led farms, vulnerable households, and local user groups to strengthen inclusive access and participation.
- Develop standard operating procedures (SOPs) for water safety, maintenance, emergency response, meter reading, and basic asset management.
- Support establishment or strengthening of local management arrangements for long-term oversight of the new systems.

Output 2.4: Enhanced community resilience through strengthened water security and reduced dependence on over-extracted groundwater.

Activities:

- Support community adaptation planning to integrate recovered water into cropping calendars, household supply strategies, and seasonal resilience measures.
- Promote sustainable water use practices that reduce pressure on local aquifers and improve overall basin water balance.
- Demonstrate how supplementary recovered water can reduce drought-related livelihood disruptions and improve agricultural reliability.
- Facilitate community feedback mechanisms, grievance channels, and user satisfaction monitoring.
- Document social, economic, and resilience co-benefits generated through improved water access.
- Integrate relevant local cropping calendars, seasonal water-sharing practices and locally identified drought-coping strategies into community adaptation planning and seasonal use of recovered water.
- Develop lessons learned and local ownership models to support replication in other climate-vulnerable communities across Armenia.

Component 3. Knowledge Generation, Learning, and Scaling Pathways for Evaporation-Recovery Solutions

Component 3 converts the pilot demonstration into actionable knowledge, decision-support tools, and institutional pathways for future replication in Armenia and the wider South Caucasus region. Because evaporation-recovery systems remain largely untested globally and have not previously been applied in Armenia, systematic evidence generation is essential to determine their technical viability, climate adaptation value, economic competitiveness, and environmental suitability under local conditions.

This component will leverage the project's monitoring systems, digital instrumentation, operational experience, and evaluation processes to generate scientifically robust findings. It will translate pilot experience into practical manuals, reservoir screening tools, policy recommendations, and dissemination products that enable informed scale-up decisions while respecting legitimate commercially sensitive proprietary information. In addition, the component will strengthen Armenia's broader climate adaptation innovation ecosystem by supporting civil society engagement, innovation exchange, and locally led adaptation idea development linked to climate-resilient water management and related sectors. The component will also establish a small catalytic support mechanism for early-stage adaptation innovation initiatives led by civil society and community actors, helping stimulate practical experimentation and locally relevant climate resilience solutions.

Outcome 3: Evidence, tools, and institutional mechanisms established for national scaling and regional replication of evaporation-recovery technologies as a climate adaptation measure.

Output 3.1: Comprehensive monitoring, reporting, and evaluation (M&E) system established.

Activities:

- Develop a results-based M&E framework covering climate resilience indicators, hydrological impacts, technical performance, community benefits, gender outcomes, and environmental safeguards.
- Utilize installed SCADA systems, telemetry, sensors, servers, and cloud storage to capture real-time operational data from the pilot system.
- Integrate relevant datasets into national water and hydrometeorological information systems where feasible.
- Conduct baseline, seasonal, mid-term, and final performance assessments.
- Undertake independent technical and financial audit of pilot implementation and first-year operations.
- Produce validated datasets for future research and scaling decisions.

Output 3.2: Technical guidelines, O&M manuals, and cost-benefit analyses prepared to inform scaling decisions.

Activities:

- Prepare engineering guidance based on actual pilot installation experience, terrain constraints, and operating conditions.
- Produce operation and maintenance manuals covering turbines, pumps, sensors, filtration, anti-icing systems, electrical systems, and safety procedures.
- Document preventive maintenance schedules and spare-parts planning requirements.
- Conduct lifecycle cost analysis including CapEx, OpEx, maintenance burden, and cost per cubic meter of water recovered.
- Compare performance against alternative adaptation measures such as lining, storage expansion, leakage reduction, pumping, or demand management.
- Develop minimum performance thresholds for future replication.

Output 3.3: Institutional pathways established for integrating evaporation-recovery into water sector policy and planning.

Activities:

- Facilitate technical dialogues with the Water Committee, Ministry of Environment, municipalities, basin bodies, and irrigation stakeholders.
- Prepare policy briefs on evaporation losses as a climate risk and technology options for mitigation.
- Develop reservoir prioritization criteria based on climate exposure, evaporation intensity, altitude, storage size, and community benefit potential.
- Support integration of findings into basin management plans, reservoir rehabilitation programs, drought strategies, and adaptation planning processes.
- Engage Armenian universities, research institutes, and engineering bodies for future local innovation ownership.
- Provide validated technical, economic and safeguards evidence generated by the pilot to relevant future Technology Needs Assessment and Technology Action Plan update processes so that reservoir evaporation-management options can be assessed on the basis of national empirical data.

Output 3.4: Knowledge dissemination at national, regional, and global levels.

Activities:

Knowledge products will distinguish clearly between information required for public learning, accountability and scaling decisions and manufacturing-level proprietary information associated with the patented/patent-pending technology.

Public project-generated information will include: aggregated and summarized performance datasets, including water-recovery volumes, energy generation and seasonal operating profiles; measured lifecycle and cost-per-m³ results; environmental and water-quality monitoring results; the conceptual system schematic and high-level operating principles; site-screening and suitability criteria; O&M cost profiles and non-proprietary operator guidance; environmental and social safeguards lessons; policy briefs; evaluation and audit findings; and other knowledge products required for Adaptation Fund learning and reporting.

Restricted technical information will include: detailed engineering and manufacturing drawings, complete bills of materials, manufacturing specifications, proprietary control software or algorithms, internal design parameters and other information whose disclosure would reveal protected manufacturing-level intellectual property. Such material may be made available to authorized reviewers and independent technical experts through controlled confidential arrangements.

The distinction is designed to ensure that all information necessary for governments, communities, researchers and potential financiers to judge adaptation performance, cost-effectiveness, environmental suitability and replication conditions remains available, while the limited engineering information required to manufacture the proprietary configuration remains protected.

- Produce public knowledge products summarizing water recovery performance, adaptation outcomes, environmental findings, and implementation lessons.
- Organize technical workshops, demonstration visits, and stakeholder field days at Marmarik Reservoir.
- Share results through Adaptation Fund learning platforms, regional resilience networks, and international water innovation forums.

- Develop communication materials highlighting community resilience benefits, gender-responsive outcomes, and innovation potential.

Output 3.5: Civil society innovation capacities and collaborative platforms strengthened to promote locally led climate adaptation innovation.

Activities:

- Establish a national climate adaptation innovation platform bringing together civil society organizations (CSOs), researchers, innovators, youth groups, engineers, and community actors to exchange ideas, lessons learned, and emerging adaptation solutions.
- Establish a women-innovators track within the adaptation innovation challenge and target at least 30% of awards to women-led initiatives.
- Establish a governance/steering arrangement for the platform with at least 30% women's representation.
- Target at least 25% youth participation in platform activities and track applications, participation and awards using sex- and age-disaggregated data.
- Ensure that the innovation challenge is open to locally rooted adaptation practices and concepts, including community-developed approaches to water retention, storage, drought resilience and other relevant climate-adaptation challenges.
- Organize innovation dialogues, thematic workshops, and collaborative learning events focused on climate-resilient and locally relevant adaptation technologies.
- Deliver targeted capacity-building programmes for CSOs and community-based organizations on climate adaptation innovation design, concept development, pilot structuring, fundraising, partnership development, and scaling pathways.
- Provide targeted mentoring and tailored support to women-led organizations and women innovators to facilitate their effective participation in the innovation challenge and wider platform activities.
- Design participation arrangements, including event timing, location and appropriate care-support measures where required, so that caregiving responsibilities do not create avoidable barriers to participation.
- Support the development and refinement of early-stage adaptation innovation concepts and locally led climate-resilience initiatives, including those addressing water security and climate vulnerability.
- Launch a small-scale adaptation innovation challenge to identify and showcase promising community-led or CSO-driven climate adaptation concepts relevant to water security and climate resilience.²
- Facilitate networking and collaboration between CSOs, academic institutions, technical experts, municipalities, and private-sector actors to strengthen Armenia's climate adaptation innovation ecosystem.
- Promote participation of women-led organizations, youth innovators, and vulnerable community representatives in adaptation innovation processes and platform activities.
- Document and disseminate lessons learned on enabling locally driven climate adaptation innovation in Armenia.

Output 3.5 complements the project's technology-validation pathway by strengthening the wider national ecosystem required to understand, absorb, complement and continue adaptation innovation. The project's core technology did not arise from an open national scouting call; it originated from a nationally developed proprietary innovation subsequently reviewed through technical, community and civil-society consultations. Output 3.5 adds an open mechanism

² For the implementation of this activity a transparent eligibility, evaluation, selection, and monitoring procedures for the catalytic adaptation innovation support mechanism in line with Adaptation Fund fiduciary and safeguards principles will be developed during the project full proposal formulation stage based on the Sub-Granting Manual developed under the ongoing LLA project of EPIU.

through which additional locally led adaptation ideas can be identified and developed, with priority relevance to water security and other project-related climate-resilience challenges.

The USD 300,000 envelope for Output 3.5 will finance the innovation platform, capacity building and a small catalytic adaptation innovation challenge administered by EPIU with an independent selection mechanism. Because the individual initiatives to be supported will not be identified at project approval, the catalytic financing mechanism will be treated as comprising Unidentified Sub-Projects (USPs) for purposes of Adaptation Fund requirements. During Full Proposal formulation, EPIU will establish the applicable governance arrangements, eligibility and exclusion criteria, fiduciary controls, independent selection procedures, environmental and social screening requirements, gender requirements, grievance arrangements, monitoring and reporting provisions, and a risk-eligibility threshold proportionate to the scale of the mechanism. Candidate initiatives whose environmental or social risks cannot be adequately assessed or managed within the mechanism will be excluded.

B. Describe how the project /programme would promote new and innovative solutions to climate change adaptation, such as new approaches, technologies, and mechanisms.

The proposed project promotes new and innovative solutions to climate change adaptation by introducing an entirely novel approach to addressing evaporation-driven water loss – one of the most climate-sensitive and least managed sources of water scarcity in Armenia and the wider South Caucasus region. While the country has made significant progress in modernizing irrigation systems, improving reservoir operations, and strengthening integrated water resources management, existing strategies treat evaporation as an unavoidable natural loss. No national programme, regional initiative, or donor-funded intervention has tested a technological solution that directly captures and converts evaporated water into a usable, climate-resilient resource. The project therefore fills a strategic innovation gap by piloting a solar-powered evaporation-recovery system at the Marmarik Reservoir that transforms climate-induced hydrological losses into additional freshwater supply.

The innovation rests on a technologically unique mechanism that uses solar energy to heat air, natural traction to drive airflow, and reservoir-cooled condensation to convert water vapor back into liquid form. This represents a fundamentally new adaptation technology for Armenia distinct from fog harvesting, desalination, or traditional atmospheric water harvesting, because it is specifically engineered to operate in reservoir environments where evaporation losses are predictable and concentrated. By testing this system under real climatic and hydrological conditions, the project introduces a new class of climate-resilient water-generation technologies that can offset evaporation intensified by rising temperatures, shrinking snowpack, and prolonged drought.

Technology principle, readiness and concept-stage performance parameters

The integrated reservoir-coupled evaporation-recovery system has not yet been field-tested as an integrated system. This validation gap is the central reason for the proposed pilot. The underlying components and physical processes, however, draw on established principles.

Natural draft. Solar radiation heats air within a duct placed along a natural slope. The warmer, lower-density air rises through buoyancy, creating a natural upward airflow without an external fan. The solar-updraft principle has previously been demonstrated at engineering scale, while the slope-duct configuration builds on earlier Armenian engineering work.

Condensation. Humid intake air is brought into contact with surfaces maintained below the air's dew-point temperature. Cooling is provided through heat exchange with colder deep reservoir water rather than through conventional mechanical refrigeration. The cooling water is circulated through a closed heat-exchange arrangement and returned to the reservoir, while recovered condensate remains physically separate from reservoir water.

Illustrative condensation principle. As a simplified example, air at approximately 30°C and 40% relative humidity carries approximately 10.6 g of water per kg of dry air and has a dew point of approximately 15°C. If this air passes over surfaces maintained at approximately +8°C, the equilibrium moisture content falls to approximately 6.7 g/kg, allowing approximately 4 g/kg of processed air to condense as liquid water. Actual recovery depends on site-specific humidity, airflow, cooling conditions and plant configuration and will therefore be independently validated during formulation and implementation.

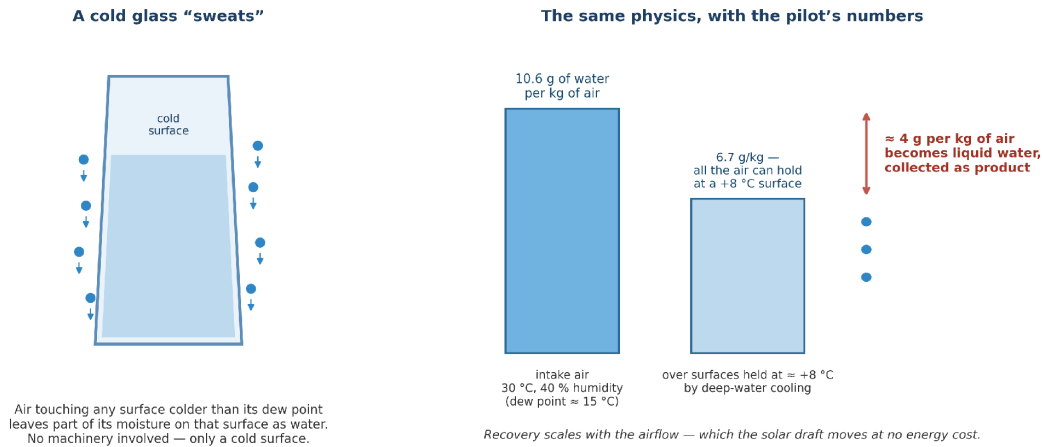
At concept stage, the integrated system is assessed at approximately TRL 3–4, based on analytical and numerical modelling rather than long-duration field operation. Subsystems such as heat exchangers, low-speed turbines and monitoring sensors are mature technologies. The project aims to advance the integrated configuration toward an operationally demonstrated TRL 6–7 through detailed modelling, CFD and other technical validation followed by monitored field operation.

For the preferred Marmarik geometry, preliminary macro-scale parameters are approximately 1.5 km of duct length along the slope and approximately 500 m of elevation gain. Concept-stage modelled reference output is approximately 7,000–9,000 m³/year of freshwater in balanced operating mode, with indicative average summer production of approximately 26–34 tonnes/day and hot-day output of approximately 60–75 tonnes/day. A water-priority configuration incorporating second-stage cooling has been modelled at approximately 12,000–15,000 m³/year. Concept-stage modelling also indicates electricity co-generation of approximately 1.2–1.5 GWh/year for the reference configuration. These figures are model-derived concept-stage estimates rather than guaranteed project outputs; binding site-specific design values will be established through PFG-supported independent validation, detailed design and confirmed site parameters.

Commissioning is targeted for approximately Project Year 2, allowing at least 24 months of monitored operation across two full seasonal cycles. This monitoring period will generate the empirical evidence required on water recovery, energy balance, operational reliability, environmental performance, O&M requirements and cost per cubic metre.

Detailed drawings, bills of materials, control logic, internal geometry and other manufacturing-level information associated with the patent-pending design will be managed as commercially sensitive information. Such information will remain accessible to authorized technical reviewers and the independent PFG validation expert through controlled confidential arrangements. Project-generated performance, cost, environmental, safeguards and adaptation evidence required for public learning and replication decisions will be disclosed as described under the project's knowledge-management arrangements.

Figure 3. Conceptual illustration of dew-point condensation in the proposed system



Technology ownership, licensing and independent oversight

The underlying technology originates from Armenian inventor Vardan Hovakimyan and related earlier patented engineering work. The reservoir-coupled configuration proposed for validation under this project is the subject of Armenian patent applications AM20260091 and AM20260092Y, filed on 10 August 2026. The engineering team associated with development of the reservoir-coupled configuration is affiliated with HOVAK NGO, one of the project Executing Entities.

Because the project is designed specifically to validate this proprietary reservoir-coupled technology, the technology itself is not being selected through a competitive technology-procurement process. No royalty or licence fee for use of the proprietary technology in the pilot's design, construction, operation and monitoring will be charged to the Adaptation Fund grant. All separable non-proprietary goods, works and services will be procured competitively in accordance with the applicable project procurement framework.

Institutional safeguards will separate proprietary technology interests from fiduciary and validation functions. EPIU, which is unaffiliated with HOVAK and the Technology Owner, retains Implementing Entity oversight of project funds, procurement compliance and environmental and social safeguards. The independent technical validation expert engaged during formulation will report directly to EPIU. HOVAK will not participate in selection of sub-projects under Output 3.5 and will not participate in procurement or other decisions where HOVAK or an affiliated person has a financial interest. Declarations of interest and a conflict-of-interest register will be maintained, and procurement decisions undertaken by HOVAK will be subject to EPIU oversight in accordance with the approved project arrangements.

Project-generated information will be governed so that performance, adaptation, cost, environmental and learning evidence needed for public accountability and scaling decisions remains accessible, while manufacturing-level proprietary information is protected.

While the proposed solution represents a novel application in reservoir environments, it builds on established physical and engineering principles of atmospheric water generation, including solar-driven air heating, humidity capture, and condensation through temperature differentials. Similar principles are applied in atmospheric water generators and condensation-based systems, though not yet adapted to large open-water reservoir contexts where evaporation is concentrated.

Preliminary conceptual development by the technology provider suggests that under high solar radiation and evaporation conditions, such as those present in Armenia's reservoir systems, sufficient moisture flux may be available for capture and conversion. The project is therefore designed as a pilot to test technical feasibility, operational performance, and adaptation value under real conditions, rather than assuming proven performance at scale.

During full proposal development, supported by Project Formulation Grant (PFG) resources, the project will further substantiate technical feasibility through detailed modelling of evaporation flux, expected recovery rates, and system performance under site-specific climatic conditions.

The project also introduces innovative operational processes for reservoir management. By integrating evaporation-recovery into water storage operations, the project establishes new procedures for monitoring water balance changes, managing recovered water, and linking technological performance with climate adaptation metrics. These processes do not currently exist within Armenia's water sector and therefore represent a significant operational shift: evaporation, previously treated as an external and unavoidable factor, becomes a manageable parameter within reservoir adaptation planning.

Innovation extends beyond the technology itself. The project creates a system-level adaptation model that connects reservoir-scale innovation with direct community benefits. The water recovered from the pilot system will be delivered to nearby communities through upgraded distribution infrastructure, helping to stabilize irrigation supply, support domestic water needs, reduce groundwater over-extraction, and alleviate climate-induced water insecurity. This approach ensures that the technological pilot produces tangible livelihood resilience outcomes, particularly for vulnerable groups such as smallholder farmers and women in water-scarce rural areas.

At the institutional level, the project introduces new capacities, standards, and decision-making tools needed to incorporate evaporation-recovery solutions into national water sector planning. Technical training, operational protocols, environmental safeguards procedures, and monitoring methodologies will be developed for the first time in Armenia. These new institutional mechanisms will prepare government agencies, basin authorities, reservoir operators, researchers, and local communities to understand, evaluate, and eventually scale such technologies. The project thus strengthens the enabling environment for long-term adoption of innovative adaptation measures.

Beyond the pilot technology itself, the project also seeks to strengthen Armenia's emerging adaptation innovation ecosystem by supporting locally led innovation capacities among civil society organizations, researchers, youth groups, and community actors. Through a collaborative innovation platform and catalytic support mechanism for early-stage adaptation initiatives, the project will encourage experimentation, partnership-building, and locally driven climate resilience solutions that extend beyond the immediate pilot technology.

The project also contributes to innovation through knowledge generation. Because evaporation-recovery technologies have rarely been tested globally, the data collected during the pilot (covering system performance, recovered water volumes, energy requirements, cost profiles, environmental impacts, and social benefits) will constitute a unique evidence base for Armenia and the region. This knowledge will inform national adaptation planning processes, contribute to technical guidelines for future reservoir modernization, and support cross-country learning with neighboring climate-vulnerable countries. The project therefore positions Armenia as a regional leader in testing frontier adaptation technologies and creates opportunities for replication in similar semi-arid, high-evaporation basins across the South Caucasus.

Finally, by documenting the financial and operational viability of the technology, the project creates the first investment case for evaporation-recovery systems in Armenia. This supports the emergence of a new climate adaptation technology market, enabling future public or private investment in scaling the solution to other reservoirs. Through these combined technological, operational, institutional, and knowledge-based innovations, the project introduces a potentially transformative approach to climate-resilient water management that has never before been attempted in Armenia or the surrounding region.

Given the innovative nature of the proposed solution, the project involves several uncertainties that will be explicitly addressed through the pilot design. Key risks include:

- i. technical performance risk, particularly whether sufficient volumes of evaporated water can be captured and condensed under real climatic conditions;
- ii. operational feasibility challenges related to installation, maintenance, and system durability in mountainous reservoir environments; and
- iii. cost-effectiveness uncertainty compared to alternative adaptation measures.

However, it is also worth highlighting that the proposed approach is well aligned with the Adaptation Fund Innovation Facility objective of supporting the testing of innovative adaptation solutions under real-world conditions, particularly where significant uncertainty exists but potential adaptation benefits are high. The project is specifically structured to address these uncertainties through pilot testing, performance monitoring, and evidence generation. During full proposal development, a detailed risk assessment and mitigation framework will be developed using PFG resources.

C. Describe how the project/programme aims to roll out successful innovative adaptation practices, tools, and technologies and/or describe how the project aims to scale up viable innovative adaptation practices, tools, and technologies.

The project aims to roll out successful innovative adaptation practices, tools, and technologies through a deliberate and phased approach that transitions the evaporation-recovery system from a proof-of-concept to an operationally validated and practically useful adaptation measure. The roll-out begins with the installation and commissioning of a pilot system at the Marmarik Reservoir, where it will operate under actual climatic conditions and real reservoir dynamics. This provides a controlled but authentic environment for refining the technology, adapting it to local conditions, and ensuring that its performance is rigorously assessed against baseline evaporation losses, hydrological trends, and community water needs. As the pilot demonstrates operational stability and measurable adaptation benefits, such as increased water availability, improved water balance, and reduced vulnerability to drought, the project will integrate the recovered water into local water distribution systems. In doing so, the initiative ensures that the innovative technology is not only tested but is also functionally embedded into the everyday water-reliance systems of the surrounding communities.

Rolling out the innovation also requires the establishment of new operational practices and institutional competencies. The project will therefore develop a suite of practical tools including operation and maintenance guidelines, reservoir-specific monitoring procedures, safe operating protocols, and environmental safeguard measures that allow reservoir operators, basin authorities, local governments, and water-user associations to participate directly in the management of the new technology. Through hands-on capacity-building programmes, technical training, and experiential learning at the demonstration site, stakeholders will acquire the skills needed to operate the system independently, interpret performance results, troubleshoot issues, and integrate the technology into broader water management routines. These activities ensure that the innovation is not merely demonstrated but is also institutionalized as a viable option within Armenia's climate adaptation toolbox.

Scaling up the innovative evaporation-recovery system is central to the project's long-term vision and is approached through a combination of evidence generation, policy integration, and institutional alignment. The project will produce detailed cost-benefit analyses, efficiency assessments, environmental impact evaluations, and lifecycle cost profiles that allow national decision-makers to compare this technology with alternative adaptation measures such as new reservoir construction, irrigation modernization, or groundwater recharge programmes. By generating scientifically validated data on the feasibility, affordability, and adaptation effectiveness of the pilot system, the project creates a strong empirical foundation for informed investment planning and policy prioritization.

The project further supports scaling by establishing a reservoir-selection framework that identifies the conditions under which evaporation-recovery systems are most effective considering factors such as reservoir size, altitude, climate, energy availability, community water demand, and ecological sensitivity. This framework will guide the Water Committee, Basin Authorities, and the Ministry of Environment in determining where replication is technically sound, economically

justified, and socially beneficial. The project's knowledge products, including technical manuals, engineering templates, monitoring methodologies, and safeguards procedures, will be designed to be easily transferable to other reservoir sites, reducing future transaction costs and accelerating uptake.

A central mechanism for scaling is the project's close alignment with national adaptation policies, water-sector strategies, and basin management planning processes. By engaging policymakers throughout implementation and sharing emerging results in real time, the project ensures that evaporation-recovery technology is considered in revisions to reservoir operation manuals, climate adaptation plans, and long-term water security strategies. In addition, the project will engage with scientific and academic institutions, fostering a national research base capable of refining and advancing the technology, supporting future innovation cycles, and ensuring that Armenia develops domestic expertise rather than relying solely on external technical inputs.

The project also recognizes the importance of regional replication. Many reservoirs across the South Caucasus and neighbouring semi-arid regions face similar climate-induced evaporation losses under rising temperatures. Through targeted dissemination of lessons learned, regional workshops, technical exchanges, and cooperation with water management authorities in Georgia, Türkiye, and Iran, the project will position Armenia as a regional leader in testing and adapting evaporation-recovery solutions. By demonstrating viability in one reservoir and documenting clear criteria for broader application, the project establishes a potentially scalable model that can be replicated across multiple basins domestically and shared internationally through the Adaptation Fund's innovation and learning platforms.

The project also recognizes that long-term scaling of climate adaptation innovation depends not only on technical validation, but also on stronger local innovation ecosystems capable of generating, testing, and refining adaptation responses. Through the adaptation innovation platform and catalytic support mechanism, the project will help strengthen national capacities for locally led climate adaptation innovation and encourage continued experimentation with climate resilience solutions relevant to Armenia's evolving climate risks.

In sum, the project approaches roll-out and scale-up not as one-time activities but as a continuous process of testing, institutional learning, community integration, and policy embedding, ensuring that the evaporation-recovery system evolves from a pilot technology into a replicable, investment-ready, and nationally relevant climate adaptation solution.

Table 5. Project's preliminary alignment with the AF Revised Results Framework

Project Objective(s)	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator
The overall goal of the project is to enhance Armenia's climate resilience and water security by piloting, validating, and enabling the	Number of direct beneficiaries with improved water security (sex-disaggregated)	2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	Indicator 2: Institutions with strengthened capacity to understand and better address climate risks and resilience [1 sector services – water services impacting 2,000–3,500 valley residents]

uptake of an innovative evaporation-recovery solution that reduces climate-induced water losses from reservoirs, strengthens adaptive capacity of vulnerable communities, and establishes scalable, evidence-based pathways for climate-resilient water management under increasing temperature and drought conditions.	Number of direct beneficiaries with improved water security (sex-disaggregated)	3: Strengthened awareness and ownership of adaptation and climate risk reduction processes	Indicator 3.2: People implementing new or improved adaptation actions [Approx. 2,000–3,500 valley residents, subject to PFG validation; ≥50% women; indirect beneficiaries include basin-level institutional and knowledge users]
	Volume of additional climate-resilient water made available annually through pilot and associated systems (m³/year)	4: Increased adaptive capacity within relevant development sector services and infrastructure assets	Core Indicator 4: Physical assets improved or constructed to withstand climate variability and change [irrigation systems disaggregated by km of linear infrastructure]
	Volume of additional climate-resilient water made available annually through pilot and associated systems (m³/year)	6: Diversified and strengthened livelihoods and sources of income for	Core Indicator 6.2: Households with increased income, or avoided decrease in income [# of households, disaggregated by # of female headed households]
	Volume of additional climate-resilient water made available annually through pilot and associated systems (m³/year)	7: Improved policies and regulations that promote and enforce resilience measures	Indicator 7: Policies, strategies, and/or plans adopted, implemented, and/or enforced that integrate climate risk and resilience considerations [≥2 disaggregated by scale and by policy step, i.e., developed, adopted, implemented, enforced]
	Volume of additional climate-resilient water made available annually through pilot and associated systems (m³/year)	8: Innovation for effective, long-term adaptation to climate change accelerated, encouraged, and enabled to scale up	Indicator 8.1: Innovations successfully reaching scale up that demonstrate local innovation participation and/or local innovation benefit [1 innovation]
	Volume of additional climate-resilient water made available annually through pilot and associated systems (m³/year)		Indicator 8.2: Institutions created and/or enabled that lead on innovation for adaptation to climate change [# of institutions, disaggregated by scale]

Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator
<u>Outcome 1: A validated and operational evaporation-recovery pilot system installed at Marmarik Reservoir that increases effective water availability and demonstrated a scalable climate adaptation solution for reservoir systems.</u>	Annual volume of water recovered (m ³ /year) Pilot commissioned and functional	Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets	Indicator 4.1.1: Development sector services strengthened to respond to climate variability and change [1 sector services – water services impacting 2,000–3,500 valley residents]
	Pilot commissioned and functional	Outcome 8: Innovation for effective, long-term adaptation to climate change accelerated, encouraged, and enabled to scale up	Indicator 8.1.2: Innovations piloted that demonstrate local innovation participation and/or local innovation benefit [1 evaporation-recovery technology pilot with community co-design]
<u>Outcome 2: Adjacent communities have improved, reliable, and climate-resilient access to recovered water, reducing vulnerability to drought, seasonal shortages, and unsustainable groundwater dependence.</u>	Improved reliability of supply	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	Indicator 2.1.1: Institutions supported to strengthen capacity to understand and address climate risks and resilience [# of water sector institutions, disaggregated by scale and sector]
	Number of beneficiaries with improved water access Reduction in seasonal shortages Improved reliability of supply	Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets	Indicator 4: Physical assets improved or constructed to withstand climate variability and change [irrigation systems disaggregated by km of linear infrastructure]
	Number of beneficiaries with improved water access Reduction in seasonal shortages Improved reliability of supply	Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	Indicator 6.1.1: People receiving targeted support for new and/or improved livelihoods to manage climate risk [Approx. 2,000–3,500 valley residents, subject to PFG validation; ≥50% women; indirect beneficiaries include basin-level institutional and knowledge users]
<u>Outcome 3: Evidence, tools,</u>	Number of knowledge products produced	Outcome 3: Strengthened	Indicator 3.2.1: Climate resilience knowledge

<u>and institutional mechanisms established for national scaling and regional replication of evaporation-recovery technologies as a climate adaptation measure.</u>		awareness and ownership of adaptation and climate risk reduction processes	products and/or tools developed and shared with stakeholders [≥6 of products/tools]
	Institutions engaged in replication pathway		Indicator 3.3.1: Number of local institutions and/or communities responsible for decision-making over how adaptation solutions are defined, prioritized, designed, and/or implemented [# of local institutions and/or communities]
	Scaling roadmap developed	Outcome 7: Improved policies and regulations that promote and enforce resilience measures	Indicator 7.1.1: Policies, strategies, and/or plans developed or adjusted to integrate climate risk considerations [≥2 of policies, strategies, and/or plans, disaggregated by scale]
	Number of knowledge products produced Institutions engaged in replication pathway	Outcome 8: Innovation for effective, long-term adaptation to climate change accelerated, encouraged, and enabled to scale up	Indicator 8.1.1: Innovations identified/supported with local participation and/or benefit [≥10 early-stage initiatives; ≥30% women-led] Indicator 8. 2.1: Innovation-focused knowledge products disseminated and/or learning events facilitated that support and enable innovation capacity at a local, national, and/or regional level [≥10 knowledge products disseminated and/or learning events facilitated)

All applicable people-based indicators will be sex-disaggregated. Baselines and final numeric targets that depend on the final service-area configuration will be validated during project formulation.

D. Describe how the project / programme would provide 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 / programme would avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.

The project will generate substantial economic, social, and environmental benefits by directly addressing climate-induced water scarcity and its disproportionate impacts on vulnerable communities. By recovering water lost through evaporation – a loss that disproportionately affects rural livelihoods and contributes to declining agricultural productivity – the project increases the effective volume of water available for domestic use, irrigation, and ecosystem support. This improvement in water security is particularly important for households whose income depends on climate-sensitive agriculture and livestock production. Enhanced reliability of water during critical growing periods strengthens local economies by stabilizing crop yields, reducing the financial risks associated with seasonal drought, and lowering the burden on households that currently depend on costly coping strategies such as private water delivery or deep-well pumping. The availability of an additional, climate-resilient water source also reduces pressure on overexploited groundwater aquifers, thereby decreasing energy costs associated with pumping and preventing long-term economic losses linked to aquifer depletion and land degradation.

The project also provides significant social benefits by targeting water-stressed communities whose vulnerabilities are intensified by climate change. Rural households, especially those located near the Marmarik Reservoir, face recurring water shortages that undermine health, hygiene, and livelihood stability. By channeling recovered water to these communities through improved distribution infrastructure, the project directly improves access to a reliable and climate-resilient water supply. This reduces the time and labor burden associated with securing water during dry periods, a burden that often falls disproportionately on women and girls. Improved water availability strengthens household resilience, reduces stress and social tension around water access, and provides a more secure foundation for community well-being.

Gender, vulnerable groups and distribution of project benefits

The project recognizes that climate-related water insecurity does not affect all community members in the same way. Rural women frequently combine responsibility for household water management with roles in subsistence and commercial agriculture and family livelihoods. More limited access to land ownership, irrigation infrastructure, agricultural services, finance and formal water-governance structures can constrain women's adaptive capacity. Water interruptions can also increase unpaid household labour and hygiene-related burdens. Seasonal male labour migration may leave women with greater de facto responsibility for household and agricultural decision-making, while young people face reduced livelihood prospects where water insecurity undermines local agriculture and associated economic activity.

The potential beneficiary area includes Artavaz, Hankavan, Meghradzor and Aghavnadzor, together with downstream users within the wider Marmarik reservoir service area to be identified through Output 2.1. Potential benefits include supplementary domestic and livestock water, supplementary irrigation support, electricity for water-service pumping where technically feasible, local employment during construction and operation, training, and participation in water-management and innovation processes. On the basis of the current modelled balanced-mode water yield, the recovered water volume is approximately equivalent to the daily drinking-water requirement of around 160–350 persons at an indicative consumption range of 70–150 litres/person/day. This comparison illustrates the scale of potential production; it does not predetermine how the recovered water will ultimately be allocated among domestic, livestock, irrigation and storage uses.

Final beneficiary numbers and infrastructure coverage will be determined during project formulation and Output 2.1 through updated demographic data, climate-vulnerability mapping, service-area analysis and detailed infrastructure planning. For initial results-framework purposes, the project uses a preliminary estimate of approximately 2,000–3,500 direct beneficiaries, expected to comprise at least 50% women, subject to validation during the PFG stage.

Allocation and access criteria developed under Output 2.1 will be participatory, transparent and publicly communicated and will include measures to prevent elite capture. The vulnerability assessment will identify women-headed households, low-income households, persons with disabilities, elderly single-person households, underserved settlements and other relevant groups. Where social-protection data are used, access and processing will be subject to applicable legal and consent requirements. Vulnerable households will receive appropriate weighting in benefit-allocation decisions, and any project-specific co-contribution arrangements will not create barriers for ultra-poor households.

No groups meeting the Adaptation Fund Environmental and Social Policy criteria for Indigenous Peoples have been identified in the proposed project area at concept stage. This preliminary screening conclusion will be verified through the PFG-supported social assessment. If national-minority households or other groups requiring culturally appropriate engagement are identified within the final service area, suitable engagement measures will be incorporated into the Stakeholder Engagement Plan and relevant safeguards instruments.

The project's preliminary gender-responsive commitments include: at least 40% women among training participants; at least 30% women-led awards under Output 3.5; at least 30% women on the innovation platform's governance/steering body; at least 25% youth participation in platform activities; and sex-disaggregation of all applicable people-based indicators. Specific targets for women's participation in project-supported employment, technical roles and internships will be established through the Gender Action Plan following the PFG gender and labour-market assessment.

Under Output 3.5, the project will establish a women-innovators track within the adaptation innovation challenge, facilitate mentoring by experienced professionals, work with women-led CSOs, design event times and formats to reduce participation barriers associated with caregiving responsibilities, and track participation, applications and awards by sex. The detailed Gender Assessment and Gender Action Plan to be prepared during formulation will validate and refine these measures.

At basin level, more than 2,100 ha of irrigated land are reported idle because of insufficient water and conveyance losses exceed 50% in parts of the Hrazdan basin district. These figures demonstrate the wider economic context of water stress and are not presented as the area expected to be restored or served directly by the pilot. Pilot-level livelihood benefits will instead be quantified against the actual volume and allocation of recovered water. The PFG-supported cost-benefit analysis will assess the value of production protected per cubic metre during deficit periods, avoided pumping and emergency-water-delivery costs, and the economic value of co-generated electricity used for water-service functions.

Environmental dimensions

Environmentally, the project supports ecosystem stability by alleviating pressures caused by declining surface water storage, reducing the need to increase withdrawals from sensitive rivers, and mitigating degradation of groundwater resources. Increasing effective reservoir storage through evaporation recovery also helps maintain ecological flows and supports biodiversity in the reservoir catchment. The innovative technology operates using renewable solar energy and natural airflow, minimizing greenhouse gas emissions and avoiding the environmental burdens associated with energy-intensive desalination or mechanical pumping. The project further contributes to environmental stewardship by introducing systematic hydrological and ecological monitoring to detect changes in water quality, reservoir temperature, or habitat conditions that may arise during operation.

In compliance with the Adaptation Fund's Environmental and Social Policy and Gender Policy, the project incorporates robust measures to avoid, minimize, or mitigate any potential negative impacts. A detailed Environmental and Social Management Plan (ESMP) will guide all stages of design, construction, and operation. Construction works will be limited to designated locations to avoid habitat disturbance, and mitigation measures will address noise, dust, soil disturbance, and waste management. Reservoir ecosystems will be safeguarded through baseline assessments, continuous monitoring, and operational protocols calibrated to avoid altering water levels, ecological flows, or sediment patterns. Occupational health and safety measures will protect workers during installation, and community safety will be ensured through controlled access to construction sites and clear communication of risks. The project explicitly avoids land acquisition, physical displacement, or restrictions on land use. Social risks, including unequal access to project benefits, will be mitigated through inclusive consultation processes, transparent eligibility criteria for community-level water allocation, and gender-responsive engagement strategies.

Through these combined economic, social, and environmental benefits, grounded in rigorous risk management and equitable participation, the project strengthens resilience for those most vulnerable to climate change while ensuring that the innovation is deployed responsibly and in full alignment with the safeguards and gender requirements of the Adaptation Fund.

E. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme and explain how the regional approach would support cost-effectiveness.

The cost-effectiveness of the proposed solution will be assessed through the pilot implementation, which is designed to generate empirical data on capital and operational costs, water recovery volumes, and cost per cubic meter of recovered water. At the concept stage, the project is positioned as an innovation pilot aimed at determining whether evaporation-recovery systems can provide a cost-competitive complement to existing adaptation measures such as reservoir expansion, irrigation efficiency improvements, or groundwater abstraction.

Table 6. Concept-stage comparison of REWater with alternative water-security responses

Option	New water?	Energy	Footprint	Indicative cost	Key limitation
New reservoir	No — stores runoff that is itself declining (~39 %)	Low	Major (inundation)	High capex, multi-year build	Depends on shrinking inflow
Canal lining / efficiency	No (saves losses)	Low	Minor	Moderate	Already funded by others; does not touch open-water evaporation
More groundwater	No (mines storage)	High (pumping)	Minor	Rising with drawdown	Aquifers already over-drafted
Tanker delivery	No	High (fuel)	None	~US\$3–8 /m ³	Crisis response, not adaptation
Mechanical AWG	Yes	Very high (0.3–0.8 kWh/L)	Minor	~US\$50–300 /m ³	Energy cost prohibitive
Surface covers / monolayers	No (suppresses 10–90 % on small ponds)	Low	Entire surface	Scale-dependent	Impractical, ecologically problematic beyond

Option	New water?	Energy	Footprint	Indicative cost	Key limitation
					tens of ha; recovers nothing
Floating PV	No (partial suppression)	Generates	Water surface	Moderate	No recovery; ice and waves at 1,900 m
REWater (this pilot)	Yes — turns a growing loss into supply	Self-supplied; co-generates	Slope corridor on state land; minimal footprint, no private land acquisition expected	The pilot's research question; target below tanker/AWG	Unproven at field scale — hence the pilot

The comparison is intended to position the pilot's research question rather than to demonstrate ex ante superiority. Cost-effectiveness is a principal hypothesis to be tested by the project. The proposed system occupies a potentially distinct adaptation niche because it seeks to recover an increasing consumptive loss while supplying its own operating energy and co-generating electricity. Its principal unresolved question is the lifecycle cost per cubic metre at field scale, which the proposed pilot is designed to establish.

Nevertheless, it should be highlighted that the proposed project will potentially demonstrate cost-effectiveness because it targets one of the most significant yet under-addressed drivers of climate-induced water loss – evaporation from open reservoirs, through a low-energy, solar-driven technology that increases effective water storage without the financial, social, or environmental costs associated with constructing new infrastructure. Traditional strategies for expanding water availability, such as building additional reservoirs, rehabilitating aging dams, or expanding groundwater abstraction, require substantial capital investment, involve long construction timelines, and often carry significant environmental and social risks, including land acquisition, resettlement, and alteration of natural river regimes. In contrast, the pilot evaporation-recovery system offers a comparatively low-cost alternative that enhances storage capacity using existing infrastructure, requires minimal land footprint, and operates using renewable energy. Because the integrated technology has not yet been demonstrated at field scale, its cost per cubic metre cannot be established credibly at concept stage. The project will therefore measure rather than assume its cost-effectiveness and will compare the resulting lifecycle cost and adaptation benefits with relevant alternative measures.

A first-of-a-kind validation plant should not be assessed solely as a conventional water-supply investment. Of the USD 4.46 million requested, USD 2.0 million is allocated directly to installation under Output 1.2, while the remainder supports engineering validation, safeguards, community infrastructure, monitoring and evidence generation, institutional learning and the wider adaptation innovation ecosystem. The project therefore finances the validated evidence base and cost curve required to determine whether later replication is justified. First-of-a-kind pilot unit costs should not be treated as replication costs; establishing realistic replication economics is one of the project's principal outputs.

The project's cost-effectiveness is strengthened through its phased, evidence-based design. Rather than investing prematurely in large-scale deployment, the project begins with a targeted pilot at the Marmarik Reservoir to validate performance, assess adaptation benefits, and determine operational costs under real climatic conditions. This staged approach avoids capital-intensive mistakes, provides accurate cost–benefit data for planners, and ensures that subsequent investments are guided by proven results. The pilot will also quantify the cost of recovered water relative to alternatives such as groundwater pumping, tanker delivery, or construction of new storage - options that are increasingly expensive under worsening drought

conditions. By focusing resources on a single demonstration site while simultaneously building institutional capacity and developing technical guidelines for replication, the project maximizes the return on investment and ensures that each dollar spent contributes simultaneously to innovation, resilience, and future upscaling.

The adaptation innovation platform and catalytic support mechanism further enhance cost-effectiveness by supporting broader adaptation experimentation and knowledge diffusion beyond the immediate pilot site. By enabling early-stage locally led adaptation concepts and facilitating collaborative learning, the project increases the long-term value and replication potential of the initial investment.

Additional cost savings arise from the project's integration of community-level water distribution upgrades with the technological pilot. Rather than pursuing parallel investments, the project coordinates the installation of pipelines or delivery systems with the testing of the evaporation-recovery technology, ensuring that recovered water can be immediately utilized for livelihood support. This integrated design reduces duplication of infrastructure, lowers operational costs for municipalities, and increases the marginal resilience benefit per unit of investment. Strengthening local capacity for operation and maintenance further reduces long-term costs by minimizing dependence on external technical support.

The project also reduces long-term economic losses associated with groundwater over-extraction, crop failure due to water shortages, and reduced hydropower generation under declining inflows. By increasing the reliability of water supply during critical months, the project helps stabilize agricultural yields, protect household incomes, and maintain flow consistency for downstream hydropower operations. These avoided losses represent significant cost savings at the national level and constitute an important dimension of the project's economic justification.

A regional perspective further enhances cost-effectiveness by creating opportunities for knowledge exchange, avoiding duplication of research, and leveraging economies of scale for future deployment. Evaporation-driven water scarcity is a shared climate vulnerability across the South Caucasus and neighboring semi-arid regions. By generating the first comprehensive dataset on reservoir-based evaporation recovery in this geographic context, Armenia produces a public good that benefits other countries facing similar hydrological and climatic challenges. The project's knowledge products (technical guidelines, cost curves, selection criteria, and environmental protocols) can be used by regional partners without requiring them to independently finance early-stage research or pilot testing. This shared learning reduces regional transaction costs and positions Armenia as an innovation hub in climate-resilient water management.

Furthermore, regional dissemination of results increases the likelihood of achieving scale, which is central to cost-effectiveness in infrastructure and technology solutions. Broader adoption of evaporation-recovery systems across multiple reservoirs within Armenia or the region would reduce unit costs through economies of scale in manufacturing, procurement, and technical training. The project's engagement with regional platforms and adaptation networks ensures that these scaling pathways remain open and that the initial investment produces benefits extending far beyond the pilot site.

In summary, the project provides a potentially cost-effective adaptation solution because it leverages existing reservoir infrastructure, minimizes capital and operating costs through renewable energy use, generates evidence before large-scale investment, integrates community water systems to maximize resilience benefits, and creates regional knowledge that reduces future costs for Armenia and its neighbors. This combination of strategic piloting, efficient

resource use, and regional learning makes the proposed intervention a low-regret, high-return investment in climate-resilient water security.

During full proposal development, detailed cost-benefit analysis will be conducted using PFG resources, including comparison with alternative adaptation options and estimation of cost-effectiveness under different scaling scenarios.

F. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist. If applicable, please refer to relevant regional plans and strategies where they exist.

Armenia is a semi-arid, water-stressed country where seasonal variability, shrinking snowpack, increased evaporation, and a rising incidence of drought undermine dependable surface and groundwater supplies. National assessments, sector diagnostics, and climate policy documents consistently classify water resources as one of Armenia's most climate-vulnerable sectors and emphasize the need for strengthened storage, modernized infrastructure, and new adaptive approaches to secure water availability for agriculture, municipal supply, and ecosystems. The proposed project is fully consistent with these priorities by directly addressing evaporation loss – a climate-exacerbated challenge identified in multiple national planning instruments but not yet targeted with technological solutions.

The Government of Armenia places modernization of reservoir infrastructure and integrated water resources management at the center of its long-term water security strategy. The Water Code, the National Water Policy, and successive government programmes highlight the need to improve reservoir operation, enhance multi-year storage, and adapt existing infrastructure to projected hydrological changes. By piloting a technology that captures vapor loss from open reservoirs and returns it to usable storage, the project aligns with national objectives to increase effective water availability without the social, environmental, and land-use impacts associated with constructing new reservoirs. It therefore complements ongoing investments in irrigation rehabilitation, reservoir safety, hydrometeorological modernization, and basin management planning.

At the climate policy level, the project directly supports Armenia's Nationally Determined Contribution (NDC) and National Adaptation Plan (NAP) both of which prioritize resilience in the water sector and call for the testing and deployment of innovative adaptation technologies. The NAP emphasizes improving water security through nature-based and engineered solutions, piloting new approaches, and strengthening evidence-based decision-making. The project provides a concrete mechanism for fulfilling these commitments by generating operational data, assessing climate benefits, and developing a replicable model for integrating innovative water recovery technologies into national adaptation planning. The ongoing NAP support programme and associated water-sector working groups offer an institutional pathway for validating results, integrating lessons into sectoral plans, and advancing national investment pipelines for scale-up.

At the sub-national level, water scarcity is a defining constraint in several basins, including Akhuryan, Sevan-Hrazdan, and Ararat, where regional development plans identify water reliability as a prerequisite for agricultural productivity, rural livelihoods, and municipal services. The Marmarik Reservoir serves communities that experience chronic seasonal shortages and depend heavily on climate-sensitive agricultural production. The project therefore aligns with basin-level management plans and local development strategies that prioritize improved storage, reduced groundwater abstraction, and climate-resilient water supply systems. By piloting an

approach that increases stored water without expanding physical footprints, the project provides a practical tool for regional authorities seeking low-regret adaptation options compatible with local environmental and social constraints.

The project is also consistent with Armenia's commitments articulated in the Third National Communication to the UNFCCC, the Biennial Update Reports, and the National Strategy for Disaster Risk Reduction, all of which highlight the need for adaptive water management, improved hydrometeorological information, and innovative technological solutions to address climate-related water deficits. These national instruments point to the importance of strengthening resilience to hydrometeorological extremes, reducing reliance on over-extracted groundwater, building climate-smart infrastructure, and integrating scientific monitoring into environmental governance, all of which are core pillars of this project.

At the regional level, the project aligns with the broader water-security priorities articulated in South Caucasus sub-regional assessments and Armenia's cooperation frameworks with neighboring countries. Rising temperatures, declining snowpack, and increased evaporation affect reservoirs across the Caucasus and north-eastern Turkey and Iran. By testing a solution that addresses a shared climate vulnerability, Armenia contributes to regional adaptation knowledge and offers a potential model for replication in similar semi-arid, high-elevation environments. The project's learning and knowledge-sharing components support regional objectives under frameworks such as the Eastern Partnership climate programmes, UNECE water cooperation mechanisms, and regional adaptation platforms that emphasize innovation and transboundary learning.

By generating rigorous performance, cost, and environmental data, the project strengthens the evidence base required for national planners to compare evaporation-recovery systems with other adaptation measures and for sub-national authorities to integrate proven approaches into water-user association practices, reservoir operations, and local development planning. In doing so, the project advances broader sustainable development goals by contributing to food security, rural incomes, ecosystem stability, and energy-efficient water management. It represents a low-regret, potentially scalable, and policy-aligned adaptation pathway that supports Armenia's long-term strategy for climate-resilient water governance.

Table 7. Alignment with relevant national policies, strategies and planning instruments

Policy / strategy / instrument (period / version)	Relevant objective or priority	Specific REWater alignment
Water Code (2002, as amended)	Framework for use and protection of water resources	Efficient-use and reservoir-management provisions; the pilot operates under its permitting.
Law on Fundamental Provisions of the National Water Policy (2005)	Long-term water-security principles	The priority of increasing effective water availability.
Law on the National Water Programme (2006)	Implementation of the water policy	Storage-efficiency and modern-technology measures.

Policy / strategy / instrument (period / version)	Relevant objective or priority	Specific REWater alignment
NDC 2021–2030 (2021)	Paris Agreement commitments	The water-sector adaptation priority; renewable co-generation adds mitigation co-benefits.
National Adaptation Plan (2021)	Cross-sector adaptation framework	NAP water-sector actions on piloting engineered solutions and evidence-based decisions; results feed the NAP water working group.
Fourth National Communication (2020)	National climate assessment	Identification of evaporation growth and –39 % flow decline as core risks.
National DRR Strategy	Disaster and climate-extreme risk reduction	Drought-risk buffering through supply and improved reservoir management.
Hrazdan River Basin Management Plan	Basin-level integrated management	Basin measures on storage efficiency and monitoring; Marmarik lies in this district.
Government Programme 2021–2026	National priorities incl. reservoir expansion	The storage agenda: recovery raises the effective yield of existing and planned reservoirs.
Armenia Transformation Strategy 2050	Long-term vision	Technology-driven development and environmental sustainability pillars.
TNA (2015) and TAP	Prioritized climate technologies	Identifies water scarcity and water-efficiency technologies as adaptation priorities and identifies rising evaporation as part of the water-sector vulnerability context, but evaporation-recovery technology was not among the prioritized technology options. REWater is therefore complementary to, rather than a direct implementation of, the existing TNA/TAP technology priorities. Validated pilot evidence will be made available to inform future TNA/TAP updates.

G. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

The project fully aligns with and will be implemented in accordance with Armenia’s relevant national technical standards, environmental assessment requirements, construction norms, and safety regulations. As an infrastructure intervention situated within an existing reservoir footprint, the project triggers several national procedures governing the design, installation, and operation of water-sector and energy-related systems. The engineering design of the evaporation-recovery pilot will comply with national construction codes, including structural standards for metal

installations, corrosion protection requirements, seismic resilience considerations, and technical specifications for small-scale energy and hydraulic systems. All civil works and installation activities will follow Armenia’s building regulations, occupational health and safety rules, and reservoir-zone permitting procedures to ensure that the pilot infrastructure meets established technical and operational safety thresholds.

In addition, the project will comply with Armenia’s environmental assessment framework. Prior to installation, the intervention will undergo environmental and social screening consistent with national environmental impact assessment (EIA) requirements, with particular attention to reservoir ecosystems, water quality, biodiversity, and potential impacts on land use or community access. Where required, the project will submit technical documentation to the Ministry of Environment or relevant Basin Management Authority for review and approval. All monitoring activities, including hydrological and water quality measurements, will adhere to national standards for data collection and laboratory analysis, ensuring that project findings are compatible with ongoing national monitoring programmes.

The project also conforms fully to the Adaptation Fund’s Environmental and Social Policy. A detailed Environmental and Social Management Plan will guide project implementation, establishing procedures to identify, avoid, and mitigate any potential adverse impacts. Construction-phase risks such as noise, dust, localized disturbance, and worker safety will be managed through standard mitigation measures embedded in contractor obligations and supervised by the implementing entity. The project has been designed to avoid land acquisition, physical displacement, or restrictions on resource access. Community-level infrastructure improvements, such as pipelines or delivery points, will be constructed within existing rights-of-way or publicly managed land to prevent both land-use conflicts and social disruption.

The pilot technology itself is low-risk in terms of environmental and social impact because it relies on solar heating and natural airflow rather than chemical processes or high-energy mechanical systems. Nevertheless, the ESMP will incorporate monitoring requirements to ensure that the installation does not alter reservoir water levels, degrade water quality, disrupt aquatic habitats, or cause unintended ecological effects. Social risks, such as inequitable access to benefits or exclusion of vulnerable groups, will be proactively addressed through participatory consultations, transparent allocation mechanisms for recovered water, and gender-responsive engagement strategies. These measures are fully aligned with the Adaptation Fund’s Gender Policy and ensure that women and vulnerable households meaningfully participate in planning, training, and benefit-sharing.

Compliance with labor, health, and safety standards will be embedded throughout project implementation, with contractors required to follow national occupational safety norms and provide protective equipment, safe working conditions, and appropriate training. The implementing entity will maintain robust oversight of safeguards compliance, ensuring that monitoring and reporting obligations are met and that any grievances arising during implementation are addressed through accessible, culturally appropriate grievance redress procedures.

Through adherence to Armenia’s technical standards, integration of national regulatory procedures, and strict alignment with the Adaptation Fund’s Environmental and Social Policy and Gender Policy, the project ensures that the innovation is piloted in a safe, responsible, and compliant manner, minimizing risks while maximizing resilience benefits for communities and ecosystems.

Table 8. Preliminary national technical and regulatory compliance matrix

Standard / regulation	Objective	Project relation & status	Steps & authority
Law on EIA and Expertise (2014)	Environmental screening/expertise	Reservoir-zone infrastructure → screening at design stage (Output 1.1)	Determination and, if required, state expertise — Ministry of Environment
Water Code permitting	Water withdrawal/return	Cooling circuit borrows and returns reservoir water → water-use permit before construction	Water Resources Management Authority / Water Committee
Construction norms, incl. seismic code	Structural safety	All slope works and steel structures → embedded in detailed design	State expertise of design; construction permit — Urban Development Committee / municipality
Hydraulic structures safety law	Dam and reservoir-zone safety	Works in the protective zone → design-stage coordination	Dam-safety authority; reservoir operator
Drinking-water sanitary rules	Potable safety	Condensate for domestic use → conditioning (remineralization, disinfection) and certification	Health and Labour Inspection Body
Irrigation/livestock water norms	Water quality for agriculture	Conformity testing under Output 1.3	Food Safety Inspection Body
Electrical installation rules	Electrical safety	Turbines, battery bank, SCADA; self-consumption first	Certified design; PSRC only if grid export pursued later
Labour Code and OHS rules	Worker protection	Contractor OHS plans mandatory (ESMP)	Health and Labour Inspection Body
Land Code; water-protection zones	Shoreline protection	State-land works, no acquisition → allocation consents at design stage	Marz administration / municipality; MoE zone requirements

The detailed design and permitting package prepared under PFG will verify the precise legal and technical instruments applicable to the final site and configuration and will incorporate the relevant requirements into engineering specifications, procurement documents, contractor obligations, water-quality protocols and the ESMP. Construction will not proceed before the required environmental, water-use, land-use, structural and other applicable approvals have been obtained.

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

A review of major national and donor-financed water-sector initiatives was undertaken to identify potential overlap, relevant lessons and opportunities for complementarity. The analysis shows that existing initiatives address important water-security pathways but do not pilot reservoir-based evaporation recovery or the proposed reservoir-coupled atmospheric-moisture technology.

Table 9. Related initiatives

Project title	Donor	Implementing entity	Timeline ; location	Main interventions	Target population	Lessons used	Overlap / synergy — why no duplication
Irrigation Systems Enhancement Project (+ Additional Financing)	World Bank	Water Committee (Water Sector Projects Implementation Unit)	2013–2019+; national	Canal rehabilitation, conveyance efficiency, WUA strengthening	Irrigation users and water-user associations nationwide	Efficiency gains do not touch open-water losses; WUA engagement model reused	Conveyance losses vs evaporation — different pathways; complementary
ASPIRED (Advanced Science & Partnerships for Integrated Resource Development)	USAID	ME&A (implementing partner)	2015–2021; Ararat Valley	Groundwater management, aquifer monitoring, energy-efficient pumping	Ararat Valley farming communities and groundwater users	Aquifer over-draft confirms the need for new, non-groundwater supplies	Groundwater focus; REWater relieves aquifer pressure — no overlap
Vedi Reservoir construction	AFD / Government of Armenia	Water Committee (MTAI)	~2017–mid-2020s; Ararat marz	New 29 million m ³ reservoir and irrigation scheme	Irrigation users of Ararat / Vayots Dzor	New storage is costly and slow; effective yield remains exposed to evaporation	New storage vs loss recovery ; different basin — complementary
Kaps Reservoir completion	KfW / Government of Armenia	Water Committee	ongoing; Shirak marz	Completion of reservoir works	Shirak irrigation users	Same as above	Same complementarity; different basin

Project title	Donor	Implementing entity	Timeline ; location	Main interventions	Target population	Lessons used	Overlap / synergy — why no duplication
EUWI+ / EU4Environment (water component)	European Union	UNECE and OECD with MoE	2016–2021; national	River basin management plans (incl. Hrazdan RBMP), monitoring capacity	Basin institutions and water administrators	Basin data used in this Concept Note	Planning support, no infrastructure; pilot results feed RBMP updates
NAP Support Project	GCF	UNDP with MoE	2020; national	NAP process, water-sector adaptation planning	National institutions	Institutional pathway for scaling validated options	Planning instrument; consumes the evidence this pilot produces
Locally Led Adaptation (LLA) project	Adaptation Fund	EPIU	ongoing; national	LLA small grants; Sub-Granting Manual	Local communities and CSOs	Sub-granting procedures reused for Output 3.5	General LLA grants vs a technology pilot; financial separation ensured

No identified initiative in Armenia currently pilots or finances evaporation recovery or reservoir-based atmospheric-moisture recovery. Where procedures, institutional arrangements or knowledge from another project are reused—for example EPIU's Sub-Granting Manual under the Locally Led Adaptation project—financial accounting, award decisions and project reporting will remain separate.

I. Describe the learning and knowledge management component to capture and disseminate lessons learned.

The proposed intervention introduces an entirely new approach to reservoir water recovery in Armenia; therefore, learning and knowledge management form a core strategic pillar of the project rather than an auxiliary activity. As a pilot initiative, the project is designed not only to test the technical feasibility and operational performance of the evaporation-recovery method, but

also to generate a rigorous evidence base that can inform national water resource planning, reservoir management, climate adaptation policy, and future investment decisions. The project will establish a structured, purposeful learning framework that captures insights at every stage – from initial design and installation to long-term operation and integration of recovered water into community supply systems.

A comprehensive system for Monitoring, Reporting and Verification (MRV) will be established to ensure that all data is generated in a consistent, scientifically robust, and policy-relevant manner. This system will include detailed measurements of baseline evaporation rates, meteorological conditions, and reservoir-level dynamics, followed by continuous monitoring of system performance, water recovery volumes, energy efficiency, and any environmental or socio-economic impacts. Quantitative data will be complemented by qualitative feedback from engineers, reservoir operators, municipal authorities, water-user associations, and community beneficiaries. These combined datasets will allow the project to assess adaptation benefits, operational constraints, cost-effectiveness, and long-term sustainability under actual climatic conditions.

Monitoring will be used not only for reporting but also for active project management. The project will apply an explicit adaptive-management cycle comprising: quarterly technical reviews against success, performance and failure criteria established in the PFG-supported Pilot Validation Framework; seasonal stakeholder/user reviews informing operational decisions; annual reassessment by the Project Steering Committee of the principal Theory of Change assumptions; and formal decision gates at commissioning acceptance, after the first full operating season and at the Mid-Term Review in 2029.

A pre-defined performance trigger will apply: where measured water recovery remains below 70% of the validated design value for two consecutive operating seasons, an engineering review will be mandatory and feasible modification, optimization or re-scoping options will be assessed. Component 2 infrastructure sizing will remain subject to these performance reviews. Independent technical/financial audit arrangements will verify both the underlying performance data and the management response to material deviations.

Central to the project's knowledge strategy is the establishment of the Marmarik Reservoir pilot as a national demonstration site for innovation in climate-resilient water management. This site will function as a practical learning hub where government agencies, basin management authorities, engineers, hydrologists, research institutions, and university students can observe the technology in operation, evaluate its behavior under Armenia's specific climatic and hydrological regimes, and study the implications for broader reservoir management. Site visits, technical demonstrations, hands-on workshops, and training events will facilitate peer learning and support the development of a domestic cadre of professionals capable of designing, evaluating, and operating such systems in the future.

Knowledge management activities will also ensure the systematic documentation and translation of lessons into actionable tools. The project will produce technical guidelines, engineering templates, operational manuals, safety protocols, and reservoir-selection criteria reflecting the insights gained from the pilot. These will be tailored for policy makers, water-sector planners, basin management bodies, and local authorities to support informed decision-making and facilitate replication. The project will also develop policy briefs and integration notes to feed lessons into national adaptation processes, reservoir rehabilitation programmes, and long-term investment planning.

In addition to national-level learning, the project will actively promote regional knowledge exchange. As climate-driven evaporation poses similar challenges across the South Caucasus and neighboring semi-arid regions, the project will share results through regional workshops, knowledge dialogues, and engagement with adaptation networks. These activities will make Armenia's experience accessible to other countries, reduce the costs of parallel experimentation, and position Armenia as a knowledge leader in innovative water recovery technologies.

By institutionalizing systematic learning, establishing a national demonstration hub, producing actionable tools, and ensuring broad dissemination of findings, the project creates the knowledge foundation necessary for thoughtful replication and scaling of this innovative method across Armenia's reservoir network and beyond. The learning and knowledge management component ensures that the pilot's results translate directly into national policies, practical applications, and long-term climate resilience strategies.

J. Describe the consultative process, including the list of stakeholders consulted, undertaken during project / programme preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

Consultations during Concept Note preparation were structured around three complementary stakeholder streams: a community consultation in the Marmarik Reservoir area on 2 June 2026; a civil-society consultation on the Climate Adaptation Innovation Platform on 17 June 2026; and a governmental technical consultation on 25 June 2026. The purpose was not only to present the proposed project but to test the climate-risk framing, technical rationale, community relevance, feasibility and proposed implementation approach and to identify measures requiring redesign.

The consultations involved 20 external participants, of whom 11 were women (55%) and 9 were men (45%). Including EPIU/HOVAK organizers and facilitators, 23 named participants were involved in the consultation process — 12 women and 11 men. External stakeholders represented national institutions, municipal authorities, residents of the proposed target area and civil society. Detailed participant information is provided in Annex 2.

Consultation feedback resulted in substantive changes to the Concept Note rather than only validation of the original design. The principal changes are summarized below.

Table 10. Incorporation of stakeholder feedback into CN

Consultation finding / recommendation	Design response incorporated into the project
Community representatives advised that irrigation infrastructure immediately adjacent to the reservoir had recently benefited from public investment and that duplicative rehabilitation was not a priority.	Component 2 was redesigned from general rehabilitation of existing irrigation infrastructure toward service-area assessment and targeted expansion of access for underserved downstream users.
Communities highlighted potential electricity generation as important for energy-intensive water functions, particularly pumping where gravity distribution is not possible.	Renewable electricity co-generation and potential use for community water-management functions were strengthened as explicit project co-benefits.
Government technical stakeholders emphasized the need for stronger scientific/technical validation, laboratory evidence, justification of pilot scale,	The project adopted a phased validation approach, including PFG-supported technical validation, site screening,

environmental assessment and permitting before field implementation.	environmental and social assessment and explicit permitting requirements prior to construction.
Civil-society consultation confirmed a gap in structured mechanisms supporting locally led adaptation innovation.	Output 3.5 was confirmed and strengthened as a national adaptation innovation platform and catalytic support mechanism.

Concept-stage consultations did not systematically collect individual participants' disability, poverty or other social-vulnerability status. The project does not retrospectively infer these characteristics. From the PFG consultation round onward, participant registration and stakeholder analysis will capture, with appropriate consent and data-protection safeguards, sex, age group and relevant vulnerability information so that representation can be assessed more systematically.

Consultation will continue throughout Full Proposal formulation and implementation. Future engagement will support detailed technical and site design, environmental and social assessment, gender analysis, governance of the Output 3.5 mechanism, water-allocation criteria, community infrastructure planning, O&M arrangements and adaptive management. The full Initial Consultation Report, participant list and supporting evidence are provided in Annex 2 and its supporting appendices.

K. Describe how the project/programme draws on multiple perspectives on innovation from e.g., communities that are vulnerable to climate change, research organizations, or other partners in the innovation space, in the context in which the project/programme would take place.

The project draws on multiple perspectives on innovation by integrating the experiences, priorities, and technical insights of actors operating at different levels of Armenia's climate-resilient water management landscape. At the community level, households and farmers around the Marmarik Reservoir, many of whom are among the most vulnerable to climate-driven water scarcity, contribute essential knowledge regarding seasonal water shortages, irrigation vulnerabilities, local hydrological changes, and socio-economic constraints. Their perspectives have shaped the project's focus on ensuring that recovered water is not only technically feasible but also accessible and useful for meeting livelihood needs. Through participatory consultations, community mapping, and engagement with women farmers and water-user associations, the project incorporates local understanding of drought cycles, coping strategies, and priority areas for improved water delivery. These inputs ensure that innovation is grounded in real-world challenges and generates tangible resilience benefits for those most affected by climatic stress.

As summarized in Section J, community perspectives materially changed the concept-stage design, including the reorientation of Component 2 away from duplicative irrigation rehabilitation toward underserved users and stronger recognition of electricity co-generation for water-management functions.

Community participation will continue beyond consultation. During project formulation, communities will participate in co-design discussions concerning intake and infrastructure siting, delivery corridors, allocation criteria, safety and local operating arrangements. During implementation, seasonal user feedback will feed the adaptive-management process, local personnel will be trained to support operation and maintenance, and community-based organizations will be eligible to participate in the innovation activities under Output 3.5. In this way, vulnerable communities are treated not only as end users but also as contributors to design, operation and future adaptation innovation.

The project also draws heavily on the perspectives of research organizations and Armenia's scientific community, including hydrologists, atmospheric scientists, water engineers, and academic institutions with expertise in reservoir dynamics and climate impacts. Technical knowledge from these institutions informs the design, calibration, and monitoring of the evaporation-recovery system, ensuring that the pilot reflects current research on atmospheric-water capture, solar thermal processes, and reservoir evaporation behavior. Partnerships with research institutions also help situate the project within ongoing scientific inquiry, enabling comparative analysis of different technological approaches, refinement of performance metrics, and the adoption of best practices from international literature. These linkages ensure that the innovation is scientifically rigorous, environmentally sound, and adaptable to Armenia's unique climatic and geomorphological conditions.

At the national level, the project aligns with and incorporates perspectives from government agencies responsible for climate adaptation, water management, and infrastructure planning. The Water Committee, Basin Management Authorities, hydrometeorological services, and relevant ministries have contributed insights into regulatory requirements, reservoir operation practices, basin-level challenges, and existing infrastructure gaps. Their involvement ensures that the innovation is compatible with national strategies, operational norms, and institutional capacities. By engaging these stakeholders from the outset, the project strengthens ownership, increases institutional readiness for future integration, and ensures that the pilot's findings are interpretable and actionable within Armenia's planning systems.

The project also recognizes civil society organizations, youth innovators, researchers, and local communities as important actors within Armenia's emerging climate adaptation innovation ecosystem. Through the establishment of a collaborative innovation platform and a small catalytic support mechanism for early-stage adaptation initiatives, the project incorporates perspectives from locally rooted actors who possess practical understanding of climate vulnerabilities and community resilience needs. This approach broadens the innovation process beyond technology providers alone and supports the development of locally relevant adaptation concepts and partnerships.

The innovation space is further enriched by engagement with private-sector technical partners, engineering firms, and developers working on renewable energy and water technologies. These actors provide perspectives on technical feasibility, maintenance expectations, cost considerations, supply chains, and long-term operability. Their contributions help shape the project's engineering design and support the development of a potentially scalable model that could eventually attract private investment or public-private partnerships if the technology proves effective.

Finally, the project connects with international organizations and adaptation networks that bring global perspectives on innovative water technologies and climate resilience. Through learning exchanges, participation in innovation platforms, and alignment with the Adaptation Fund's innovation strategy, the project benefits from comparative knowledge about similar technology trials in other climates, methodological advancements in atmospheric-water harvesting, and best practices for scaling high-potential innovations. These perspectives inform the project's learning framework, evaluation criteria, and scaling strategy, ensuring that Armenia's pilot contributes to and benefits from the broader global innovation ecosystem.

By drawing on these diverse viewpoints (local communities, vulnerable groups, research organizations, government agencies, private-sector experts, and international partners) the project constructs an innovation process that is inclusive, scientifically grounded, operationally feasible, and responsive to real climate resilience needs. This multidimensional approach strengthens both the relevance and the potential scalability of the proposed solution, ensuring

that the innovation is shaped not by a single technocratic vision but by the integrated perspectives of all actors who will help refine, apply, and ultimately benefit from the new methodology.

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

The requested AF financing of USD 4.46 million represents the full cost of implementing a climate adaptation intervention that would not occur in the absence of targeted adaptation finance. The proposed project addresses a climate-specific vulnerability – accelerating water losses from reservoirs due to increased evaporation under rising temperatures – that lies outside the scope of conventional water-sector investments and public financing mechanisms in Armenia.

Under baseline conditions, Armenia’s water sector investments focus on rehabilitation of existing infrastructure, irrigation efficiency, groundwater management, and hydrometeorological monitoring. While these measures are necessary, they do not address evaporation-driven losses from surface reservoirs, which are intensifying due to climate change and increasingly undermine water availability for agriculture, communities, and ecosystems. The proposed evaporation-recovery technology is not a standard infrastructure upgrade, nor is it financially justified under non-climate development objectives, as it targets losses that were historically considered unavoidable and are only now becoming critical due to climate change.

The incremental cost of adaptation lies in piloting, validating, and integrating a novel, climate-responsive technology that converts climate-exacerbated evaporation into a usable water source. This includes costs associated with technology design and customization to local climatic conditions, installation of pilot infrastructure within a reservoir environment, establishment of climate-sensitive monitoring systems, and development of operational protocols capable of functioning under uncertain and evolving hydrological regimes. These costs are directly attributable to climate change impacts and would not be borne by national budgets or traditional development finance in the absence of AF support.

The funding request also reflects the high-risk, high-learning nature of an innovation project. As this is the first application of such a technology in Armenia and one of very few globally significant resources are required for rigorous environmental and social risk management, performance monitoring, verification of adaptation benefits, and knowledge generation. These activities are essential to ensure that the innovation is safe, effective, and suitable for replication, but they do not generate immediate financial returns and therefore cannot be financed through commercial investment or cost-recovery mechanisms.

A substantial share of the requested funding is dedicated to ensuring that climate adaptation benefits reach vulnerable communities, rather than remaining confined to a technical demonstration. This includes investments in community-level water infrastructure, needs assessments, and capacity building to enable equitable access to recovered water and reduce reliance on over-extracted groundwater. These measures are adaptation-specific, addressing climate-induced water insecurity, and go beyond what would be required for a purely technical pilot.

The requested budget also covers institutional and policy-related adaptation costs, including stakeholder engagement, capacity building for basin authorities and water-user associations, development of technical guidelines, and integration of lessons into national adaptation and water planning processes. These activities are essential to convert a one-time pilot into a potentially scalable adaptation pathway and ensure long-term resilience benefits, yet they fall outside standard operational budgets of public institutions.

From a cost-effectiveness perspective, the USD 4.46 million investment is justified by its potential to unlock system-wide adaptation benefits. If successful, the pilot will provide evidence for a potentially scalable approach that increases effective water storage without the social, environmental, and financial costs of constructing new reservoirs or intensifying groundwater abstraction. The project therefore represents a low-regret adaptation investment, where the learning and institutional benefits alone justify the funding even under conservative performance scenarios, while successful technical outcomes could significantly reduce future adaptation costs across Armenia's reservoir network.

In summary, the requested Adaptation Fund financing covers the full cost of adaptation by enabling Armenia to respond to a climate-induced water security challenge through innovation, learning, and institutional transformation. The project would not proceed without dedicated adaptation finance, and its benefits (reduced climate vulnerability, enhanced water security, and potentially scalable adaptation knowledge) extend well beyond the pilot site, justifying the level of funding requested.

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

The sustainability of the project's outcomes has been a central consideration throughout the design of the intervention, ensuring that the benefits of the pilot extend well beyond the duration of the grant and establish the foundations for long-term climate resilience in Armenia's water sector. The project's core innovation – recovering evaporated water from a reservoir – has been structured in a way that supports sustained operation, institutional integration, and future replication through a combination of technical robustness, local capacity-building, and policy alignment.

At the technical level, the evaporation-recovery system is designed as a low-energy, low-maintenance solution that relies on solar heating and natural airflow rather than complex mechanical components. This inherently reduces long-term operational costs and minimizes the risk of technical failure. The project includes comprehensive training for reservoir operators, municipal engineers, basin authorities, and local technicians to ensure that the system can be operated, maintained, and repaired using skills that will remain available in the country. By embedding operation and maintenance procedures within existing institutional responsibilities, rather than creating parallel systems, the project ensures continuity even after external support concludes.

Assets financed under the project will be transferred into appropriate public or community-serving ownership arrangements rather than remaining with the Technology Owner. The pilot evaporation-recovery infrastructure is expected to become state property within the responsible public-sector water-management system and to be held and operated after commissioning by the designated reservoir operator. The precise institutional owner/operator will be confirmed during Full Proposal preparation by the Ministry of Environment and EPIU and formalized through an appropriate stewardship, handover or operating arrangement. Community water-distribution assets will be assigned to the relevant municipality, water-user organization or other legally competent service entity, depending on the final infrastructure configuration.

The pilot is designed to meet its own auxiliary energy requirements through co-generation and to minimize fuel-dependent O&M. Operator personnel will receive practical training under Output 2.3, supported by SOPs and the O&M documentation developed under Output 3.2. The project will also provide an initial spare-parts stock sufficient for approximately two years of routine operation, subject to final engineering definition.

A detailed post-project O&M and financing plan will be completed during Full Proposal development and implementation. It will identify the responsible annual budget source for the designated operator, quantify recurrent O&M requirements, account for operating-cost savings associated with self-generated electricity, and assess any legally applicable municipal or service-tariff arrangements for community water delivery. Adaptation Fund financing is intended to finance technology validation and project establishment rather than permanent operating subsidy. Continued operation after grant closure will therefore rely on the designated operator, locally available technical capacity and the agreed O&M financing arrangement. Future replication will proceed only where measured cost and performance data demonstrate that it is justified and may be financed through national programmes, climate finance, licensed deployment or other appropriate sources rather than continued Adaptation Fund support.

Institutional sustainability is reinforced through close engagement with national and sub-national agencies responsible for water management, climate adaptation, and reservoir operations. The project is embedded within the governance framework of Armenia's water sector, aligning with strategies and planning processes led by the Water Committee, Basin Management Authorities, the Ministry of Environment, and local governments. These institutions are involved in all stages of the pilot, including design, monitoring, interpretation of results, and identification of replication opportunities. By strengthening the institutional architecture required to oversee innovative water technologies, the project ensures that the evaporation-recovery method can be absorbed into existing water planning and decision-making systems after the pilot phase. Furthermore, the project produces policy briefs, operational guidelines, reservoir-selection criteria, and monitoring protocols that will remain available as durable public goods supporting future implementation.

Financial sustainability is promoted by generating clear evidence on cost-effectiveness and lifecycle performance. The project develops detailed cost-benefit analyses and investment models that allow national planners and potential financiers to compare the evaporation-recovery system with alternative adaptation interventions. These analyses combined with real performance data provide the financial justification needed for national budget allocations, donor engagement, and private-sector interest in scaling the technology. As a result, future replication does not depend on continued external grant support but can be integrated into regular water-sector investments and climate adaptation financing streams, including those opened through the NAP process and national development programmes.

Environmental sustainability is ensured by the technology's reliance on renewable energy, its minimal physical footprint, and its low risk of ecological disturbance. The project follows a rigorous Environmental and Social Management Plan that includes monitoring of hydrological, water quality, and ecological parameters. By reducing pressure on groundwater resources and helping stabilize reservoir levels during drought, the project contributes to long-term ecological resilience and improved environmental stewardship. Environmental safeguards and operational protocols developed for the pilot will support environmentally responsible replication across additional reservoirs.

Social sustainability is strengthened through measures to ensure that project benefits are equitably distributed and that vulnerable communities are meaningfully engaged. The design incorporates community consultations, participatory needs assessments, and gender-responsive engagement to ensure that recovered water is integrated into local water systems in ways that directly address vulnerability and livelihood needs. By improving water reliability for agriculture, domestic needs, and local services, the project supports enduring resilience for households whose well-being depends on predictable water access. The involvement of water-user associations, municipal authorities, and local stakeholders builds ownership, enhances trust in

the technology, and ensures that community priorities shape long-term use of the recovered water.

Knowledge sustainability is promoted through a strong learning and dissemination component that equips national institutions, scientific bodies, and regional partners with the evidence and tools needed to continue innovation after the project ends. The demonstration site at Marmarik Reservoir will remain an operational reference point for ongoing research, training, and evaluation. Public technical guidelines, non-proprietary operator guidance, performance evidence, O&M cost profiles, inspection protocols and screening criteria developed during implementation will remain accessible for learning and replication decisions, while manufacturing-level proprietary information will be handled in accordance with the data-governance arrangements described under Output 3.4.

Sustainability is also strengthened through investment in local adaptation innovation capacities and collaborative learning mechanisms. By supporting civil society organizations, researchers, and community actors through the adaptation innovation platform and catalytic support mechanism, the project contributes to a longer-term ecosystem capable of continuing adaptation experimentation, knowledge exchange, and locally led climate resilience initiatives beyond the lifetime of the project.

Overall, the project's design ensures that sustainability is not confined to the technology itself but extends to the institutional, financial, environmental, and social systems that will support continued use and expansion of the innovation. By embedding capacity, producing actionable knowledge, aligning with national strategies, and reducing long-term operational burdens, the project creates the enabling conditions for sustained climate-resilient water management well beyond the lifespan of the intervention.

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

Based on the nature, scale, and location of the proposed interventions, the project would fall under Environmental and Social Risk Category B (Medium Risk) in accordance with the Adaptation Fund's Environmental and Social Policy.

The project involves the installation and operation of innovative infrastructure within an existing reservoir environment, as well as limited construction of small-scale water distribution systems for adjacent communities. While the project does not entail large-scale civil works, land acquisition, physical displacement, or irreversible environmental impacts, it does trigger several environmental and social principles presented below. All identified risks can be effectively avoided, minimized, or mitigated through a site-specific Environmental and Social Management Plan, inclusive stakeholder engagement processes, gender-responsive consultation and scheduling practices, strict adherence to labor and safety standards, and continuous monitoring and grievance redress mechanisms.

In addition to standard construction-related risks, the innovative operating mechanism requires specific environmental monitoring. These include potential localized changes in temperature and humidity around the intake/outlet; possible effects of the deep-water cooling and return circuit on reservoir thermal stratification; quality and intended use of recovered condensate; and verification that cooling-water withdrawal/return and condensate recovery do not adversely affect reservoir or downstream water balance. These mechanism-specific risks will be investigated during the PFG environmental assessment and managed through operating thresholds and monitoring incorporated into the ESMP.

Table 11. Project's ES Checklist

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<i>Compliance with the Law</i>		Moderate risk The project involves installation of pilot infrastructure within a reservoir area, which may trigger national requirements related to environmental permitting, construction standards, water use regulations, and occupational safety. There is a risk of non-compliance if approvals are delayed, documentation is incomplete, or contractors fail to follow applicable national standards. Mitigation: All activities will be screened against national legal requirements prior to implementation. Necessary permits, approvals, and technical clearances will be obtained from relevant authorities before construction begins. Contractual clauses will require contractors to comply with Armenian laws on construction, labor, safety, and environmental protection. Compliance will be monitored by EPIU through regular site supervision and reporting.
<i>Access and Equity</i>		Moderate risk Recovered water volumes may be limited during the pilot phase, creating a risk that access to additional water is perceived as unequal among communities or households. There is also a risk that infrastructure improvements (e.g. pipelines, delivery points) disproportionately benefit certain users (e.g. larger farmers) while smaller or remote users have reduced access. Mitigation: Transparent criteria for allocation and use of recovered water will be developed in consultation with local authorities and water-user associations. Community consultations will be used to identify priority needs and avoid elite capture. Distribution infrastructure will be designed to serve agreed beneficiary groups, and access arrangements will be clearly communicated. A grievance redress mechanism will allow communities to raise concerns related to access or perceived inequities.
<i>Marginalized and Vulnerable Groups</i>		Moderate risk Vulnerable groups, including women, elderly people, and smallholder farmers, may have limited ability to participate in consultations, trainings, or decision-making processes due to time constraints, caregiving

		responsibilities, mobility limitations, or social norms. As a result, their needs may be under-represented. Mitigation: Consultations and training activities will be scheduled at times and locations that consider the availability of vulnerable groups. Separate or targeted consultation formats will be used where necessary. Participation will be monitored and documented, and corrective actions will be taken if certain groups are under-represented. Information will be provided in accessible formats and language.
<i>Human Rights</i>		Low to moderate risk Construction and operation activities may temporarily affect community safety or access to shared spaces around the reservoir if works are not properly managed. There is also a risk that lack of information or consultation could undermine the right to participation and access to information. Mitigation: Construction sites will be clearly demarcated, and safety measures will be implemented to prevent accidents. Communities will be informed in advance about planned works, timelines, and potential disruptions. Stakeholder engagement will be continuous throughout the project cycle, ensuring access to information and meaningful participation. A grievance mechanism will be in place to address complaints related to project activities.
<i>Gender Equity and Women's Empowerment</i>		Moderate risk Women may face barriers to participation in project activities, including consultations, training, and water-governance processes, due to household responsibilities, seasonal labor demands, or cultural norms. Without mitigation, project benefits may not adequately reflect women's priorities. Mitigation: Gender considerations will be integrated into stakeholder engagement planning. Training schedules and locations will be adjusted to accommodate women's availability. Women's participation will be tracked, and additional outreach will be conducted if participation is low. Water-user association engagement will explicitly include female representatives where applicable.
<i>Core Labour Rights</i>		Moderate risk The project involves contractors and workers for construction and installation activities. There is a risk of non-compliance with labor standards related to working conditions, occupational safety, wages, or working hours if not adequately supervised. Mitigation: All contractors will be required to comply with national labor legislation and core labor standards.

		Contracts will include provisions on occupational health and safety, prohibition of child and forced labor, and fair working conditions. EPIU will conduct supervision and require reporting on labor practices. Non-compliance will trigger corrective actions or contract enforcement measures.
<i>Indigenous Peoples</i>	✓	No groups meeting the Adaptation Fund Environmental and Social Policy criteria for Indigenous Peoples have been identified within the proposed project area at concept stage. The conclusion will be verified through the PFG-supported social assessment. If the final service area identifies groups requiring differentiated or culturally appropriate engagement, appropriate measures will be incorporated before implementation.
<i>Involuntary Resettlement</i>	✓	No land acquisition, physical displacement or permanent restriction of livelihood access is anticipated. The concept design assumes use of state/public land and existing rights-of-way. Land status, access and cadastral conditions will be verified during formulation. Temporary construction-related restrictions, if any, will be addressed through the ESMP, stakeholder communication and grievance mechanism.
<i>Protection of Natural Habitats</i>		Low risk Installation of pilot infrastructure near or within a reservoir may cause localized disturbance to habitats if siting and construction are not carefully managed. Mitigation: Site selection will avoid sensitive habitats where possible. Construction footprints will be minimized. Environmental monitoring will be conducted to detect any unexpected impacts, and operations will be adjusted if adverse effects are observed.
<i>Conservation of Biological Diversity</i>		Low risk Construction and operation could create localized disturbance to aquatic or terrestrial species and ecological functions through noise, lighting, limited vegetation removal or changes in near-reservoir conditions. Mitigation: PFG-stage ecological screening will identify sensitive species and biodiversity features relevant to the final site. Siting will avoid sensitive areas where feasible, vegetation clearance will be minimized, and appropriate biodiversity indicators will be included in environmental monitoring. Where adverse effects are detected, construction practices or operating arrangements will be adjusted accordingly.
<i>Climate Change</i>		Low to moderate risk

		The performance of the pilot evaporation-recovery system is inherently dependent on climatic variables such as temperature, humidity, wind patterns, and diurnal temperature gradients. Climate variability and extremes (e.g. prolonged heatwaves, atypical humidity conditions, or altered wind regimes) may reduce water recovery efficiency or affect operational stability during certain periods. There is also a risk that short-term climatic conditions during the pilot phase may not be fully representative of longer-term climate trends, potentially limiting the robustness of conclusions for scaling and replication. Mitigation: The project is explicitly designed as a pilot to operate under real and variable climatic conditions. Baseline hydrometeorological data will be collected prior to installation and compared against operational performance across different seasons. System design parameters will be adjusted based on local climate conditions identified during the feasibility and design phase. Continuous monitoring of temperature, humidity, wind, and evaporation rates will allow performance to be assessed in relation to climate variability. Results will be interpreted conservatively, with clear documentation of climatic conditions during operation. Scaling decisions will be based on multi-season evidence and defined climatic suitability criteria, reducing the risk of maladaptation or inappropriate replication.
<i>Pollution Prevention and Resource Efficiency</i>		Low risk Construction activities may generate waste, noise, or minor emissions. Improper waste handling could cause localized pollution. Mitigation: Waste management procedures will be included in contractor obligations. Construction waste will be collected and disposed of in accordance with national regulations. Noise and dust control measures will be applied during works.
<i>Public Health</i>		Low to moderate Construction activities and operation of pilot infrastructure may pose temporary safety risks to workers and nearby communities, including risks from machinery, elevated structures, or restricted access areas. Mitigation: Occupational Health and Safety Plans will be required from contractors. Personal protective equipment will be provided to workers. Community safety measures will include fencing, signage, and controlled access to construction areas. Emergency procedures will be established and communicated.

<i>Physical and Cultural Heritage</i>		Low risk Works will occur in mountainous reservoir surroundings where previously undocumented cultural or archaeological features cannot be excluded at concept stage. Mitigation: A PFG-stage desk screening will identify known cultural-heritage features and consult the competent heritage authority where relevant. The ESMP and works contracts will include a chance-find procedure requiring work to stop and the competent authority to be notified if archaeological, historical or cultural material is encountered.
<i>Lands and Soil Conservation</i>		Low to moderate risk Slope-based construction, excavation, access works and drainage near the reservoir may create localized erosion, sedimentation, soil disturbance and slope-stability risks. Mitigation: Output 1.1 will include slope-stability and terrain assessment. The ESMP will include erosion and sediment controls, drainage management, topsoil salvage where relevant, revegetation/restoration requirements and operation-phase observation of affected slopes. Installation corridors will be selected to avoid significant clearing of natural vegetation; any unavoidable limited vegetation removal will follow applicable national permitting and compensation/restoration requirements.

**PART III: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE
IMPLEMENTING ENTITY**

A. Record of Endorsement on behalf of the Government

Mr. Hambardzum Matevosyan Minister of Environment Ministry of Environment of the Republic of Armenia	Date: <i>June 19, 2026</i>
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B. Implementing Entity Certification

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 (the Water Code, the National Water Policy, the NAP, the updated NDC, etc.) and subject to the approval by the Adaptation Fund Board, <u>commit to implementing the project in compliance with the Environmental and Social Policy of the Adaptation Fund</u> 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: Mr. Armen Yesoyan, Acting Director of EPIU SA of MoE, RoA	
Date: <i>June 26, 2026</i>	Tel. and email: +37410651631, info@cep.am
Project Contact Person: Ms. Milena Kiramijyan, Head a.i. of Project Implementation and Monitoring Department	
Tel. And Email: +37410651631, milena.kiramijyan@epiu.am	



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REPUBLIC OF ARMENIA
MINISTER OF ENVIRONMENT
РЕСПУБЛИКА АРМЕНИЯ
МИНИСТР ОКРУЖАЮЩЕЙ СРЕДЫ

№ 1/08.2/5371
« 19 » « 06 » 2026

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

Subject: Endorsement for REWater Armenia (Reclaiming Evaporated Water for Climate Resilience in Armenia) Large Innovation Grant Project

In my capacity as designated authority for the Adaptation Fund in the Republic of Armenia, I confirm that the “Reclaiming Evaporated Water for Climate Resilience in Armenia” (REWater Armenia) 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 Republic of Armenia.

Accordingly, I am pleased to endorse the abovementioned project proposal with support from the Adaptation Fund. If approved, the project will be implemented by the “Environmental Project Implementation Unit” State Agency of the Ministry of Environment of the Republic of Armenia and executed by the later together with “HOVAK” Social and Environmental Innovative Technologies Development NGO.

Sincerely,

Hambardzum Matevosyan



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Revised PFG Submission Form
Project Formulation Grant (PFG)

Submission Date: July 8, 2026

Adaptation Fund Project ID: AF00000560

Country/ies: Republic of Armenia

Title of Project/Programme: REWater Armenia (Reclaiming Evaporated Water for Climate Resilience in Armenia)

Type of IE (NIE/RIE/MIE): NIE

Implementing Entity: "Environmental Project Implementation Unit"
State Agency of the Ministry of Environment
of the Republic of Armenia ("EPIU" SA of
MoE, RoA)

Executing Entity/ies: "EPIU" SA of MoE, RoA
HOVAK – Social & Environmental Innovative
Technologies Development NGO

A. Project Preparation Timeframe

Start date of PFG	November 15, 2026
Completion date of PFG	March 15, 2027

B. Proposed Project Preparation Activities (\$)

List of Proposed Project Preparation Activities	Output of the PFG Activities	US\$ Amount	Budget note
Environmental, Social and Gender Safeguards Package Development	Environmental and Social Assessment and Action Plan - Environmental and Social Risk Assessment - Environmental and Social Management Plan (ESMP) - Environmental and Social Monitoring Plan - Climate risk screening	35,000	International Environmental & Social Safeguards Expert: 20days*USD450=USD9,000 Team Leader / National Environmental Specialist: 30days*USD300=USD9,000

	• Biodiversity and ecosystem screening • Preliminary environmental baseline • Preliminary cumulative impact screening • Environmental permitting roadmap • Environmental compliance matrix Gender Assessment and Action Plan • Gender Assessment • Gender Action Plan • Gender indicators • Gender monitoring framework Stakeholder Engagement Plan • Stakeholder Consultation Report • Stakeholder Engagement Action Plan • Grievance Redress Mechanism • Consultation database • Preliminary beneficiary mapping and vulnerability assessment • Preliminary equitable water-allocation framework		National Hydrology Expert: 15days*USD200=USD3,000 National Social Safeguards and Gender Specialist: 15days* USD200=USD3,000 National Biodiversity Specialist: 15days* USD200=USD3,000. National Stakeholder Engagement Specialist: 10days*USD200=USD2,000 Miscellaneous (consultation logistics, data acquisition, translation, editing, printing and other supporting expenses): USD6,000
Technical Feasibility and Full Proposal Package Development	Full Large Innovation Funding Proposal • narrative • logframe • budget • implementation schedule • disbursement schedule • procurement plan • MEL • implementation arrangements Technical Feasibility Annex 1) comparative screening of Marmarik and two to three technically plausible candidate reservoirs against pre-defined suitability criteria, including:	55,000	Team Leader / National Climate Adaptation & Proposal Development Expert: 30days*USD300=USD9,000 International Water Resources & Hydrology Expert: 15days*USD450=USD6,750 International Innovation & Technology Validation Expert: 10days*USD450=USD4,500 National Financial & Economic Expert: 10days*USD200=USD2,000

	• hydrological assessment • evaporation modelling • technology validation • freshwater production estimates • renewable energy estimates • operational assumptions • technical risks • evaporation and intake-air humidity • usable elevation gain • solar exposure • projected water yield • projected cost-effectiveness • permitting feasibility • community adaptation benefit • environmental-corridor feasibility 2) assessment of alternative installation corridors at the preferred site, prioritizing existing clearings, tracks, rights-of-way and other alignments that provide adequate solar exposure without significant clearing of natural vegetation. Economic & Financial Analysis • cost-benefit analysis • cost-effectiveness • sensitivity analysis • financial sustainability • O&M financing • institutional ownership and post-project operational arrangements Pilot Validation Framework (establishing the objective go/no-go criteria, including minimum technical, climatic, environmental and economic thresholds for confirmation of the final pilot site prior to Full Proposal submission)¹ • innovation success criteria • monitoring protocol • validation methodology • scalability indicators		National Procurement Specialist: 10days*USD200=USD2,000 National Monitoring, Evaluation and Learning Specialist: 10days*USD200=USD2,000 5 National Sectoral Experts: 5*15days*USD200=USD15,000 Miscellaneous (technical datasets and data processing, temporary field measurements and equipment rental, GIS/site survey services, translation, editing, graphic design, document formatting and other supporting technical expenses): 12,750
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¹ If Marmarik does not meet the minimum thresholds, construction will not proceed there; the next-ranked eligible site will be considered or the design will be re-scoped before submission of the Full Proposal.

	• performance indicators • failure criteria		
PFG implementation	• Technical advise provided for ToR development where needed • Site missions conducted • Workshop(s) conducted	10,000	2 National Sectoral Experts: 2*10days*USD150=USD3,000 Validation Workshop for 60 persons including venue, catering, printing: USD 3,000 Transport services/fuel: USD 1,000 Miscellaneous (office supplies, communications and other implementation support expenses): USD3,000
Total Project Formulation Grant		100,000	

Please describe below each of the PFG activities and provide justifications for their need and for the amount of funding required:

Activity 1. Environmental, Social and Gender Safeguards Package Development

The proposed project introduces an innovative evaporation-recovery technology that has not previously been implemented in Armenia. Consequently, development of the Full Proposal requires comprehensive environmental, social and gender due diligence to ensure compliance with the Adaptation Fund Environmental and Social Policy and Gender Policy, while also identifying the environmental and regulatory requirements applicable under Armenian legislation.

The requested budget reflects the multidisciplinary expertise required to undertake environmental, hydrological, biodiversity, social and gender analyses, facilitate consultations with national and local stakeholders, and prepare the safeguard documentation necessary for development of a technically sound and fully compliant Full Proposal.

Activity 2. Technical Feasibility and Full Proposal Package Development

The objective of this activity is to transform the approved Concept Note into a fully developed investment proposal supported by a robust technical, financial and institutional evidence base. As the proposed intervention represents a first-of-its-kind application of innovative evaporation-recovery technology within Armenia's water sector, additional analyses are required to reduce the principal technical, environmental, social, institutional and financial uncertainties associated with the proposed innovation and to demonstrate technical feasibility, adaptation effectiveness, operational viability, long-term scalability and cost-effectiveness.

The requested budget reflects the need for a multidisciplinary team combining international and national expertise, acquisition and processing of technical datasets, field measurements, GIS and site survey services, and preparation of supporting analyses required to demonstrate the technical credibility, financial viability and replication potential of the proposed innovation.

Activity 3. Project Formulation Coordination and Validation

Successful preparation of the Full Proposal requires effective coordination among the Implementing Entity, the future Executing Entity, consultants, governmental institutions and local stakeholders. This activity will ensure the efficient management of the formulation process, preparation of procurement documentation where required, organization of technical meetings and site missions, and validation of the completed proposal prior to submission.

Though general coordination of the PFG implementation will be performed by EPIU functional departments (financial, procurement, project implementation and monitoring units), the specific content of the project requires additional expertise which should be ensured especially while drafting the ToRs of the PFG activities. Hence, Activity 3 covers the provision of this essential technical support, as well as field missions to the Marmarik Reservoir and surrounding communities to support proposal consultations and refinement, site diagnostics, etc., and organization of a national validation workshop involving up to 60 representatives of government institutions, local authorities, academia, civil society, development partners and other key stakeholders. The workshop will provide an opportunity to present the final proposal package, validate the proposed implementation arrangements, and ensure broad institutional ownership prior to submission to the Adaptation Fund. Accordingly, the requested budget covers national technical support, workshop organization, transport services, communication and logistical expenses necessary to ensure a coordinated, transparent and participatory project formulation process.

The activity will also support coordination of the independent technical validation process and review of the technical feasibility outputs prior to finalization of the Full Proposal.

Overall, the Project Formulation Grant is designed to reduce the principal technical, environmental, social, institutional and financial uncertainties associated with the proposed innovation establish an objective evidence base for the final investment decision, and ensure that the resulting Full Proposal is implementation-ready and fully compliant with the Adaptation Fund's requirements for Large Innovation Projects.

C. Implementing Entity

This request has been prepared in accordance with the Adaptation Fund Board's procedures and meets the Adaptation Fund's criteria for project identification and formulation

Implementing Entity Coordinator, IE Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Mr. Armen Yesoyan, Acting Director of EPIU SA of MoE, RoA		July 8, 2026	Ms. Milena Kiramijyan, Head a.i. of Project Implementation and Monitoring Department	+37410651631	milena.kiramijyan@epiu.am

ANNEX 1. PRELIMINARY GENDER ASSESSMENT

1. Purpose

This Preliminary Gender Assessment has been prepared to support the design of the proposed Adaptation Fund Innovation project on evaporation-recovery technology for climate-resilient water management in Armenia. It provides an initial assessment of gender-related opportunities and potential barriers relevant to the project and demonstrates how gender considerations have informed the Concept Note. A comprehensive Gender Assessment and Gender Action Plan will be undertaken during the project proposal formulation stage in accordance with the AF Gender Policy (AFGP) and Armenia's national gender equality framework to:

- undertake a detailed analysis of gender-differentiated climate vulnerabilities within the project area;
- assess women's and men's access to water resources, irrigation systems, decision-making processes, and innovation opportunities;
- identify any potential gender-related risks associated with pilot implementation;
- develop measurable gender-responsive indicators and targets;
- prepare a Gender Action Plan consistent with the AFGP; and
- establish monitoring arrangements for gender-responsive implementation throughout the project lifecycle.

2. Gender Context

Armenia has established a comprehensive legal and policy framework promoting gender equality, including constitutional guarantees of equal rights and the Law on Guaranteeing Equal Rights and Equal Opportunities for Women and Men. The country is also party to key international instruments, including the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW). Despite this enabling framework, gender disparities persist, particularly in rural areas where traditional gender roles continue to influence access to productive resources, participation in decision-making, and economic opportunities.

Within rural communities, women play a central role in household water management, subsistence agriculture, and family livelihoods. However, they often have more limited access than men to land ownership, irrigation infrastructure, agricultural extension services, financing opportunities, and water governance processes. These inequalities may reduce women's capacity to respond effectively to increasing water scarcity associated with climate change. At the same time, women possess valuable local knowledge regarding household water use, agricultural practices, and community adaptation needs, making their participation essential for designing effective climate adaptation interventions.

3. Initial Gender Considerations for the Project

Based on the preliminary assessment and consultations undertaken during Concept Note preparation, no significant gender-specific adverse impacts associated with the proposed

intervention have been identified. Instead, the project presents several opportunities to strengthen gender-responsive climate adaptation.

The project is expected to improve water availability and reliability for rural communities, thereby reducing pressures associated with seasonal water scarcity that disproportionately affect women through their responsibilities in household water management and agricultural production. Improved access to reliable irrigation water may also contribute to reducing labour burdens, increasing agricultural productivity, and strengthening livelihood resilience for women farmers and women-headed households.

Gender-differentiated vulnerability will be examined in greater detail during formulation. At concept stage, relevant pathways include increased unpaid labour and household-management burdens associated with unreliable water supply; women farmers' comparatively limited access to productive resources, finance and irrigation decision-making; increased responsibility of women in households affected by seasonal male migration; and reduced livelihood opportunities for young women and men where water insecurity constrains agriculture and local economic activity.

The project is expected to create differentiated benefit pathways. Women and women-headed households may benefit from more reliable household water, reduced time and coping burdens and explicit consideration within equitable allocation criteria. Women farmers may benefit from supplementary irrigation reliability and targeted training under Output 2.3. Women and young professionals will have specific participation pathways within the Climate Adaptation Innovation Platform and innovation challenge. Men engaged in agriculture may benefit from improved irrigation reliability and reduced energy requirements for pumping where recovered water and co-generated electricity are used for water-service functions. These expected benefit pathways will be validated through the comprehensive Gender Assessment.

Beyond water-related benefits, the proposed Climate Adaptation Innovation Platform and catalytic support mechanism will create new opportunities for women-led civil society organizations, women innovators, researchers, and young professionals to participate in the development and promotion of locally led climate adaptation solutions. By explicitly encouraging participation of groups that are often underrepresented in technical innovation processes, the project seeks to promote more inclusive climate innovation ecosystems.

4. Gender Considerations in the Consultation Process

Gender considerations were integrated throughout the Concept Note consultation process. Efforts were made to ensure balanced participation of women and men during stakeholder consultations involving national institutions, local communities, and civil society organizations. Across the consultation events, women represented 55% of participants and men 45%, demonstrating a balanced and inclusive consultation process that enabled both women and men to meaningfully contribute to project design. Women farmers, female community representatives, women participating in local water management activities, and representatives of women-led organizations contributed to discussions regarding local water challenges, priorities for improved water access, and opportunities associated with the proposed innovation.

Participants emphasized the importance of ensuring equitable access to project benefits, maintaining transparent decision-making regarding future allocation of recovered water resources, and designing consultation and capacity-building activities in ways that accommodate women's participation. Feedback also highlighted the value of creating opportunities for women and young professionals to contribute to climate adaptation innovation beyond their traditional roles as beneficiaries.

These consultations informed the project's commitment to inclusive stakeholder engagement, gender-responsive capacity building, and active participation of women in the Climate Adaptation Innovation Platform proposed under Output 3.5.

5. Preliminary Gender Actions Incorporated into Project Design

The Concept Note already incorporates several gender-responsive measures, including:

- ensuring balanced participation of women and men throughout project consultations and future stakeholder engagement activities;
- promoting participation of women farmers, women-headed households, and female representatives of water-user associations in needs assessments, capacity-building activities, and decision-making processes related to community water infrastructure;
- encouraging participation of women-led organizations, women innovators, researchers, and youth within the Climate Adaptation Innovation Platform and catalytic support mechanism;
- designing training activities and consultation formats that facilitate participation by women, taking into account potential time and caregiving constraints where relevant;
- integrating sex-disaggregated participation data into project monitoring where appropriate.

6. Preliminary Gender-Responsive Results and Targets

The following preliminary targets have been incorporated into project design and will be reviewed and validated during preparation of the comprehensive Gender Assessment and Gender Action Plan.

Area	Preliminary commitment / target
Direct beneficiaries	Approx. 2,000–3,500, subject to PFG validation; ≥50% women
Training under project activities	≥40% women
Output 3.5 adaptation innovation awards	≥30% women-led initiatives
Innovation platform governance / steering body	≥30% women

Platform participation	≥25% youth
Monitoring	100% of applicable people-based indicators sex-disaggregated
Project-supported employment, internships and technical roles	Specific targets to be established through the Gender Action Plan following labour-market and skills assessment

To support achievement of these targets, Output 3.5 will include a women-innovators track, targeted mentoring and capacity support for women-led organizations and innovators, inclusive scheduling and participation arrangements, and sex-disaggregated monitoring of participation, applications and awards. The Gender Action Plan will determine whether additional measures, including care-support or other accessibility arrangements, are required to remove identified participation barriers.

ANNEX 2. INITIAL CONSULTATION REPORT

1. Purpose and objectives of the consultations

The “Environmental Project Implementation Unit” State Agency of the Ministry of Environment of the Republic of Armenia (EPIU) has conducted stakeholder consultations for discussion and validation of the draft concept note on “REWater Armenia (Reclaiming Evaporated Water for Climate Resilience in Armenia)” project with potential target community, governmental agency and CSO representatives. The concept note was revisited and finalized to incorporate stakeholder feedback will be submitted to the Adaptation Fund (AF).

The purpose of the consultation was to validate the draft concept note’s problem analysis, climate risk prioritization, the innovative solution, and to collect actionable technical feedback from range of stakeholders to improve the concept note prior to further development.

The validation deck explicitly framed the consultation around: (i) confirming priority climate risks and vulnerabilities, (ii) checking the logic that links risks to proposed solutions, (iii) explaining the innovation-related technicalities, (iv) presenting the proposed structure and expected results, and (v) identifying which measures should be removed, revised, or scaled up based on feasibility and expected impact.

2. Consultation methodology and process

The consultation followed a structured validation sequence consistent with good practice for AF concept note development:

1. **Context and climate-risk discussion:** confirmation of the most essential climate risks and observed challenges for livelihoods and water.
2. **Intervention-by-intervention review:** detailed discussion of the proposed activities, with emphasis on adequacy, feasibility, and expected impact.
3. **Prioritization and scaling:** discussion of which measures should be expanded, revised, or potentially deprioritized given budget and implementation constraints.
4. **Capture of missing solutions:** identification of additional practical proposals suggested by stakeholders.

3. Summary of key feedback and validation results

3.1 Consultation 1 – Civil Society Consultation on Climate Adaptation Innovation Platform

This consultation focused on the proposed establishment of a national climate adaptation innovation platform, which is envisaged under Component 3 of the project as a mechanism to strengthen civil society engagement, promote youth-led innovation, and facilitate the development of locally led climate adaptation initiatives. The proposed platform was presented as a collaborative space where civil society organizations, researchers, innovators and young professionals could exchange ideas, receive technical support and mentoring, and progressively transform promising adaptation concepts into mature initiatives capable of attracting financing.

The NGO welcomed the initiative and expressed strong interest in participating in the future platform. Participants emphasized that in their knowledge Armenia currently lacks dedicated mechanisms that

systematically support civil society organizations in developing climate adaptation innovations and connecting innovative ideas with potential funding opportunities. At the same time, they acknowledged that the project was still at the concept stage and considered that more detailed discussions regarding their possible role should take place during full proposal development.

How feedback was incorporated into the Concept Note

The consultation confirmed the relevance of establishing the climate adaptation innovation platform and the catalytic support mechanism under Output 3.5. The Concept Note was further strengthened by emphasizing that the platform will serve not only as a knowledge-sharing mechanism but also as a collaborative environment supporting early-stage adaptation innovation development, networking, capacity building, and preparation of promising ideas for future financing opportunities. The consultation also confirmed the need to continue stakeholder co-design of the platform during the project proposal formulation phase.

3.2 Consultation 2 – Community Consultation in the Marmarik Reservoir Area

The consultation sought to validate local climate vulnerabilities, understand water security challenges, discuss the proposed pilot intervention, and identify community priorities regarding the use of additional water generated through the innovative evaporation-recovery mechanism.

Participants confirmed that water availability remains a priority concern, particularly under increasing climate variability. However, one of the most important findings related to the originally proposed investment in rehabilitation of existing community irrigation infrastructure. Community representatives explained that significant improvements to local irrigation systems had already been financed by the Government in recent years. Instead of rehabilitating infrastructure that had already been upgraded, participants recommended focusing on improving access for downstream communities located further within the reservoir service area that continue to experience constraints in utilizing available water resources.

Participants also highlighted that they see significant value in the broader co-benefits that could be generated by the proposed innovation, particularly its potential to produce renewable energy alongside additional freshwater. Community representatives noted that locally available electricity generated through the pilot could support energy-intensive water management functions, including the operation of pumping stations where gravity-fed distribution is not feasible, while also strengthening the overall resilience and sustainability of local water supply systems. They therefore encouraged the project to give greater consideration to the energy-generation potential of the proposed technology as an important complementary benefit rather than solely focusing on water recovery.

How feedback was incorporated into the Concept Note

This consultation resulted in one of the most substantive revisions to the Concept Note. Rather than focusing on rehabilitation of existing irrigation infrastructure adjacent to the reservoir, Component 2 was redesigned to include a comprehensive assessment of water users across the wider reservoir service area and to finance targeted community-level water distribution infrastructure where additional access is required to utilize the recovered water. This revised approach better reflects actual local needs, avoids duplication with recent public investments, and improves the adaptation benefits generated by the project.

In addition, the Concept Note was revised to place greater emphasis on the renewable energy co-benefits of the proposed technology. While water recovery remains the project's primary adaptation objective, the narrative now better reflects the potential for self-generated renewable energy to support climate-resilient operation of community water infrastructure, including, where appropriate, energy requirements for pumping

and water distribution. This reinforces the project's integrated contribution to both water and energy resilience.

3.3 Consultation 3 – Governmental Technical Consultation

This consultation aimed to validate the technical rationale of the proposed innovation, assess institutional feasibility, review regulatory considerations, and discuss the project's alignment with Armenia's water management priorities.

Prior to the meeting, the draft Concept Note had been circulated among relevant governmental institutions, enabling participants to review the proposed intervention in advance. Particular attention was devoted to environmental impact assessment requirements applicable to the pilot, the need to verify the availability of laboratory testing and scientific evidence supporting the proposed technology before field implementation, and the justification for the proposed pilot scale.

Project developers clarified that the proposed scale of the pilot had been determined based on technical and engineering calculations and is also necessary to generate sufficiently robust operational and economic evidence. A substantially smaller installation would not provide an adequate basis for evaluating technical feasibility or cost-effectiveness, thereby limiting the project's ability to assess future replication potential.

Participants acknowledged the importance of these clarifications and expressed strong interest in remaining engaged throughout project preparation and implementation. They noted that reservoir management and climate-resilient water management currently represent national priorities and agreed that, should the pilot successfully demonstrate technical and adaptation feasibility, the approach could inform future modernization of reservoir management practices in Armenia and potentially provide valuable lessons for countries facing similar climatic and hydrological conditions.

How feedback was incorporated into the Concept Note

The Concept Note was revised to strengthen references to compliance with Armenia's environmental assessment framework, emphasize the phased approach to technology validation, and clarify that detailed technical, hydrological, environmental and safeguards assessments will be undertaken during full proposal development using Project Formulation Grant resources. In addition, following stakeholder recommendations, the project explicitly recognizes that implementation of the pilot will be subject to the applicable requirements of Armenia's environmental impact assessment legislation and all relevant permitting procedures. Compliance with national environmental assessment and permitting requirements will be fully addressed and integrated into the project design during the full proposal formulation stage. Additional explanation was also included regarding the rationale for the proposed pilot scale and the project's learning-oriented approach to future replication.

4. Overall Influence of Stakeholder Consultations on Project Design

The consultations substantially strengthened the Concept Note and confirmed broad stakeholder support for the proposed innovation. Stakeholder feedback resulted in several important design refinements, including:

- redesign of Component 2 from rehabilitation of existing irrigation infrastructure towards targeted expansion of water access based on identified community needs;
- inclusion of a national climate adaptation innovation platform and catalytic support mechanism to strengthen locally led adaptation innovation;

- stronger emphasis on compliance with Armenia's environmental legislation and phased technical validation of the innovative solution;
- clarification of the scientific and cost-effectiveness rationale for the proposed pilot scale;
- reinforcement of the project's learning, replication, and knowledge-generation objectives.

Overall, the consultations confirmed that the project addresses an emerging priority within Armenia's water sector while strengthening the project's technical credibility, institutional ownership, and potential for long-term replication.

Table X. Traceability of Stakeholder Feedback into Project Design

Consultation	Main feedback	Change to Concept Note / project design
Marmarik-area community consultation – 2 June 2026	Recently upgraded nearby irrigation infrastructure should not be rehabilitated again; underserved downstream users require better access	Component 2 redesigned toward wider service-area assessment and targeted extension of water access
Marmarik-area community consultation – 2 June 2026	Electricity generated by the pilot could support pumping and other water-service functions	Energy co-generation strengthened as a project co-benefit and potential input to climate-resilient water distribution
Civil-society consultation – 17 June 2026	Armenia lacks structured mechanisms to support locally led climate adaptation innovation	Output 3.5 confirmed and strengthened as an innovation platform and catalytic support mechanism
Governmental technical consultation – 25 June 2026	Need stronger laboratory/scientific validation, pilot-scale justification, EIA compliance and permitting before field implementation	Phased PFG validation, independent technical assessment, environmental and social assessment, permitting and site-validation requirements strengthened

5. Future Consultative Process

Recognizing the innovative nature of the proposed intervention, stakeholder engagement will continue throughout the project proposal formulation phase and project implementation. Future consultations will support detailed technical design, environmental and social assessment, gender analysis, governance arrangements for the climate adaptation innovation platform and catalytic support mechanism, community-level infrastructure planning, and validation of implementation arrangements. This iterative consultation process will ensure that stakeholder feedback continues to inform project development, risk management, and future scaling pathways.

Future consultation registration and stakeholder analysis will also improve participant-level disaggregation. Where appropriate and with informed consent and applicable data-protection safeguards, the PFG-stage process will record sex, age group, disability status and relevant social-vulnerability characteristics. This will allow the project to assess not only gender balance but also representation of vulnerable groups. No such

comprehensive vulnerability data were collected during the concept-stage consultation round, and the project will not retrospectively infer participants' vulnerability status.

6. Supporting Documentation

Attendance sheets signed by participants, photographs from consultation meetings, presentation materials, and meeting records have been retained by the Implementing and Executing Entities. Signed attendance sheets and available photographic documentation from the consultation process are provided within this Consultation Report. Presentation materials and detailed meeting records are retained by EPIU and the Executing Entity and can be provided to the Adaptation Fund Secretariat if further documentation is required.

7. Consultation Participants

N	Name	Sex	Position	Entity	Stakeholder Category	Vulnerability status recorded?	Date	Format
1.	Ms. Liana Melqonyan	F	Chief Specialist of Water Policy Department	Ministry of Environment (MoE)	National institution	Not systematically recorded at concept stage	June 25, 2026	In person meeting
2.	Ms. Yelena Khalatyan	F	Head of Climate Research and Monitoring Division of Climate Service	“Hydrometeorology and Monitoring Center” SNCO of the MoE	National institution		June 25, 2026	In person meeting
3.	Ms. Lusine Shakaryan	F	Head of Hydrological Forecast Division of Hydrological Service	“Hydrometeorology and Monitoring Center” SNCO of the MoE	National institution		June 25, 2026	In person meeting
4.	Mr. Vahan Sahradyan	M	Specialist of Water Use and Stocking Division	“Jrar” CJSC of the Ministry of Territorial Administration and Infrastructure	National institution		June 25, 2026	In person meeting
5.	Mr. Armen Movsisyan	M	Worker of “Hrazdan Cement” Factory	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
6.	Mr. Arsen Grigoryan	M	Worker of Electric Networks of Armenia	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
7.	Mr. Sasun Tavaqalyan	M	N/A	Resident of Artavaz	Community		June 2, 2026	In person meeting

				Community				
8.	Ms. Laura Nikoghosyan	F	First Class Specialist	Municipality of Artavaz	Regional institution		June 2, 2026	In person meeting
9.	Ms. Hasmik Hovhanissyan	F	First Class Specialist	Municipality of Hanqavan	Regional institution		June 2, 2026	In person meeting
10	Mr. Artush Movsisyan	M	Specialist	Municipality of Artavaz	Regional institution		June 2, 2026	In person meeting
11	Mr. Arayik Movsisyan	M	N/A	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
12	Ms. Nune Ghazaryan	F	Director of Preschool Educational Institution	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
13	Ms. Hasmik Hovhanissyan	F	N/A	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
14	Ms. Narine Naltakyan	F	N/A	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
15	Ms. Nelli Sahakyan	F	N/A	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
16	Ms. Anna Dabaghyan	F	N/A	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
17	Mr. Artsrun Gevorgyan	M	Administrative Head	Municipality of Hanqavan	Regional institution		June 2, 2026	In person meeting

18	Mr. Artyom Khachatryan	M	N/A	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
19	Mr. Hamlet Atanesyan	M	N/A	Resident of Artavaz Community	Community		June 2, 2026	In person meeting
20	Ms. Sirarpi Manyan	F	President	"Yeghvard" youth-ecological NGO	Civil society		June 17, 2026	Online videocall
21	Ms. Milena Kiramijyan	F	Head of Project Implementation and Monitoring Department	"Environmental Project Implementation Unit" State Agency	NIE	N/A	All days	All formats
22	Mr. Hakob Hakobyan	M	Specialist of Project Implementation and Monitoring Department (Community Liaison Focal Point)	"Environmental Project Implementation Unit" State Agency	NIE		All days	All formats
23	Mr. Eduard Hovakimyan	M	President, EE representative	Hovak NGO	EE		All days	All formats

Across the consultation events there were 20 external participants: 11 women (55%) and 9 men (45%). Including three EPIU/HOVAK organizers and facilitators, the total consultation record comprises 23 named participants – 12 women and 11 men.

Annex 2A – Signed Attendance Sheets



ADAPTATION FUND



REPUBLIC OF ARMENIA
MINISTRY OF
ENVIRONMENT



ՀԱՅԱՍՏԱՆԻ ՀԱՆՐԱՊԵՏՈՒԹՅԱՆ
ՄԻՋԱՎԱԶՈՒՆ ԵՐԱՐԵՎԱՆԻ
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Շրջակա միջավայրի նախարարության «Ընապահականության ծրագրերի իրականացման գրասենյակ» պետական
ինժեներական կողմից մշակված «REWater Հայաստան. գյուղատնտեսական և քաղաքացիական ջրի վերաբերյալ՝ կլիմայի փոփոխության նկատմամբ
դիմապայմանությունը բարձրացնելու նպատակով» դրամաշնորհային ծրագիր հայեցակարգի շուրջ

ՄԱՍՆԱԿԻՑՆԵՐԻ ՑԱՆԿ

Խորհրդակցություններ ծաղկաձոր խոշորացված համայնքի վարչական միավորների ներկայացուցիչների հեղ

2026թ. հունիսի 2

N	Կառույց/բնակավայր	Մասնակից	Կոնտակտային տվյալներ	Ստորագրություն
1.	Կառույցի գլխավոր գործադիր	Վահագնյան Արմեն	093886648	
2.	ՆԳՄ / Ներքին կառույց	Սարգսյան Եղանե	098470700	
3.	ՆԿ	Բաբայան Նարեկ	093-34-54-48	
4.	Ներքին կառույցի գլխավոր գործադիր	Ջեֆերյան Զարգուհ	093-19-04-90	
5.	Կառույցի գլխավոր գործադիր	Մանուկյան Նարեկ	098-49-88-69	



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ARMENIA NATIONAL ADAPTATION
FUND

6.	Արցախի համայնքային կոմիտեի կողմից 2018	Արցախի համայնքային կոմիտեի	098. 59. 56-97	Արցախի համայնքային կոմիտեի
7.	Արցախի համայնքային կոմիտեի կողմից 2018	Արցախի համայնքային կոմիտեի	094-35-15-62	Արցախի համայնքային կոմիտեի
8.	Արցախի համայնքային կոմիտեի կողմից 2018	Արցախի համայնքային կոմիտեի	094. 83. 99. 15	Արցախի համայնքային կոմիտեի
9.	Արցախի համայնքային կոմիտեի կողմից 2018	Արցախի համայնքային կոմիտեի	094168213	Արցախի համայնքային կոմիտեի
10.	Արցախի համայնքային կոմիտեի կողմից 2018	Արցախի համայնքային կոմիտեի	093424675	Արցախի համայնքային կոմիտեի
11.	Արցախի համայնքային կոմիտեի կողմից 2018	Արցախի համայնքային կոմիտեի	098170739	Արցախի համայնքային կոմիտեի
12.	Արցախի համայնքային կոմիտեի կողմից 2018	Արցախի համայնքային կոմիտեի	098885542	Արցախի համայնքային կոմիտեի
13.	Արցախի համայնքային կոմիտեի կողմից 2018	Արցախի համայնքային կոմիտեի	094-90-10-99	Արցախի համայնքային կոմիտեի
14.	Արցախի համայնքային կոմիտեի կողմից 2018	Արցախի համայնքային կոմիտեի	077 077 802	Արցախի համայնքային կոմիտեի



ADAPTATION FUND

REPUBLIC OF ARMENIA
MINISTRY OF
ENVIRONMENT

ՀԱՅԱՍՏԱՆԻ ՀԱՆՐԱՊԵՏՈՒԹՅԱՆ
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15.	Արդյունաբերական թ.ձ.	Արդյունաբերական խմելու ջրեր	077 57 8983	
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ADAPTATION FUND

REPUBLIC OF ARMENIA
MINISTRY OF
ENVIRONMENT



Շրջակա միջավայրի նախարարության «Բնապահպանական ծրագրերի իրականացման գրասենյակ» պետական հիմնարկի կողմից
մշակված «REWater Հայաստան. գյուղըշիացած ջրի վերադարձ՝ կլիմայի փոփոխության նկատմամբ դիմականությունները
բարձրացնելու նպատակով» դրամաշնորհային ծրագիր հայեցակարգի շուրջ

ՄԱՍՆԱԿԻՑՆԵՐԻ ՑԱՆԿ

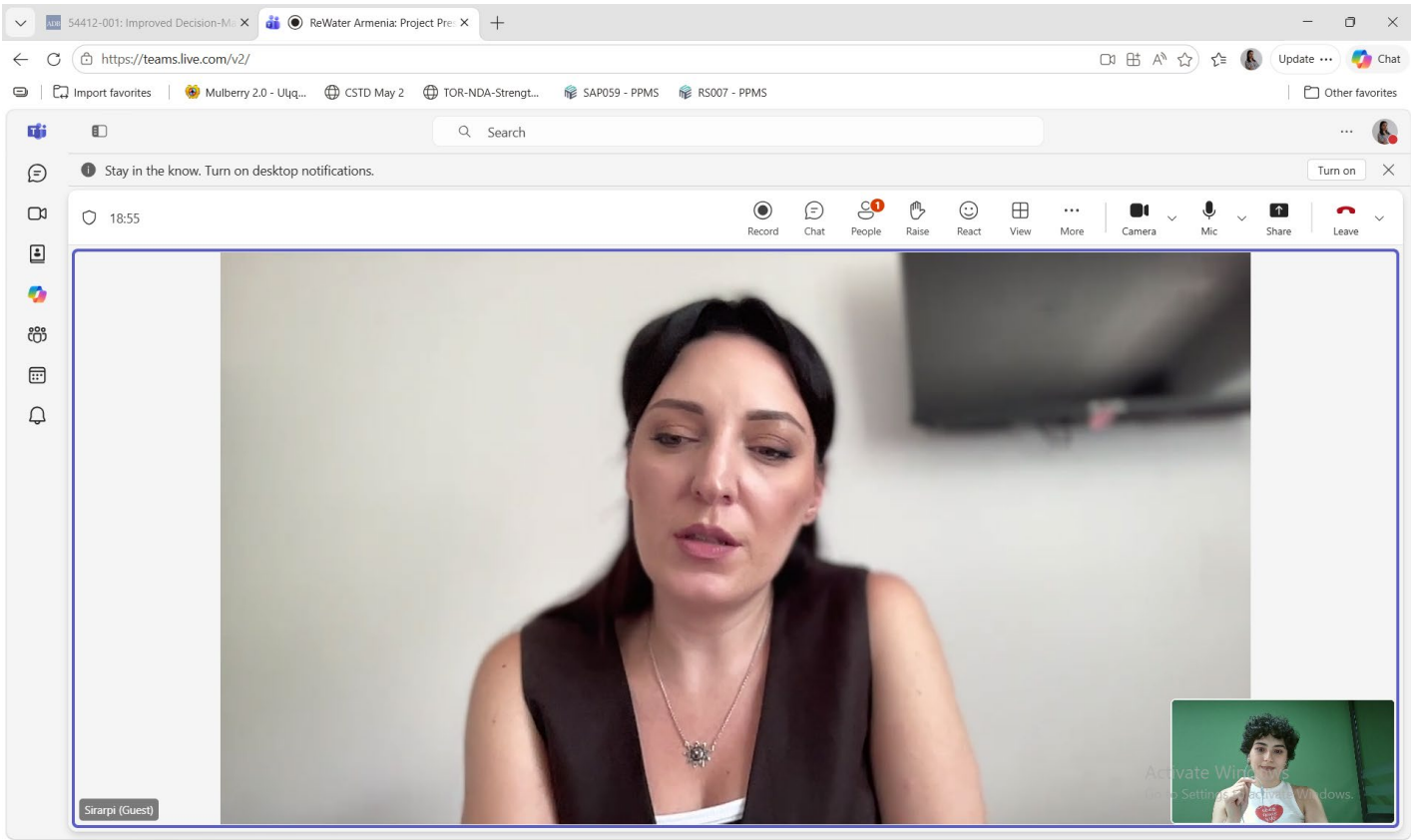
Խորհրդակցություն պետական հազվածի ներկայացուցիչների հետ

2026թ. հունիսի 25

N	Կառույց, պաշտոն	Մասնակից	Կոնտակտային տվյալներ	Ստորագրություն
1.	ՇՄՆ կլիմայական քաղաքականության վարչության պետ	Նոնա Բուդոյան	Nona.budoyan@env.am	
2.	ՇՄՆ ջրային քաղաքականության վարչության գլխավոր մասնագետ	Լիանա Մելգոնյան	liana.melqonyan@env.am 011818524/5271	
3.	ՇՄՆ «Հողօդօրենսդրության ոլորտի և մոնիթորինգի կենտրոն» ՊՈԱԿ-ի կլիմայի ծառայության կլիմայի ուսումնասիրության և մոնիթորինգի բաժնի պետ	Ելենա Խալաթյան	Yelena.khalyan@metemonitoring.am yelenakhalyan@gmail.com 077551020	

4.	ՀԱՆՐԱՊԵՏՈՒԹՅԱՆ ԼՈՒՍԻՆԵ ՇԱՃԱՐԿԱՆ ԱՌՆԻՊՈՐՏՈՒՄ ԿԵՆՏՐՈՆ» ՊՈԱԿ-ի հիդրոլոգիայի ծառայության հիդրոլոգիական կանխատեսումների բաժնի պետ	Լուսինե Շաճարյան	luseshakaryan@gmail.com 094633071	
5.	«Ջրատ» ՓԲԸ-ի ջրագրագործման բաժնի պետ	Վազգեն Գասպարյան	094911790	
6.	«Ջրատ» ՓԲԸ-ի ջրագրագործման բաժնի Սեփ և կազմակերպչական բաժնի Շահապատկերի ղեկավար	Պարգևատրվող Պարգևատրվող	093 12 12 00	
7.	Կենտրոնի ղեկավար			
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Annex 2B – Photographic Record of Consultations



Online meeting with Yeghvard NGO





Meeting with community





Meeting with state institution representatives