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## EU4Environment in Eastern Partner Countries: Water Resources and Environmental Data

### BRING BACK NATURE IN HAJIGABUL LAKE IN A WATER-SAVING APPROACH (AZERBAIJAN) – CONCEPT NOTE

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This note has been prepared in the framework of the EU4Environment-Water and Data programme (activity 1.1.3) on the basis of an initial brief bibliographical review, a study visit and discussions with local stakeholders and experts (Dec. 2023). This note describes a Phase 1 dedicated to the design of a participatory programme of works for Hajigabul Lake and a Phase 2 for the implementation of this programme.

#### Description of the site

Hajigabul Lake is located downstream of the Kura transboundary river basin. In the Shirvan-Salyan Economic Region, it covers 2 districts: Hajigabul and Shirvan. Its surface is about 8.4 km<sup>2</sup>, its altitude is -19.6m. It is divided into 2 lakes (Main and Baby Hajigabul) which are separated by a hydraulic structure built during the Soviet period.



Figure 1: Concerned area (UN map)

The lake was formed as a result of periodic flooding of the Kura River. It is considered to be a partial relic and shallow lake formed by the retreat of the Caspian Sea 6,000 years ago.

This area has been modified over the years mainly due to: human works in the area, human activities in the upstream basin (abstractions, dredging, dams, etc.). Hajigabul Lake is considered to be the most damaged lake in Azerbaijan due to anthropogenic impacts. As a result of the draining of the wetland ecosystems of the Garasu River and the damming of the Kura River by the cascade of water reservoirs, the ecological conditions of the lake have been severely affected.

The satellite views show the development of fish ponds and irrigation upstream, especially in the 2020's in the North with centre-pivot irrigation. The Eastern part of the imagery shows how dry this area is, as if Hajigabul Lake was the border between the productive irrigated area and the desert. Until recent years, periods of filling the lake have been followed by periods of drying.



Figure 2: Hajigabul Lake from a 1954 map (1/250,000)

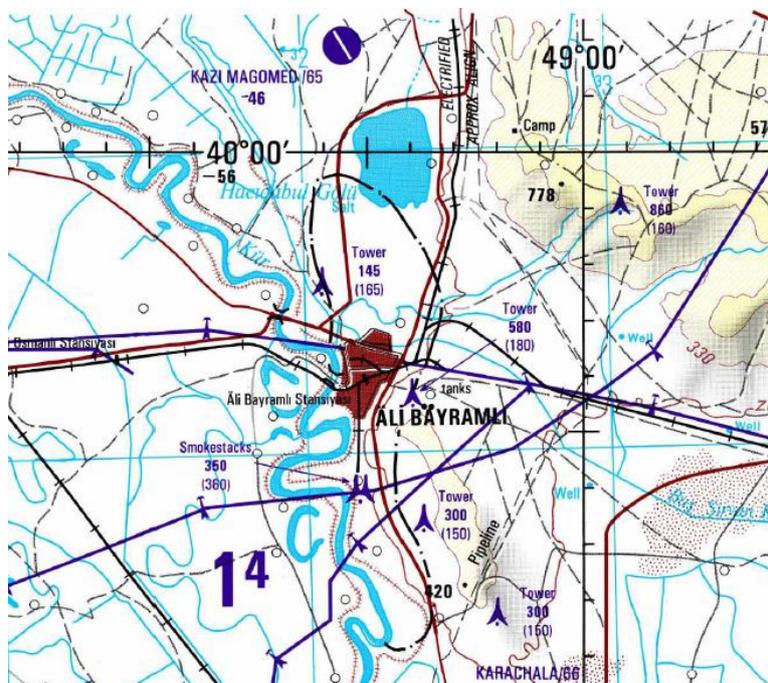
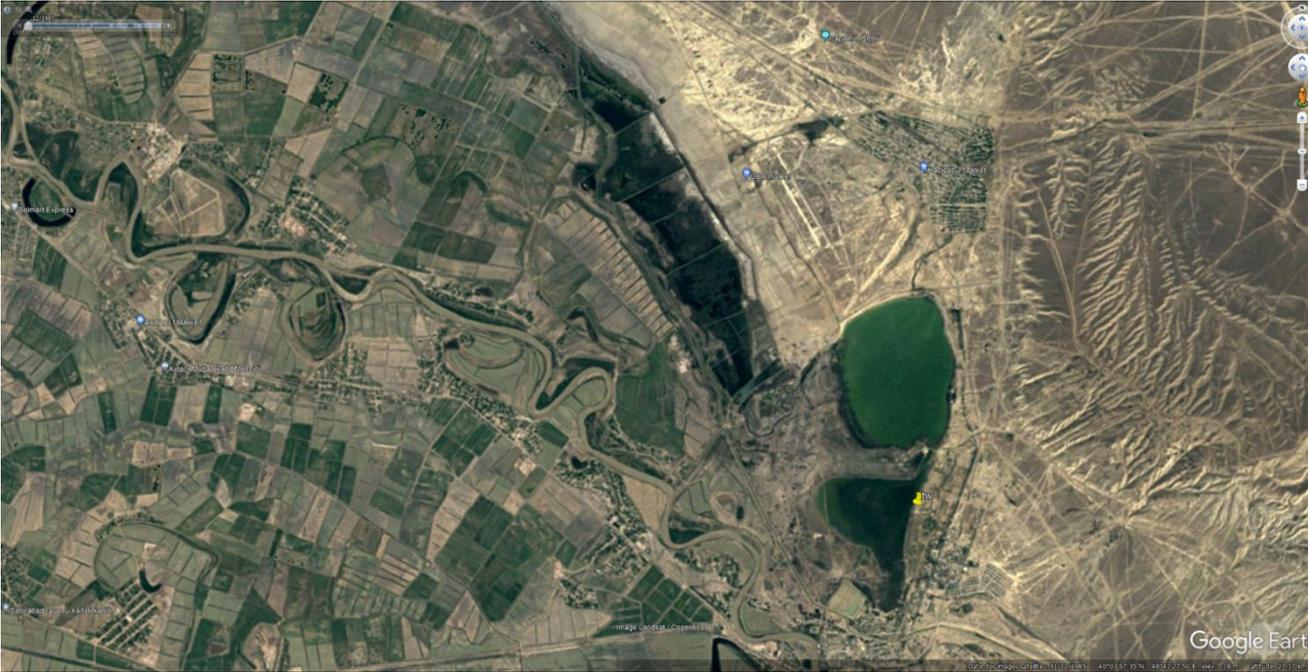


Figure 3: Hajigabul Lake from a 1999 map (1/250,000)



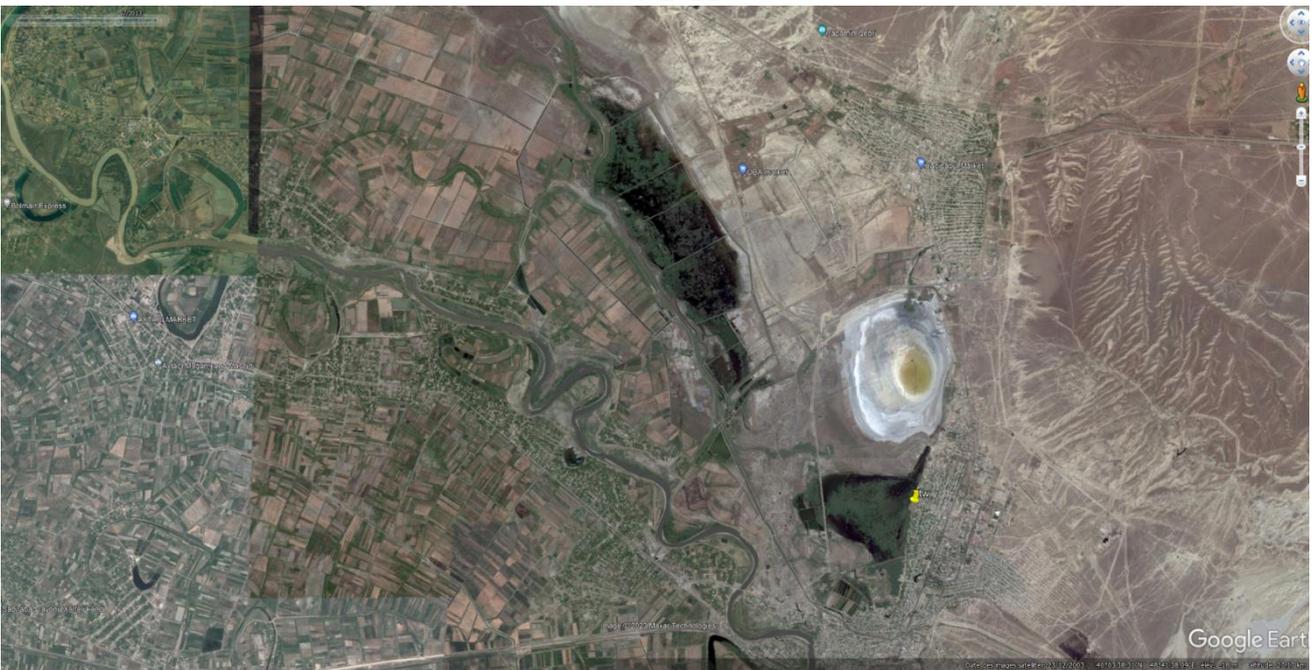
December 1985



September 2009



March 2012



July 2023



May 2018



December 2023

**Figure 4: Collection of satellite views (Google Earth)**

## Description of the issues

### *Biodiversity Loss*

Hajigabul Lake is included in the list of Important Birds Areas of Global Significance. It is also considered as a potential Ramsar Site. It has been reported that the number of registered bird species decreased. It is known that 5 species of Globally Threatened birds, 35 species of birds of European Importance and 6 species of birds listed in the Red Book of Azerbaijan are found in Hajigabul Lake. The lake is particularly important as one of the largest regular wintering areas for Globally Threatened White-Headed Duck (around 1,000 individuals annually).

Since 1994, Hajigabul Lake has lost its importance for fishing. Before the damming of the Kura River, about 16 species of fish were found in the lake. In the period 1986-1991, the catch of commercial fish species in Hajigabul Lake varied from 18 to 81 tonnes. In the past, the lake was navigated by small boats.

#### *Water Scarcity*

Water from the Kura River was pumped into the lake until 1992. Later, the water supply from the Kura River was stopped. Water from the Shirvan Thermal Power Plant used to be discharged into Hajigabul Lake. During the Soviet period, a dam was constructed between the main lake and the baby lake to reduce the risk of flooding. A collector/canal (Shirvan) was built from the Kura. The Kura Canal was built for drainage and evacuation to the Caspian Sea.

In the early 00s, the lakes gradually dried up. Baby Lake was filled by a pumping system from the canal. Baby Lake is less dry than the main lake.

The main lake was sacrificed and dried up. Now, and throughout the year, the main lake is dry, with only mud (silt) and no vegetation due to residual salt. However, satellite images show the main lake with more or less water for short periods.

#### *Water quality*

Wastewater more or less treated arrive in the lake without any dilution. In 2020, a treatment wetland was built to collect the pollution from 325 population equivalents of Shirvan (constructed wetlands with free water surface). In 2023 it is not functioning.

A lot of solid waste (mainly plastic) litters the land.

#### *Socio-economic impacts*

The landscape, fishing and other amenities have changed dramatically, with a major impact on the local population. The lake ecosystem has become a muddy area like the surrounding silty soils.

Fishing and tourism (bird watching, etc.) are severely affected by the scarcity and development of the lake into a dry area.

### **Objectives**

No miracle solution can be expected to restore Hajigabul Lake. Planning at the Kura scale is inevitable to reduce abstractions and increase Kura flows especially in the climate change context. What interest is there to bring water back in this large area (other than wasting water resources and subjecting them to evaporation)?

Therefore, the project could be a partial restoration of the 2 lakes and implantation of vegetation on the edges to create wetlands. The lake will be separated from the land with wetlands or directly accessible in a small part according to Nature based Solutions.

The more complex the shape of the lake, the larger the shoreline development factor is. This reflects the amount of nearshore habitat. The figures below describe possible shapes.

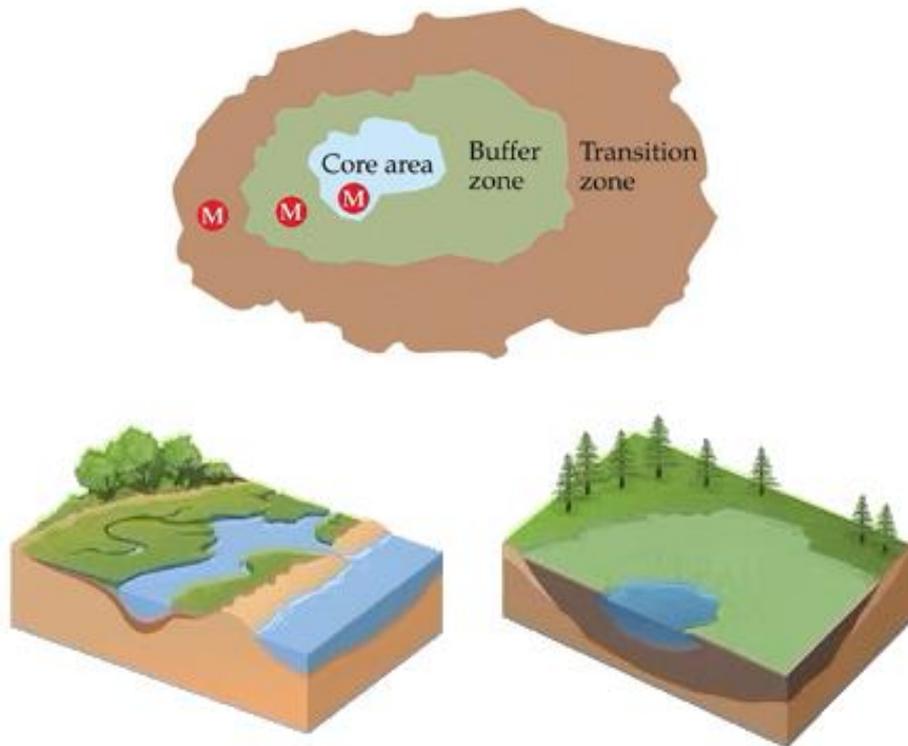


Figure 5: Examples of similar restoration initiatives (M: monitoring station)

## Consistency with policy

### *Of Azerbaijan*

Azerbaijan's geographical location and its diverse climate make the country's water resources extremely sensitive to climate change and other environmental impacts.

Water cooperation has proven to offer multiple benefits that accelerate progress across almost all the SDGs and that is why it should be up scaled.

Azerbaijan is a vulnerable country to climate change effects, and especially with the increase in the number, duration of droughts and water shortages. According to various climate scenarios water shortage will be increased up to 10-20% by 2040, which will have serious negative impacts to the whole economy and particularly to agriculture.

As a downstream country, Azerbaijan attaches great importance to transboundary water cooperation and formulated its national water policy in line with the 2030 Agenda.

Key focuses are improving water treatment, reducing losses, creating alternative water resources and recycling, assessment of water resources, improvement of the accounting system, integration of data into the "Electronic Water Management" information system and transition to an integrated management system.

By the State Climate Change Commission and Water Commission, large-scale measures are being taken to minimize negative impacts of climate change and increase climate resilience and take decarbonisation pathway.

Azerbaijan continues to work with international partners to implement the relevant SDGs.

In order to ensure effective management of water resources and prevent water scarcity, Azerbaijan formulated its national water policy. Moreover, Azerbaijan’s National Water Strategy is currently underway to develop an action plan based on integrated approach to water-climate policies in line with the SDGs.

Azerbaijan is actively working with international organizations to address environmental risks, including those related to water resources. Climate change is progressing day by day. In order to ensure resilience to hazardous hydrometeorological events, Azerbaijan is developing nationwide projects on establishing early warning systems. In addition, the modernization of hydrological observations has been ensured through the creation of automated observation systems. Azerbaijan has built the necessary capacity to monitor and manage water resources through the "Digitalized Water Management" information system. As a contribution to the UN Water Action Agenda Azerbaijan expresses readiness to act as a Regional Data Hub bringing together water information from the countries of the region on one platform to create the Global Water Information Services.

The project is in line with the orientations mentioned above.

### *Of the EU*

The project aims to climate change adaptation considering the severe drought situation Azerbaijan will face (and salinity of water and soils) in the coming years.

Concerning the Green Deal, the project concerns mainly the output “Preserving and restoring ecosystems and biodiversity”.

The EU supports biodiversity conservation and sustainable development through initiatives like the Biodiversity Strategy for 2030.

All these initiatives provide a framework for promoting the transition to a more sustainable and resilient economy, and for supporting biodiversity conservation and ecosystem restoration.

### *Of Other International Commitments*

The main SDGs concerned are mentioned below:



## **Components and activities of the phase 1**

### *Component 1: Technical studies*

In order to prepare such a large project, preliminary studies are necessary to identify relevant works. The studies will address the characterisation of Hajigabul Lake and propose a future design and courses of action to restore near-natural conditions, which will be discussed, reviewed and redirected under Component 3.

Important: Note that the project cannot solve all the problems of the Kura River, but must be linked to the development of a River Basin Management Plan for the whole Kura River and local Quantitative Water Allocation Management Plans to address quantitative issues. Activities related to the whole Kura basin will not be addressed in this project.

Results will be: technical reports characterising Hajigabul Lake with a diagnostic and proposal of technical actions. Reports will be reviewed in the light of the results of the other components.

### **Component 2: Socio-economic valorisation**

Component 2 will specifically address the benefits of the project to the local people. Based on the proposals from Component 1 and to be discussed in Component 3, a socio-economic diagnostic will be used to prepare a participatory socio-economic plan for Hajigabul Lake, to be discussed and reviewed in Component 3.

A cost-benefit analysis will be developed, including valuation of restored ecosystem services. In order to ensure the sustainability of the project, a common vision needs to be shared among the population. The idea is not to close an area and ban all human activities, but to organise human activities for the long term in balance with ecosystem protection.

Taking into account the "One Health" concept, the health of ecosystems, humans and animals are interlinked and the proposals must contribute to strengthening them.

Consistency with the relevant regional and district development plans will be sought.

The results will be: socio-economic reports characterising the activities of local communities with a diagnosis and a proposal for action. The reports will be reviewed in the light of the results of the other components.

### **Component 3: Stakeholders' involvement**

In order to ensure the sustainability of the project and its local ownership, it is necessary to establish an inclusive governance: government representatives, regional and district representatives, municipal and local governments, local communities, experts, farmers, industry, local NGOs, etc., gathered in a gender-balanced manner to develop a local partnership involving the population, which is the key to the success of such an approach.

By working together, they can ensure the long-term sustainability of Hajigabul Lake ecosystem and the well-being of its inhabitants.

It must work as a decentralised process. Therefore, extensive activities of local facilitation teams, awareness-raising, workshops, training, etc. will be implemented to involve the communities in the decision-making process.

The results of components 1 and 2 will be discussed, shared and reviewed during component 3 activities.

The results will be: meetings reports, workshops, training, comments on the results of components 1 and 2 and a final action plan with cost estimation, validated by the local stakeholders as a charter and/or a common agreement with a common vision of an attractive future to restore nature in Hajigabul Lake in a water saving way. The final participatory action plan will be used to motivate donors.

Table 1 suggests a rough content of the studies (C1: Component 1).

## **Components and activities of the phase 2**

Phase 2 will be dedicated to the implementation of the actions, identified with the results of the 3 components of Phase 1.

## **Synthetic table of components and activities for phases 1 and 2**

The table below proposes a coherence between objectives, studies (phase 1) and actions (phase 2).

**Table 1: Description of the 2 phases of Hajigabul Lake project**

Type of study	Study – Phase 1	Works – Phase 2
C1: Design of the new Hajigabul Lakes System	Topography to prepare a relevant and detailed map of the complete site and around.	<p>Implementation of additional monitoring system (e.g. piezometric network)</p> <p>Public works like dredging and digging in some areas to reduce the area of the lake, bring groundwater to the surface (small ponds, wetlands) in the big lake, extend depth, find the substratum; create artificial edges, gently sloping banks, islands, etc.</p> <p>Implementation of new wetlands and protection the existing wetlands.</p>
C1: Design of the new Hajigabul Lakes System	Bathymetry of the lakes to estimate the depth of sediments, of the bed-rock then to propose local excavation in a final design.	
C1: Design of the new Hajigabul Lakes System	Sediments (granulometry, quality, salinity, organisation in horizons) to estimate the dredging needs and the process to evacuate the saltier horizons.	
C1: Design of the new Hajigabul Lakes System	Study groundwater (depth, quality) to evaluate the impact of groundwater on surface water (alimentation of the lake, degradation).  Propose a piezometric network.	
C1: Design of the new Hajigabul Lakes System	Study the meteorological conditions and runoff.  Propose a rainwater collection approach (Natural water retention measures, reservoirs, etc) and its sustainable management.  Design the lake taking the wind into account (to reduce the impact of wave action on banks).	
C1: Design of the new Hajigabul Lakes System	Collect similar international experiences.  Propose examples of relevant design and approaches.	
C1: Design of the new Hajigabul Lakes System	Production of a design of the project (map, plans, material needs, volume of works, etc.) must be in line with the results of the other studies i.e. water resources available, quality of sediments, target species and habitats, development of biodiversity, management of the human activities, etc. The design must be costed and ready for the consultation.	
C1: Water resources management	<p>Study of the available water resources (quantity, salinity) and the current management of the hydraulic system (Kura, Kura canal, Shirvan collector, waste water, runoff, etc).</p> <p>Study the flood risks.</p> <p>Estimate the volume and area of the lakes which could be filled, the quality and salinity to estimate the optimum blending between Kura and Shirvan Collector.</p> <p>Propose a hydraulic management in a smart way depending on quantity and salinity.</p>	<p>Implementation of additional monitoring system</p> <p>Construction of infrastructures, implementation of software, identification of the responsibilities</p>

Type of study	Study – Phase 1	Works – Phase 2
	Propose a prioritisation (Main Hajigabul, Baby Hajigabul or both).	
C1: Water resources management	<p>Monitor the quality of the inputs in the Hajigabul system (Kura, Kura canal, Shirvan collector, waste water, runoff, etc).</p> <p>Proposal of measures to improve the quality of the tributaries and various inputs in the lake in order to avoid eutrophication and to improve the quality of the lakes;</p>	<p>Sanitation (e.g. creation of efficient Treatment Wetlands).</p> <p>Buffer protection.</p> <p>Improvement of agricultural practices and fisheries.</p> <p>Associated controls.</p> <p>Limit the new polluting activities.</p>
C1: Water resources management	Propose a rough scheme at the upstream basin scale.	To be included in the Kura-Araz River Basin Management Plan.
C1: Biodiversity development	<p>Implement a botanic approach to identify the relevant and not invasive plants for the edges of the lake.</p> <p>Search plants to extract the salt from the Shirvan Collector (like a Treatment Wetland).</p> <p>Opportunity of productive species.</p>	<p>Breeding of plant vegetation adapted to salty, tilly and wet conditions.</p> <p>Plantation in the chosen areas.</p> <p>Organisation of the protection and maintenance of the vegetation.</p> <p>Organisation of the productive areas if any.</p>
C1: Biodiversity development	<p>Identify and assess the current and past biodiversity of the Hajigabul system.</p> <p>Study the opportunity and the risks to (re)introduce species (seal, etc).</p> <p>Propose the construction of dedicated habitats to the target species.</p>	Construction of specific habitats to favour the biodiversity.
C2: Solid waste management	<p>Inventory of solid waste deposit.</p> <p>Propose a sustainable solid waste management in the 2 raions.</p>	<p>Clean the existing deposit.</p> <p>Manage solid wastes in the 2 raions in a sustainable way.</p> <p>Set garbage collector in the site.</p> <p>Raise awareness of the local people and tourists.</p>
C2: Socio-economic development	<p>Develop a socio-economic analysis of the expectations and needs of local population of the 2 raions.</p> <p>Propose and size economic opportunities (fish, tourism, plants, intensive agriculture, etc.).</p> <p>Propose a scheme for the tourists' movement inside the site.</p>	Facilitate the development of the identified economic activities in line with the concerned agencies.
C2: Land property issues	Identify the issue of property (lake vs land) especially between the 2 concerned rayons (Shirvan and Hajigabul) and the Shirvan Oil Company.	<p>The land-owning issues are solving with clear properties and responsibilities.</p> <p>A protection status is proposed.</p>

Type of study	Study – Phase 1	Works – Phase 2
	Propose the responsibilities, legal support needs, budget.	
C3: Stakeholders' involvement	Develop the stakeholders' analysis. Propose a relevant governance linked with the project involving local people (implementation of a local steering committee, consultation process, etc.).	Maintain the institutional arrangement during the works and beyond.
C3: Results monitoring	<p>Propose criteria and dash board to follow-up the progress of the project:</p> <ul style="list-style-type: none"> <li>Success rate of plants implementation,</li> <li>Habitat quality,</li> <li>Species richness, population density, distribution</li> <li>Water quality,</li> <li>Carbon sequestration,</li> <li>Area of the flooded areas and duration in the Hajigabul system,</li> <li>Number of visitors,</li> <li>Trends of income for the local people,</li> <li>Satisfaction of the local people, participation rates,</li> <li>Etc.</li> </ul> <p>Propose the baseline and a communication plan to share the results.</p> <p>These indicators will be used to track changes in the ecosystem, evaluate the effectiveness of restoration efforts, and inform future management decisions. These indicators can be monitored through various methods such as field observations, ecological surveys, remote sensing, and water quality sampling. By regularly monitoring these indicators, restoration practitioners and stakeholders can evaluate the effectiveness of restoration activities and make informed management decisions to ensure the long-term health and sustainability of Hajigabul Lake ecosystem. Defining specific values for targets of the indicators mentioned requires a more detailed analysis of the current state of the ecosystem, as well as a thorough understanding of the ecosystem's capacity to recover from degradation.</p>	Fill the dashboard after the works.

## Planning

The 3 components mentioned above could be developed over 18 months as Phase 1.

In a Phase 2, the participatory measures defined and validated in Phase 1 (works, monitoring, local regulations, awareness raising, etc.) could be implemented over 24 months, subject to budget availability.

## Budget

The estimated budget for the development of the three components above is estimated at EUR 250,000 - 500,000, including local and international expertise, additional monitoring, logistics, organisation of meetings, etc. (Phase 1).

It is difficult to provide a rough estimate of the cost of restoration works as the cost will depend on many factors, including the specific activities and interventions required, the timeframe for implementation and the availability of funding sources. Restoration costs could range from EUR 2,500,000 to EUR 5,000,000, depending on the scale and complexity of the restoration activities and supporting socio-economic measures.

The cost of monitoring and evaluation of the restoration work and socio-economic impacts could range from EUR 25,000 to EUR 40,000, depending on the frequency and extent of the monitoring activities required to track the progress of the restoration.

## Project owner

The project owner for the 3 components described above (phase 1) is the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan.

For the phase 2, the project owning will depend on the measures.

**Annex: Photos (December 2023)**



**View of the lake from the North (from Hajigabul district)**



**View from the East (from Shirvan district)**



**The Shirvan collector (North)**



**The Shirvan collector (South)**



**One of the solid waste deposit**



**Close to Baby Hajigabul (Shirvan district)**



**Example of the past (Shirvan district)**