



# MANAGEMENT PLAN FOR SUDOCHYE LAKE SYSTEM RAMSAR SITE



MINISTRY OF ECOLOGY,  
ENVIRONMENTAL PROTECTION  
AND CLIMATE CHANGE OF THE  
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The contents of this report are the sole responsibility of the author and can in no way reflect the official opinion of the GIZ project.

On behalf of  
Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN)

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## Key Terminology of the Ramsar Convention

<b>Term</b>	<b>Definition</b>
Aquaculture	The farming of fish or other aquatic organisms. In wetlands, aquaculture must be managed to avoid disturbance to sensitive species and degradation of ecological character.
Buffer Zone	A surrounding area that provides additional protection to a core wetland by controlling or limiting potentially harmful activities.
CEPA Programme (Communication, Education, Participation, and Awareness)	A Ramsar framework for engaging stakeholders and the public to support wetland conservation through outreach, training, and participatory approaches.
Collector–Drainage Canal	An engineered canal that collects and removes irrigation drainage water. In the Sudochoye Lake System, such canals (e.g., KKS, Ustyurtskiy) are the main sources of inflow and strongly influence water quality and salinity.
Contracting Party	A country that has signed and ratified or acceded to the Ramsar Convention and thereby agreed to uphold its obligations.
Core Zone (Strict Conservation Zone)	A legally defined area within or near a protected site with the highest level of protection, where public access and activities are strictly limited or prohibited to safeguard sensitive habitats and species.
Criteria for Identifying Wetlands of International Importance	A set of nine ecological and biological criteria used to assess whether a wetland qualifies as internationally important.
Ecological Character	The combination of the ecosystem components, processes, and services that characterize the wetland at a given point in time.
Ecosystem Services	The benefits people obtain from ecosystems, including provisioning, regulating, supporting, and cultural services.
Ecotourism	Nature-based tourism that aims to minimize environmental impacts, support conservation, and provide benefits to local communities.
Environmental (Ecological) Flow	The quantity, timing, and quality of water flows required to sustain the ecological functioning, habitats, and species of a wetland ecosystem.
Flyway	A major migration route used by bird species between their breeding and non-breeding areas.
Habitat Connectivity	The degree to which separate habitat patches remain linked, allowing species to move, feed, and breed.

Hydrochemical Monitoring	The regular measurement of chemical parameters in water—such as salinity, nutrients, and dissolved oxygen—to assess ecological condition and changes over time.
Hydrological Monitoring	The systematic measurement of water levels, inflows, to understand wetland dynamics and detect changes affecting ecological character.
Important Bird and Biodiversity Area (IBA)	A site recognized internationally for its significance in bird conservation, identified using globally standardized criteria developed by BirdLife International.
Low-Impact Visits	Tourist activities designed to minimize disturbance to wildlife and habitats, such as guided visits, use of marked trails, seasonal restrictions, and controlled group sizes.
Mineralization (Total Dissolved Solids – TDS)	A measure of the total concentration of dissolved minerals and salts in water. Higher mineralization indicates increased salinity.
Ramsar Convention	An international treaty adopted in 1971 in Ramsar, Iran, for the conservation and wise use of wetlands through local and national actions and international cooperation.
Ramsar Information Sheet (RIS)	The standardized data form used to describe Ramsar Sites, including their ecological features and threats.
Ramsar Site	A wetland that has been designated by a Contracting Party for inclusion in the List of Wetlands of International Importance under the Convention.
Salinization	The accumulation of dissolved salts in soils or water bodies, often resulting from irrigation drainage, evaporation, and limited freshwater inflow.
Seasonal Wetland	A wetland that is temporarily flooded during certain seasons and dry at other times.
Wetland	Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including marine areas with depth at low tide not exceeding 6 meters.
Wetland Inventory	A comprehensive collection of data on wetlands, including their location, size, type, and values. A fundamental tool for wetland planning and management.
Wetland management plan (for a Ramsar Site)	A documented strategy that describes the site's current ecological-hydrological status, sets objectives for maintaining or improving its ecological character, prioritises actions to achieve those objectives, and provides a framework for implementation, monitoring and review.
Wise Use	The maintenance of wetlands' ecological character, achieved through the implementation of ecosystem

	approaches, within the context of sustainable development.
Wildlife Sanctuary (State Wildlife Sanctuary)	A national protected area category in Uzbekistan (“Zakaznik” in Russian), established to conserve specific species, habitats, or natural complexes. Economic activities are restricted and regulated but not fully prohibited, unlike in strict nature reserves.
Zero-Waste Principle (in protected areas)	A rule requiring visitors and operators to prevent littering, remove all waste they bring, and avoid practices that generate pollution.

## List of the abbreviations used in the text

<b>Abbreviation</b>	<b>Full Term</b>
AA	Administrative Authority
BOD <sub>5</sub>	Biochemical Oxygen Demand (5 days)
CRA	Climate Risk Assessment
CBD	Convention on Biological Diversity
CEPA	Communication, Education, Participation and Awareness
COD	Chemical Oxygen Demand
DIAPOL-CE	Policy Dialogue and Knowledge Management on Climate Protection Strategies
DO	Dissolved Oxygen
EC	Electrical Conductivity
GHG	Greenhouse Gases
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IBA	Important Bird and Biodiversity Area
IWRM	Integrated Water Resources Management
KBA	Key Biodiversity Area
KKS	Kundradskiy Collector–Drainage Canal (Kundradskiy sbros)
MBZ	Managed Buffer Zone
MES	Ministry for Emergency Situations
MoEEPCC	Ministry of Ecology, Environmental Protection and Climate Change
MWR	Ministry of Water Resources of Uzbekistan
NFP	National Focal Point
NWI	National Wetland Inventory
PA	Protected Area
RIS	Information Sheet on Ramsar Wetlands
RRI-CA	Ramsar Regional Initiative for Central Asia
SLS	Sudochye Lake system
STRP	Scientific and Technical Review Panel
TDS	Total Dissolved Solids
WWD	World Wetlands Day

## Introduction to the management context

During the preparation of the Management Plan for the Ramsar site Sudochye Lake System, we followed the methodology and structure outlined in “Wetland Management Planning – A Practitioner’s Guide” by Matthew Simpson, published by the Ramsar Regional Centre – East Asia (RRC–EA, 2020). The development of this document was carried out with the intention that it will serve as a model for the preparation of management plans for other Ramsar Sites in Uzbekistan in the future.

The following key guidelines were applied during the preparation of this Management Plan:

- ensuring the text is well structured and clearly formatted to allow readers to easily navigate the information,
- using accessible and inclusive language understandable to all stakeholders,
- providing data and referencing sources wherever possible to substantiate factual statements,
- incorporating tables, and maps to support and illustrate the description,
- describing, to the best of our knowledge and based on available information, all qualifying Ramsar Criteria.

Efforts were made to indicate both the information currently available and the data gaps that require further research for a comprehensive evaluation of the site. As part of this process, the project team conducted a field visit to the Sudochye Lake System in March 2025 and organized two stakeholder consultations—the first in March and the second in October 2025. Both took place in Nukus, Republic of Karakalpakstan.

## Governance structure and policy context

The Sudochye–Akpetki State Wildlife Sanctuary (also referred to in the national legislation as a *state nature reserve*) is a protected natural territory of the Republic of Uzbekistan, category: Complex (Landscape) Sanctuary / State Sanctuary. It was established by Resolution No. 58 of the Cabinet of Ministers of the Republic of Uzbekistan dated 8 February 2021, “On the Establishment of the ‘Sudochye–Akpetki’ Wildlife Sanctuary in the Republic of Karakalpakstan” (MoEEPCC, 2021).

The wildlife sanctuary’s lands are classified as lands designated for nature protection. These lands are completely excluded from economic use and are utilized exclusively for the preservation, reproduction, and restoration of protected natural objects and complexes. The sanctuary 's territory is considered in the development of plans and programs, zoning schemes, and other plans for territorial planning, natural resource use, and their protection.

The total land area of the "Sudochye Lakes System" section is 84,702 hectares. The total area of the "Sudochye Lakes System" protection zone is 52,938 hectares (MoEEPCC, 2021).

At present, the legislation of the Republic of Uzbekistan, in particular the Law “On Protected Natural Areas”, does not explicitly require the development of management plans for wildlife sanctuaries, which covers almost entirely Sudochye Lake System Ramsar Site.

Approval of the Management Plan could be implemented through departmental regulations of the Ministry of Ecology, Environmental Protection and Climate Change (MoEEPCC) of the Republic of Uzbekistan or decisions of local authorities. In the country’s protected areas management practice, there are precedents where management plans for national parks and sanctuaries were approved by orders of the MoEEPCC (Aripdjanov, 2025).

For the Sudochye–Akpetki Wildlife Sanctuary, established by a Government Resolution, it would be appropriate to formalize the Management Plan as a regulatory document—for example, by approving it through a Resolution of the Cabinet of Ministers of the Republic of Uzbekistan. As a result, the Cabinet of Ministers Resolution No. 58 of 8 February 2021, which established the Sudochye–Akpetki Wildlife Sanctuary, could be supplemented with a clause assigning responsibility for implementing the Management Plan, as well as for approving the zoning map of the Wildlife Sanctuary and the list of prohibited activities within the protection and buffer zones.

The same Resolution already contained a mandate to prepare a proposal for the inclusion of Sudochye in the Ramsar List of Wetlands of International Importance; similarly, it could include a mandate concerning the management plan (Aripdjanov, 2025).

Thus, the legal framework would consist of the following components: a) the Law on Protected Areas (defining the general competence of agencies and the concept of a management plan); b) the Resolution establishing the Wildlife Sanctuary (setting specific objectives); and c) a regulatory act approving the Management Plan. The latter would give the document official status, making it binding for all participating organizations.

It should be noted that the Management Plan itself does not have the force of law, but it contains recommendations and measures, for the implementation of which specific instructions and provisions must be reflected in the operative part of the approving document. Therefore, simultaneously with the development and adoption of the plan, a mechanism for its implementation must be defined: the authorities responsible for each activity area should issue their own orders to carry out the measures, and local governments should incorporate the key provisions of the plan into their district socio-economic development programmes.

The success of the Management Plan will largely depend on how effectively its provisions are integrated into the practical work of responsible agencies and land users (Aripdjanov, 2025).

After the development and agreement of the Management Plan with all relevant stakeholders (MoEEPCC, Ministry of Water Resources, local authorities, donors etc), it must be officially approved—ideally, by a Resolution of the Cabinet of Ministers of the Republic of Uzbekistan. The resolution should specify which institutions are responsible for implementing each section of the Plan. Afterward, this resolution should be circulated among all relevant agencies so that they can incorporate the Plan’s measures into their annual work programs.

Each agency assigned a task must ensure that budgetary resources are allocated for its implementation. For example, the MoEEPCC in the Republic of Karakalpakstan should plan garbage collection and transportation from the Sudochye Lake System (SLS) / Sudochye-Akpetki Wildlife Sanctuary. This will transform the plan from a purely advisory document into a component of official development programs (Aripdjanov, 2025).

Some measures will require amendments to existing legal and regulatory acts. The Resolution approving the Management Plan should contain the relevant proposals. For instance, the establishment of a buffer zone will require amendments to the Cabinet of Ministers’ Resolution establishing the Wildlife Sanctuary. The Plan should also envisage the creation of a Directorate/Administration for Sudochye and an increase in staffing, which can be formalized through amendments to the same government resolution.

Overall, the political and legal environment of Uzbekistan is sufficiently flexible to integrate a new Management Plan. Based on the analysis, a number of areas for improving existing legislation were identified to ensure the effective protection and sustainable use of the Sudochye

Ramsar Site. The following recommendations for amendments and additions to legal acts are proposed.

**Strengthening Legal Protection of the Territory and Its Resources.** The first set of changes aims to give the Sudochye–Akpetki Wildlife Sanctuary a clearer and stronger legal status. Although the Wildlife Sanctuary has already been established by a government resolution, it would be useful to consider upgrading its category of protection. One option is to transform the Wildlife Sanctuary into a national (natural) park. The Law on Protected Areas allows for the creation of natural parks whose main objective is to preserve valuable natural complexes while allowing regulated tourism and educational activities. Assigning Sudochye the status of a national park of republican importance would strengthen protection and attract more management resources. However, this is a long-term goal (Aripdjanov, 2025).

At the initial stage, it is proposed to introduce the concept of “Ramsar Sites” into national law. For example, amend the Law on Protected Areas to include a provision stating that: “Protected areas may include wetlands of international importance (Ramsar Sites), for which a special regime of protection and sustainable use shall be established.” This would legally recognize the special status of such areas and facilitate alignment with the Ramsar Convention.

It is also necessary to revise the permitted and prohibited types of land and resource use within the area. The Cabinet of Ministers should adopt a resolution specifying authorized and prohibited activities within the Sudochye Ramsar Site.

Permitted uses would include traditional, low-impact activities such as small-scale fishing under quotas, limited grazing in designated zones, and regulated ecotourism on approved routes. Such clearly codified rules would make enforcement straightforward and legally binding.

**Introducing a Legal Framework for “Wise Use” of Ramsar Wetlands Resources.** This involves specifying the “wise use” principle at the national level. The Law “On Nature Protection” could be amended to include a provision that: “With respect to wetlands of international importance, principles of wise use shall be applied to ensure the maintenance of their ecological character.”

Building on this, the Cabinet of Ministers could be mandated to adopt a Regulation on the Rational Use of Resources in Ramsar Territories, defining:

- requirements for Environmental Impact Assessment (EIA) for any projects affecting Ramsar Sites;
- the obligation to maintain environmental water flows;
- the priority of species and habitat protection over economic activities; and
- public participation in monitoring and decision-making.

The principles of sustainable use must be integrated into sectoral regulations. Examples:

- Fisheries regulations: limit industrial fishing in Ramsar Sites.
- Subsoil-use regulations: prohibit exploration or extraction within Ramsar Sites.
- Land legislation: require environmental approval from ecological authorities before converting land around Ramsar Sites for other purposes (Aripdjanov, 2025).

Together, these measures would form a legal shield around Sudochye Lake System and similar wetlands.

**Necessary Amendments to Sectoral Laws:**

- Law “On Protected Areas”. Add the term “Ramsar Sites” and clarify provisions on buffer zones. Article 47 already refers to protective zones but lacks clear parameters. Require that every new protected area’s establishing document defines buffer-zone width and

restrictions. For existing areas, instruct the Government to establish them. Introduce the concept of a “managed buffer zone”—areas with limited, regulated economic activity under protected-area administration supervision.

- Law “On Nature Protection”. Add a provision requiring mandatory state environmental expertise for projects within or near Ramsar Sites and strengthen penalties for pollution or destruction of rare species in these territories.
- Law “On Water and Water Use”. Introduce the concept of “environmental (ecological) flow” — the volume of water required to maintain wetland ecosystems. This should become a recognized priority in water allocation, defined scientifically and approved by the ecological and water authorities. Require users to maintain discharge quality safe for ecosystems and impose liability for disrupting hydrological regimes (e.g., unauthorized closure of supply channels).
- Laws “On Protection and Use of Wildlife” and “On Protection and Use of Flora”. Limit use of biological resources to non-destructive forms — e.g., prohibit hunting etc. These provisions should appear both in subordinate rules and directly in the laws.

Updating Subordinate Acts:

For instance, Cabinet Resolution No. 13 of 2018 on visiting protected areas could be expanded for Sudochye Lake System to establish special visitation conditions and licensing requirements for tourism, and to list Sudochye among territories where controlled ecotourism may occur.

Introducing a Legal Status of “Managed Buffer Zone”. Currently, legislation mentions protective zones but does not define how they are managed. It is proposed to establish the concept of a “Managed Buffer Zone (MBZ)” around the Sudochye Ramsar Site—a zone adjacent to the Wildlife Sanctuary boundary, where limited economic activity is permitted under conditions that minimize negative impacts (Aripdjanov, 2025).

This can be formalized as follows:

- The government resolution defines MBZ boundaries (coordinates or landmarks) and stipulates a special regime for this zone.
- The resolution authorizes the MoEEPCC, together with local authorities, to prepare a Regulation on the Managed Buffer Zone of the Sudochye–Akpetki Wildlife Sanctuary. This document should specify permitted activities and prohibited ones. It should also set requirements for sustainable wildlife, land and water management practices and require coordination of any new projects with the Wildlife Sanctuary administration and environmental authorities.
- The Wildlife Sanctuary administration, jointly with local ecological inspections, must have authority to monitor and patrol the buffer zone.

The MBZ would offer a balanced system — protecting the core wetland while allowing compatible traditional use, thus avoiding social conflict. Once the MBZ is approved, information on its boundaries should be entered into the land cadastre, with appropriate notations in land-use documents.

The proposed legislative package would include:

- Amendments to national laws (to strengthen Ramsar protection, environmental flows, and buffer zones), and

- New government resolutions and departmental acts (to define Sudochoye’s protection regime and Managed Buffer Zone).

Implementation of these recommendations would significantly enhance the legal protection of Sudochoye and create conditions for cross-sectoral cooperation in its sustainable management.

## Identified stakeholders

Effective implementation of the Management Plan requires a clear division of functions among the various agencies and organizations.

1. Ministry of Ecology, Environmental Protection and Climate Change (MoEEPCC) of the Republic of Uzbekistan, an administrative authority (AA) for the Ramsar Convention in Uzbekistan.

This is the lead authorized body responsible for overall leadership of Plan implementation. Proposed roles of the MoEEPCC:

The Ministry should initiate the necessary amendments to laws and resolutions prepare draft regulations on the regime of the Wildlife Sanctuary and buffer zone, changes to the State Environmental monitoring Programme and approve standards for resource use.

The Ministry should lead interagency coordination, convene meetings, monitor implementation of measures by all participants, and maintain a consolidated work schedule.

Through its Protected Areas Department, the MoEEPCC should provide methodological guidance to the Wildlife Sanctuary administration, engage research institutes in monitoring, and ensure the exchange of best practices with other Ramsar Sites.

The Ministry should prepare applications for financing Plan measures from the state budget and seek external resources (GEF grants, technical assistance from different donor agencies, etc.), acting as the country’s single representative.

2. Ministry of Water Resources of Uzbekistan (MWR) determines if, when, and how much water from Amudarya River reaches the Sudochoye Lake System (SLS) and respectively controls the canals, collectors, and hydrological structures.

The Ministry of Water Resources (MWR) should work closely with the Ministry of Ecology, Environmental Protection and Climate Change (MoEEPCC) to ensure the provision of ecological (environmental) flows to the Sudochoye Lake System. These flows are essential for maintaining stable water levels and salinity, which in turn support reedbeds, breeding waterbirds, and the overall ecological character of the Ramsar Site, preventing further degradation. In return, MoEEPCC should regularly share hydrochemical monitoring data from the Sudochoye Wetland System with MWR to enable informed operational decisions.

Another important aspect of coordination concerns the operation and maintenance of supply and drainage infrastructure, including irrigation and collector-drainage channels that feed into Sudochoye. Strengthening and modernising the state hydrological monitoring system—covering inflows, outflows, water levels, salinity and other key parameters—is critical for effective water regulation.

The participation of MWR is essential for translating the Management Plan’s measures—such as environmental flow allocations, adjustments to hydraulic structures, emergency routing, and routine maintenance—into practical water management decisions that safeguard the ecological integrity of the Sudochoye Lake System while supporting the livelihoods of local communities.

3. The Ministry of Agriculture of Uzbekistan is responsible for agricultural land use, pasture management, promoting sustainable agricultural practices and the regulation of agrochemical practices in the including areas of the irrigation system attached to the Kundradskiy Collector–Drainage Canal, the main source of the chemical pollution of the Sudochye wetlands. Another important function is the management of aquaculture and fish-farming.

Agricultural activities in the wider Priaralye, including irrigation farming and livestock grazing, directly influence the wetland’s hydrological regime, nutrient loads, salinity levels and reedbed dynamics through water abstraction, drainage flows and diffuse pollution from fertilizers and pesticides. The Ministry’s engagement is essential to integrate wetland-friendly agricultural practices—such as reduced agrochemical inputs, improved soil management, controlled livestock access and promotion of conservation agriculture—into district development plans.

As a decision-maker in irrigation scheduling and extension services, the Ministry can help reduce harmful runoff to collector-drainage channels feeding Sudochye and ensure that local farmers adopt practices compatible with Ramsar’s “wise use” principles. Active cooperation with the Ministry will support long-term sustainability of the wetland by aligning agricultural policies, farmer training programmes and rural development measures with the ecological needs of the Sudochye Lake System.

4. The Ministry for Emergency Situations (MES) is an important stakeholder in the management of the Sudochye Lake System due to its current lease and planned operational use of Bol’shoe Sudochye Lake.

As the institution is responsible for overseeing this water body, MES plays a direct role in shaping how the lake is managed, particularly with regard to proposed aquaculture development, infrastructure maintenance, and access control. Because Bol’shoe Sudochye is an integral component of the Ramsar Wetland, MES activities must align with Ramsar principles of wise use, ensuring that any economic use—especially fish farming—does not negatively affect water quality, waterbird breeding colonies, hydrological regimes, or the ecological character of the site. Effective cooperation between MES, the Ministry of Water Resources, and the Ministry of Ecology is essential to ensure that aquaculture management and environmental protection are fully harmonised. MES participation is therefore critical both for maintaining safe operational conditions at Bol’shoe Sudochye and for ensuring long-term ecological sustainability of the entire Sudochye Lake System.

5. Council of Ministers of the Republic of Karakalpakstan and local authorities (*Khokimiyat*)

Regional authorities play a dual role—on the one hand, they have decision-making powers at the republic/district level; on the other, they ensure day-to-day interaction with the local population.

The Council of Ministers of Karakalpakstan provides institutional support: issues decisions on allocating land for the Wildlife Sanctuary and buffer zone, amends regional development plans, and coordinates the activities of district Khokimiyat. Ideally, one of the Deputy Chairs of the Council of Ministers (responsible for environment or agriculture) should supervise implementation of the Management Plan in the republic.

The Khokimiyat of Muynak District is directly responsible for many practical matters: preventing illegal activities (within its powers via the internal affairs bodies and the environmental inspectorate), organizing public hearings, informing residents about rules of conduct in the protected area, and facilitating projects (e.g., providing premises for the Sudochye Directorate, equipment for improving hydraulic structures, etc.).

The Land Department of the Khokimiyat and the district cadastre centre will be involved in demarcating the boundaries of the Wildlife Sanctuary and buffer zone on the ground, and in re-registering land status. This is important to prevent, for example, allocating land in the buffer zone for farming or construction.

Community engagement: As the closest level of government, the Khokimiyat is engaged in resolving conflicts, accounting for the views of local communities, and integrating conservation plans with people's needs (see Chapter 6 for details).

#### 6. Environmental education and scientific institutions

Universities of Uzbekistan and Karakalpakstan are important academic and civil-society stakeholders for the Sudochoye Lake System, especially through their engagement in ornithological research and student birdwatching clubs coordinated by the Uzbekistan Society for the Protection of Birds (UzSPB).

Karakalpak State University named after Berdakh in Nukus is the main higher-education and research centre in Karakalpakstan and hosts a bioecology laboratory that has carried out long-term ornithological studies in the Priaralye and Ustyurt region, including research on waterbirds and steppe species.

At the national level, universities such as the National University of Uzbekistan (with its Zoology Department and Zoological Museum), Tashkent State Agrarian University (with its Department of Ecology and Botany and eco-active student projects), and other regional institutions host biology and ecology programmes and cooperate with UzSPB in waterbird surveys and Important Bird Area work. Since 2007, the IBA and UzSPB programmes have developed a network of student birdwatching clubs at state universities across Uzbekistan (including clubs in Tashkent, Nukus and other cities), training young ornithologists and involving them in national waterbird censuses and conservation education.

By engaging these universities and student clubs as partners—through joint field courses, bird counts at Sudochoye, thesis research, and CEPA activities—the Management Plan can build local scientific capacity, support long-term biodiversity monitoring, and strengthen public awareness of the Ramsar Site's values among the next generation of specialists.

Regional eco-centre or education centre: ideally, a small eco-centre dedicated to the Priaralye and Lake Sudochoye could be created in Muynak or Nukus. Such centres are often established with project support (e.g., from international donor agencies). Their tasks include running excursions, lectures for local schoolchildren, and environmental campaigns (shoreline clean-up days, World Wetlands Day events, etc.). Eco-centre staff can work jointly with the Sudochoye Directorate on visitor reception and the development of tourist routes.

Scientific institutes: The Karakalpak Branch of the Academy of Sciences, the Institute of Zoology in Tashkent, and universities should be involved in biodiversity monitoring and research (e.g., twice-yearly bird counts, hydrobiological water analyses, monitoring of saiga migration etc).

#### 7. Local communities, including women, are central stakeholders in the long-term management of the Sudochoye Lake System.

Residents of Muynak District and surrounding settlements partially continue to be dependent on the wetland for a range of livelihood activities like livestock grazing and possibly small-scale

fishing. Rangers of the Sudochye-Akpetki wildlife sanctuary also come from the local communities.

Climate risk analysis in the Sudochye Lakes System (GIZ, 2025) shows that changing climate will heavily impact negatively the ecological condition of the area, and women are more vulnerable to the climate risks than man due to socio-economic and cultural factors.

Limited access to land ownership, financial resources, and technical knowledge further constrains their ability to adapt. Climate risks such as extreme weather events like sandstorms also exacerbate health risks.

That is why providing opportunities for the local communities, especially for women, who are not so mobile to be financially included into the management of the Sudochye Lakes System is so important. The most promising are eco-tourism activities, therefore training and entrepreneurship programs should also be provided to help women develop alternative income sources, reducing dependency on the families on climate-sensitive livelihoods (GIZ, 2025). Access to credit and microfinance programs will provide additional support.

Strengthening participation of the local communities, especially women in decision-making, eco-tourism development, awareness programs will improve the social relevance and effectiveness of the Management Plan. Ensuring equitable involvement of women and vulnerable groups helps build local ownership of conservation actions, reduces conflict, and enhances the resilience of both the community and the Sudochye Lakes System.

## Site description

### Site boundary

The Sudochoye Wetlands are situated approximately 220 km northwest of Nukus, in the northern part of the Republic of Karakalpakstan. Sudochoye Lake System located in the most Northern-western part of Amudarya Delta in its coastal subregion (Rogov, 1957). Before the massive use of the Amudarya water for irrigation, Sudochoye - Karateren system was the largest lake system of Amudarya delta. To the south of Cape Urga of the Ustyurt plateau was located the largest lake of this system – the shallow Lake Sudochoye, with an area of 330 000 ha and an average depth of 0.5 - 1.5 m. The second largest lake Karateren was lying on the east from the Cape Urga.

Currently, the site comprises a complex of numerous small and four relatively large lakes— Bol'shoe Sudochoye, Akushpa, Begdulla-Aydyr, and Karateren (BirdLife International, 2009). The size and surface area of these lakes vary significantly from year to year, depending on prevailing hydrological conditions.



Image 1. Sudochoye Lake System. Changed after European Union, Copernicus Sentinel-2 imagery (Taken on 3 October 2023).

The western boundary of the site follows the elevated escarpments of the Ustyurt Plateau, rising to 129–152 m above sea level<sup>1</sup>, see image 2.

<sup>1</sup> Measured using GoogleEarth Pro



Image 2. Ustyurt Plateau and Sudochye Lake System. (photo: Olga Denyshchyk).

In its central part, reed beds historically extended from the plateau slopes to the water's edge, forming an important habitat for wildlife. However, during the field visit in March 2025, reed vegetation was observed mainly as a patchwork of isolated islands, and no extensive reed stands were present along the Ustyurt side (please see picture 2). Near the former settlement of Urga, the Karateren Lake is located—possibly the last remaining water body from the original deltaic lake system. The westernmost point of the site is at 43°37'56.81"N, 58°25'19.34"E. For the borders of the SLS please see image 4.

The southern boundary of the site has an oval configuration and most likely follows the edge of the seasonal wetlands. It crosses the Kundradskiy Collector–Drainage Canal (KKS). The southernmost point is located at 43°21'39.01"N, 58°23'28.85"E. The southern part of the site forms a wide buffer zone protecting the core area of the Sudochye Lake System (SLS).

The eastern boundary crosses the Ustyurtskiy Collector–Drainage Canal and runs northwestward until it reaches the Akkumskaya Dam. The easternmost point is 43°34'39.73"N, 58°45'19.55"E.

The northern boundary follows the Akkumskaya Dam, constructed in 2000–2001, and provides an extensive buffer zone for the wetland complex. The northernmost point is 43°40'26.66"N, 58°33'56.50"E.

The approximate centre of the site is located at 43°29'41.59"N, 58°32'22.28"E.

Sudochye lake Important Bird Area (IBA) are situated in the central part of the SLS. The southernmost and northernmost sections of the Ramsar Site thus serve as buffer zones safeguarding IBA area.



Image 3. Reed beds in Sudochy Lake system in March 2025. (photo: Olga Denyshchuk).

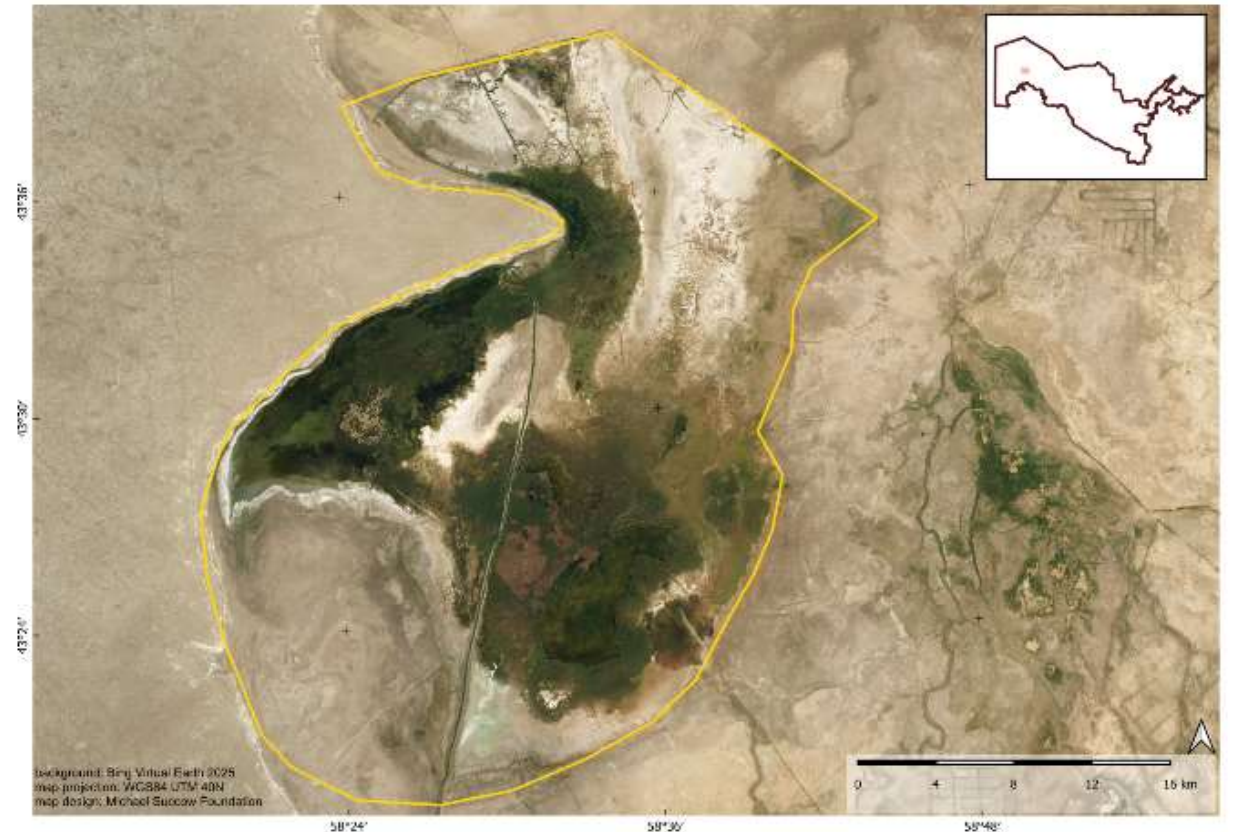


Image 4. Borders of the Ramsar site Sudochy Lake System

Sudochye part the Sudochye–Akpetki Wildlife Sanctuary and its buffer zone covers a larger area than the SLS. Map 2 represents the borders of the SLS and other protected areas can be seen below.

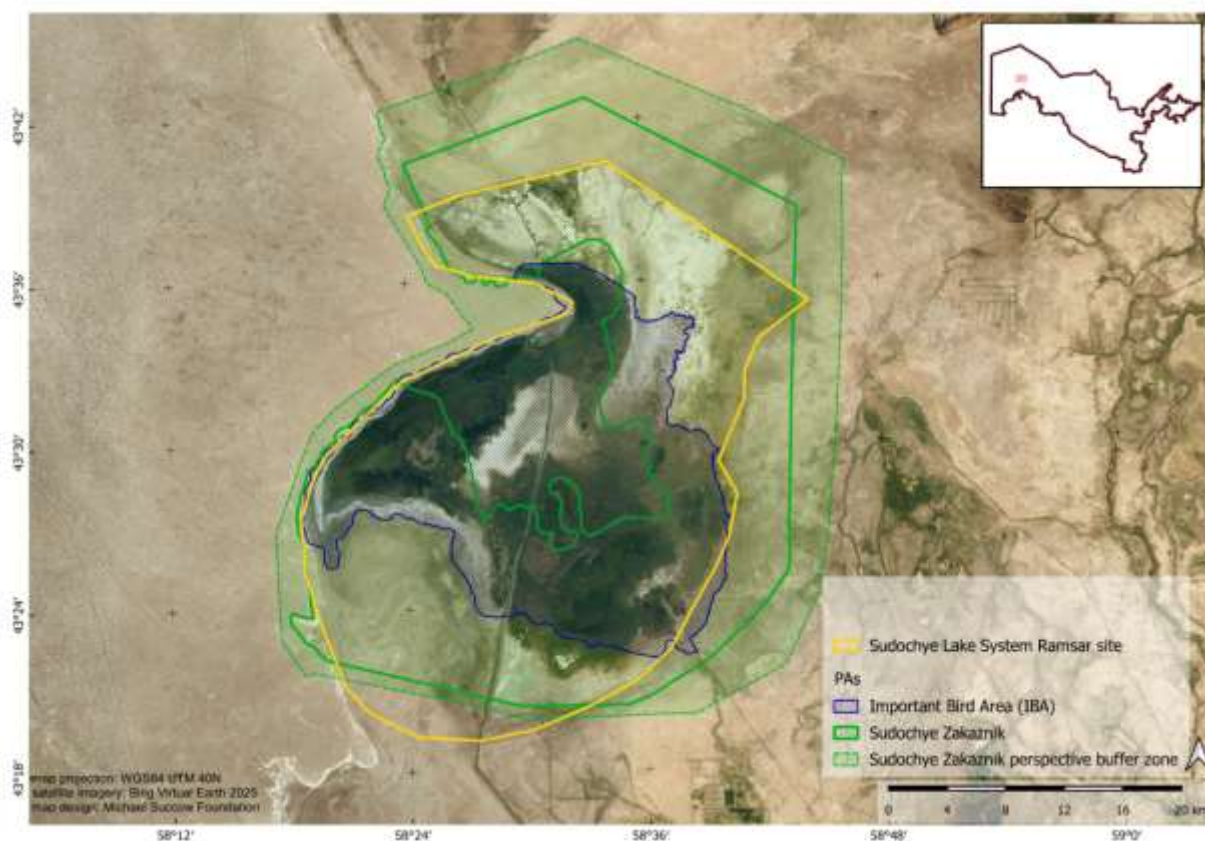


Image 5. Borders of the Ramsar site Sudochye Lake system, Sudochye-Akpetki wildlife sanctuary and Important Bird and biodiversity Area Sudochye Lake.

## Biogeography

According to Udvardy’s Biogeographical Province classification, the Sudochye Lake System lies within the Palearctic Realm, Turanian Province, and the biome of cold winter deserts (Udvardy, 1975).

Under Bailey’s Ecoregions of the World, the region corresponds to deserts of continental climate (Bailey, 1989).

Based on the World Wildlife Fund (WWF) Terrestrial Ecoregions classification, the Sudochye Lake System belongs to the Central Asian Riparian Woodlands Ecoregion, within the Deserts and Xeric Shrublands biome of the Palearctic Realm (Olson et al., 2001).

## Criteria for designation

The wetlands of the Ramsar site Sudochye Lake System (under Article 1 of the Ramsar Convention) occupies approximately half of the territory and are the areas of marsh or open water—natural or artificial—whether permanent or temporary—with brackish or saline water that may be static or flowing. This means that the Sudochye Lake System comprises a mosaic of semi-natural and artificial wetland habitats.

### **Criterion 1: Representative, rare or unique natural or near-natural wetland types**

Before the massive use of the Amu Darya water for irrigation, Sudochye - Karateren system was the largest lake system of Amudarya delta. To the south of Cape Urga was located the largest lake of this system – Lake Sudochye, with an area of 330 000 ha. The second largest lake Karateren was lying on the east from the Cape Urga. All the water bodies were interconnected between themselves and occasionally with the Aral Sea and the area had the massive reed beds.

After water from Amudarya River started massively used for irrigation which led to the dramatic fall in the amount of water that reaches the delta and decrease of the Aral Sea, the Sudochye–Karateren lake system became isolated and underwent significant changes; Sudochye Lake split into several separate water bodies, while only Karateren Lake retained its original status. The rest are four large lakes: Akushpa, Begdulla-Aydyn, Taily, and Bol’shoe Sudochye. Its present water level is sustained primarily by collector-drainage channels from the irrigation fields rather than by a direct natural arm of the river. Potentially the site retains habitat types typical of the former southern Aral region and supports very high waterbird diversity.

Part of the wetland system continues to be used for aquaculture with non-native fish species. To maintain fish populations, regular stocking is carried out.

### **Criterion 2: Rare species and threatened ecological communities**

The Sudochye Lake System lies along the West Asia–East Africa flyway used by migratory waders and shorebirds (Boere & Stroud, 2006) and serves as an important stopover and breeding site for numerous waterbird species (Kreitsberg, 2008). Key breeding species include the globally threatened Dalmatian Pelican (*Pelecanus crispus*) (3–30 pairs in 2000–2002), Great White Pelican (*P. onocrotalus*) (up to 300 individuals locally and 6,500 on passage), Glossy Ibis (*Plegadis falcinellus*) (approximately 100 pairs), and the globally threatened White-headed Duck (*Oxyura leucocephala*) (up to 50 pairs) (Kreitsberg, 2008).

Large flocks of Greater Flamingo (*Phoenicopterus roseus*) are regularly recorded. Although earlier reports suggested that consistent nesting occurred mainly in the wider southern Priaralye region, in May 2014 a major breeding colony—estimated at about 7,000 individuals and 3,000 nests—was documented on the northern part of the Sudochye Lake System, marking the first confirmed flamingo nesting site in Uzbekistan. However, subsequent years have shown that breeding at the site is irregular and highly dependent on hydrological conditions (Ametov et al., 2018).

The surrounding landscape, including the Ustyurt Plateau, provides habitat for Caracal (*Caracal caracal*) and Goitered Gazelle (*Gazella subgutturosa*), both considered rare and declining in Uzbekistan (Kreitsberg, 2008). The wintering significance of the lake varies depending on annual inflows and freezing conditions; in years of low water and severe cold, ice formation limits its role as a wintering site (Mitropolskiy et al., 2009).

### **Criterion 3: Biological diversity**

The site supports a regionally important assemblage of wetland-dependent species within the South Priaralye/Turanian biogeographic region, including numerous colonial waterbirds and desert–delta fauna, across a diverse mosaic of arid-zone wetland habitats (reedbeds, seasonal marshes, saline flats, shallow lakes).

#### **Criterion 4: Support during critical life cycle stage or in adverse conditions**

The Sudochye Lake System supports large concentrations of migratory waterbirds during critical staging periods and provides breeding opportunities for colonial waterbirds when hydrological conditions are suitable; its role varies inter-annually with water availability (Ametov et al., 2018; Mitropolskiy et al., 2009). Aggregations during migration have reached ~86,000 individuals, underscoring the site's function as a major stopover on the West/Central Asian flyways (Ametov et al., 2018). In May 2014, observers documented a major Greater Flamingo (*Phoenicopterus roseus*) breeding colony (~7,000 birds; 2,985 nests), evidencing support during the breeding stage; breeding did not recur in 2015 due to high water levels submerging nesting islets, illustrating hydrological dependence (Ametov et al., 2018). The system also regularly holds substantial numbers of pelicans, ibises and other hydrophilic birds in migration and breeding seasons (Ametov et al., 2018). In adverse conditions, drought and water-level instability are identified as the main constraints; biodiversity components at Sudochye are "completely dependent upon the water volume," and maintaining adequate inflow is recommended to secure breeding and staging functions for threatened species (Ametov et al., 2018).

#### **Criterion 5: >20,000 waterbirds**

Regular counts have recorded more than 20,000 waterbirds, and during peak migration periods between 1999 and 2002, totals ranged from 32,300 to 86,000 individuals, meeting also the Important Bird Area (IBA) criterion A4iii (Kreitzberg, 2008).

#### **Criterion 6: >1% waterbird**

Twenty bird species of the number more than 1 % of the population were recorded during migration on Ramsar site Sudochye Lake System by BirdLife between 1987 and 2005, including migratory gatherings of the White-headed Duck (*Oxyura leucocephala*)—up to 4,000 individuals recorded between 1999 and 2005, representing nearly half of the global population of this species (Kreitzberg, 2008).

In May 2014, observers documented a major breeding colony of Greater Flamingo (*Phoenicopterus roseus*) at Sudochye (≈ 7,000 birds; ≈ 2,985 nests), indicating the site may meet Criterion 6 (≥ 1% of the population); however, nesting was not recorded in 2015 due to high water levels, so regularity requires further evidence from additional years (Ametov et al., 2018).

## Description of the wetland's ecological character

### Ecosystem components

The region is characterized by a desert–continental climate with sharp diurnal temperature fluctuations, cold winters, hot summers, and very limited precipitation. Annual rainfall averages only about 100–200 mm, falling mainly in spring and autumn. Northwesterly winds prevail in autumn and winter, while westerly and southwesterly winds dominate in spring and summer, shaping dust transport dynamics (Encyclopædia Britannica, 2025; Zhang et al, 2020).

Over the past century, the climate of Karakalpakstan has warmed significantly, with a clear upward trend in temperatures beginning in the early 1930s, despite year-to-year variability. The Ustyurt Plateau and the Aral Sea basin, including the Sudochoye Lake System, have recorded the highest rates of temperature increase in Uzbekistan, with average annual air temperatures rising by 0.41–0.43°C per decade (Republic of Uzbekistan, 2021).

One of the most pronounced impacts of this warming is the rise in extreme heat events. The average number of days with maximum daily temperatures of 39°C or higher ( $T_x \geq 39^\circ\text{C}$ ) has more than doubled in recent decades. Currently, the region experiences an average of 17 heatwave days per year, compared to only 8–10 days in the early to mid-20th century (Republic of Uzbekistan, 2021).

Another defining feature of the regional climate is the prevalence of dust and salt-dust storms originating from the exposed Aralkum seabed. These events peak in late spring and early summer, reducing air quality, transporting salts over long distances, and affecting soils, vegetation, and human health (Zhang et al, 2020).

Hydrological dynamics reflect these climatic stresses. The Amu Darya's flow shows an increasing frequency of low-water years, with particularly severe shortages recorded in 2008, 2011, 2018, and 2021. Such deficits are now a regular occurrence, most acute during the vegetation period when irrigation demand is highest (Khozhmuratova & Kalenderova, 2024).

Looking forward, climate projections indicate that Karakalpakstan—including the Sudochoye Lake System—will experience the most significant overall increase in mean annual temperatures within Uzbekistan. Together with the expected rise in heat extremes, dust-storm activity, and recurrent low-flow years, these changes will intensify existing environmental and socio-economic challenges, heightening risks to both ecosystems and public health (GIZ, 2025).

A recent study “DIAPOL-CE: Conduction of a climate risk analysis in the Sudochoye Lakes System, Uzbekistan” conducted by experts of Research Institute of Environment and Nature Conservation Technologies has proven that in the area of Sudochoye Lake System, climate change is manifested through rising temperatures, altered precipitation patterns, increased wind velocity, and more frequent dust and salt storms. These climate hazards are worsening due to the unsustainable management practices. Experts concluded that the waterbody is rapidly losing their biodiversity, while water resources are becoming increasingly scarce (GIZ, 2025).

### Geomorphic setting

Geomorphologically, the area forms part of an ancient alluvial plain, where lake basins alternate with weakly expressed, flat interfluvial plains that were once waterlogged. The Quaternary

alluvium exhibits distinct mesorelief features with frequent vertical and lateral alternations of sands, silts, and clays. Situated within a groundwater transit–discharge zone, the area has a high water table, which promotes intensive soil salinization (Fayziev, 2024).

The geomorphic setting of the Sudochoye Lake System reflects the combined influence of deltaic evolution, hydrological regulation, and salinization processes. In recent decades, the construction of embankments, dams, and the collector–drainage network has reshaped local relief and altered shoreline morphology (Vereshchagina, 2015; Khozhamuratova & Kalenderova, 2024).

Altitudes within the Sudochoye Lake System range between 48 and 52.7 metres above sea level<sup>2</sup>.

### Wetland types

According to the Ramsar wetland typology, the Sudochoye Lake System is best described as a mosaic of seasonal saline flats (Ss) and seasonal freshwater marshes (Ts) sustained intermittently by drainage inflows and strongly influenced by human-made wetland types. The site no longer functions as a permanent deltaic lake. The collector–drainage canals that supply and discharge water are Type 9 (canals and drainage channels, ditches), and any impounded basins operating as storage are Type 6 (water storage areas/reservoirs). (Type 3—irrigated land—would apply only where irrigated fields occur within the site boundary.)

### Habitat connectivity

In the past, forming one freshwater wetland complex withing the Amudarya delta, all water bodies were hydrologically connected between each other, with the river and with the sea (with the sea at least periodically).

Later, as the large lakes broke up into smaller ones and the shoreline of the sea shifted, the water bodies lost their hydrological connection with the sea, the river, and with one another.

Currently, only Bol'shoe Sudochoye – Begdulla-Aydyn system through collector-drainage canal Ustyurtskiy (continuation of the Raushan branch of the Amudarya) has a provision maintain the hydrological connectivity with the river. However, due to very limited water supply through collector-drainage canal Ustyurtskiy the water level in Bol'shoe Sudochoye in the past several years was very low, so very limited inflow from the river was not reaching the water body and water spread through the reed thickets.

Currently, according to the information available, the following water bodies Akushpa, Taily, Karateren, Begdulla-Aydyn are connected by Kundradskiy collector-drainage canal (KKS), but not connected to the river.

So, currently, SLS is sustained mainly by collector-drainage inflows rather than direct Amudarya discharge. Furthermore, water inflows are highly variable (0.96 km<sup>3</sup> in 2018–19 vs. 10.83 km<sup>3</sup> in 2017–18), which leads to unstable connectivity and seasonal fragmentation of habitats.

SLS is a critical node in the West Asian flyway, linking desert and steppe habitats with wetland stopovers. It provides foraging and nesting grounds for up to 230 bird species, including globally threatened ones.

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<sup>2</sup> Measured using GoogleEarth Pro

Habitat connectivity is deteriorating shrinking water areas, salinization, and drying of reedbeds fragment breeding and feeding habitats, reducing the system's capacity to function as a continuous wetland corridor.

## Plant species

There is no plant species list for the Ramsar Site Sudochoye Lake System, so as a stepping stone we use a plant species list of State wildlife sanctuary "Sudochoye-Akpetki" limited to the embryophytes, prepared as part of the research project "Conservation and Sustainable Management of Lakes, Wetlands, and Riparian Corridors as Pillars of a Resilient and Land-Degradation-Neutral Aral Basin Landscape Supporting Sustainable Livelihoods" in 2022-2024<sup>3</sup>. We do not know when the list of the plant species was compiled, considering several very dry years, when the water level of the Sudochoye Lake System water bodies has fallen significantly, it made possible that species composition has been changed.

We suggest that the botanical survey should be conducted in Sudochoye to prepare the list of the plant species.

For example, listed strictly freshwater macrophytes would not survive in the saltiest basins (e.g., Akushpa, and sometimes Karateren/Begdulla-Aydyn during drought years with 25–50 g/L) and would only persist in fresher pockets or years (e.g., parts of Bol'shoe Sudochoye, Begdulla-Aydyn in wet years, and collector-drainage canal /river-influenced margins).

This includes: *Salvinia natans*, *Lemna minor/L. gibba*, *Vallisneria spiralis*, *Potamogeton natans*, *Potamogeton crispus* & *P. pusillus*, *Catabrosa aquatica*, *Alisma plantago-aquatica*, *Sagittaria trifolia*, *Butomus umbellatus*. These are classic fresh-very-low-brackish species; they won't tolerate the 25–50 g/L episodes documented in Akushpa and (in 2001) parts of Karateren and Begdulla-Aydyn, so they would drop out of those basins under such conditions and survive only in fresher refugia.

In the list there are salt-tolerant macrophytes/helophytes that can persist in the system's saltier waters: *Ruppia maritima*, *Stuckenia (=Potamogeton) pectinata*, *Najas marina*, *Bolboschoenus maritimus*, *Schoenoplectus litoralis*, *Phragmites australis*, *Aeluropus spp.*, *Salicornia/Suaeda/Halocnemum/Halostachys* etc. These are typical of brackish to saline lakes and coastal marshes and match the salinity regime seen in Akushpa and during drought years elsewhere.

The tugai (riparian forest) has been largely destroyed for use as fuel. At present, licorice (*Glycyrrhiza glabra*), reed, and other salt-tolerant plant communities are forming in its place. The rehabilitation of degraded phytocenoses directly depends on the stability of the hydrological regime and the water exchange within the lakes (Mitropolskiy et al, 2009).

## Animal species

There is no animal species list for the Ramsar Site Sudochoye Lake System, so as a stepping stone we use a fauna species list of State Wildlife Sanctuary "Sudochoye-Akpetki", prepared as part of

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<sup>3</sup> These lists constitute the baseline data for "Sudochoye-Akpetki" Reserve  
<http://wetlands.uz/files/List%20of%20species%20of%20higher%20plants%20and%20vertebrates%20of%20the%20Sudochoye-Akpetki%20reserve.pdf>

the research project "Conservation and Sustainable Management of Lakes, Wetlands, and Riparian Corridors as Pillars of a Resilient and Land-Degradation-Neutral Aral Basin Landscape Supporting Sustainable Livelihoods" in 2022-2024<sup>4</sup>. We do not know when the list of animal species was compiled, considering several very dry years, when the water level of the Sudochoye Lake System water bodies has fallen significantly, it made possible that species composition and numbers has been changed.

## **Birds**

Thus, according to the mentioned above list, in SLS there are 295 bird species. At the same time, according to BirdLife publication of 2009, not more than 230 bird species have been recorded at Sudochoye Lake System, including 12 globally threatened and 3 nationally threatened species. During migration, concentrations of up to 86,000 waterbirds of 20 species have been observed. Of particular importance are the migratory gatherings of the White-headed Duck (*Oxyura leucocephala*)—up to 4,000 individuals, representing nearly half of the global population of this species (Kreitzberg, 2008).

Out of 295 bird species listed for the Sudochoye-Akpetki State Wildlife Sanctuary, there are approximately 116 obligate wetland/waterbird species such as loons, grebes, pelicans & cormorants, herons/ibis/spoonbill, flamingo, waterfowl, rails/coots, shorebirds incl. avocets/stilts/plovers/sandpipers, gulls & terns, kingfisher).

SLS is broadly suitable for a full wetland bird assemblage in “normal/wet” years, when Begdulla-Aydyn and Bol’shoe Sudochoye provide brackish, shallow, reed-fringed habitat and Karateren behaves as a through-flow basin. Akushpa functions as the saline lagoon node (flamingos, some waders) if it holds water.

In dry years, connectivity collapses, salinity spikes (e.g., 40–50 g/L in 2001), and Bol’shoe even dried—most marsh/piscivore guilds crash, while saline specialists (flamingos/some shorebirds) persist only where water remains.

## **Fishes**

The number of the fish species depends on the amount of water in the water bodies over the several years’ time, chemical composition of the water, connectivity of the water bodies with the Amudarya River and artificial re-stock by the local fishermen. Because salinity level is different in the water bodies of Sudochoye Lake System, we believe that the fish composition is also different for each of the water body.

Data on fish species is available from two sources: (1) Ecological monitoring of Sudochoye wetlands in the frames of large GEF project on restoration and management of the water resources in Aral Sea regional, conducted from autumn 1999 to autumn 2002 (Kreitsberg-Mukhina et al, 2003), (2) official list of the species for the Sudochoye Akpetki State Wildlife Sanctuary.

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<http://wetlands.uz/files/List%20of%20species%20of%20higher%20plants%20and%20vertebrates%20of%20the%20Sudochie-Akpetki%20reserve.pdf>

According to the ecological monitoring of 1999-2002, ichthyofauna was represented by 24 species and subspecies of the fishes, majority of which (16 species) belong to the carp family.

Of all recorded fish species, five belong to the group of small, non-commercial fishes, while the remaining species are of commercial importance. The species diversity of the ichthyofauna in the lakes of the Sudochoye wetland is formed by native species of the Aral–Amudarya basin and Far Eastern introductions, which were either accidentally or intentionally brought into the region. Most species are permanent residents of the lakes, and only a few enter accidentally with incoming waters. Almost all are freshwater reproductive forms, inhabiting water bodies with salinity up to 12 g/L, while only a few species (such as atherine, Amur goby, and medaka) can tolerate higher salinity levels of 30–35 g/L (Kreitsberg-Mukhina et al, 2003).

According to the list species of the Sudochoye-Akpetki State Wildlife Sanctuary, there are 33 fish species, including 3 fish species of global importance, namely two endangered species Pike Asp (*Aspiolucius esocinus*), Ostroluchka (*Capoetobrama kuschakewitschi*), one vulnerable species Aral Barbel (*Barbus brachycephalus*).

However, multiple assessments indicate that the lakes of the Sudochoye have lost much of their fishery importance due to highly mineralized collector-drainage inflows, and recurrent desiccation: sections of the system (e.g., Akushpa) have “completely lost economic significance,” with fish harvests ceasing in dry years (Kurbanbaev et al., 2023).

### **Reptiles and amphibians**

According to the list species of the Sudochoye-Akpetki Wildlife Sanctuary there are 26 species of reptiles and amphibians found in Sudochoye Lake system.

### **Mammals**

According to the list species of the Sudochoye-Akpetki State Wildlife Sanctuary there are 40 species of mammals found in Sudochoye Lake system including three species of the global importance, namely, near threatened Asiatic Wild Ass (*Equus hemionus*), vulnerable Goitered Gazelle (*Gazella subgutturosa*) and Marbled Polecat (*Vormela peregusna*).

### **Soils types**

Deltaic/alluvial deposits with widespread saline soils (solonchaks). Under the conditions of insufficient watering, the hydromorphic delta soils degrade and change into deserted types, the swamp-boggy soils are transformed completely and the drying types of meadow-boggy and alluvial-meadow soils with very high salinity prevail, and the areas of takyr soil, sand and solonchak increases (SIC ICWC, 2008).

### **Water regime**

**Water permanence.** Water levels in all water bodies of Sudochoye Lake System fluctuate widely; some basins dried completely during the 2000–2001 and 2010 drought (e.g., Bolshoe Sudochie) (Saparov et al, 2019).

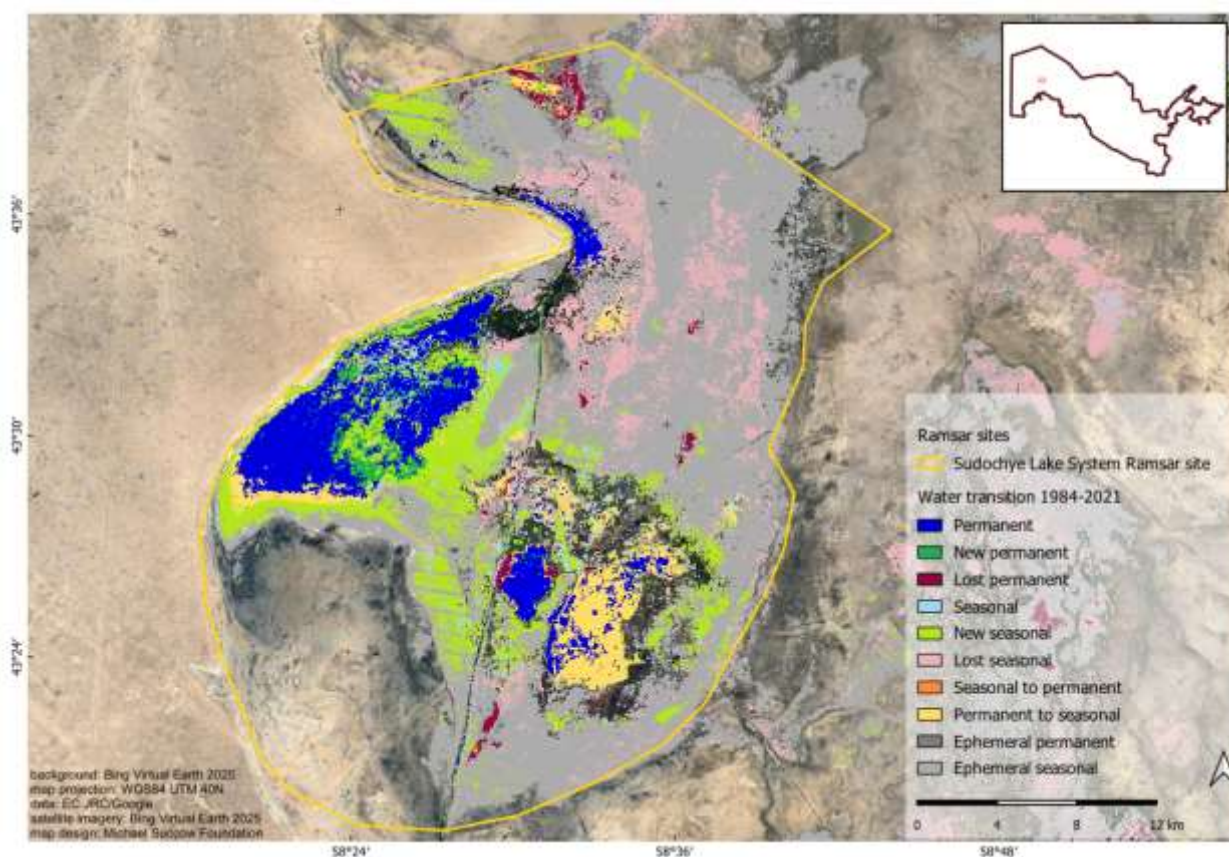


Image 6: Water transition of the Sudochoye Ramsar site between 1984 and 2021 from [Global Surface Water Explorer](#).

**Water source:** Water regime entirely depends on the inflow of water from:

1. collector-drainage canal KKS that bring only drainage, highly mineralised water from the irrigated lands.
2. collector-drainage canal Ustyurtskiy that also directly connected to the Amudarya River and thus has a technical capacity to bring freshwater to the Sudochoye Lake System.

However, over the last years, inflow to SLS is only through collector-drainage canal KKS.

**Water destination:** Right now, Sudochoye Lake system is a final destination of the water inflow, however during implementation of the GEF project “Ecological monitoring of Sudochoye wetlands in the frames of large GEF project on restoration and management of the water resources in Aral Sea regional” in the beginning of the 2000<sup>th</sup>, Akkumskaya Dam was built with the outflow from the Sudochoye Lake System in the direction of the former Aral Sea with the plan, that after reaching the certain water level 52.20 m, the sluice will be open and process of “washing out the salts” from the Sudochoye wetland will start (Kreitsberg-Mukhina et al, 2003).

**Stability of water regime:** Water regime is not stable and at current situation is not predictable.

**Connectivity of surface water and groundwater:** Regional hydrography has become strongly anthropogenic (collectors/canals replacing natural arms), with lowered groundwater levels on dried reaches; surface-groundwater connectivity is reduced/alterred.

There are local zones of groundwater discharge represented by depressions of deep lakes, in particular Karateren, Sudochoye, and others. At the same time, when there is no flow in the channels, these local zones serve as a natural drain for the surrounding areas. (Fayziev, 2024).

**Stratification and mixing region:** Very shallow ( $\approx 0.6\text{--}2.2$  m); generally wind-mixed.

**Sediment regime:** Deltaic/alluvial setting with fine deposits; branches of the river collapsed, and new artificial channels/collectors dominate modern sediment pathways bringing salts from irrigation fields (Verezhagina et al, 2015).



Image 7. The ending part of the collector-drainage canal KKS. View from the Ustyurt Plateau. March 2025. (Photo by Olga Denyshchyk).

**Water turbidity and colour:** High turbidity; transparency 0.12–0.20 m, water colour from light green to dark green; odour from weak to strong marshy (Eshmurodova, 2025).

**Water temperature:** According to the data of Environmental Monitoring Program of the Republic of Uzbekistan in 2016-2020 and 2021-2025, obtained from the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Karakalpakstan the average year temperature of water in Sudochye (there is no specification on the name of the water body) between 2020 and 2023 (based on 4 measurements per year) ranged from 12°C to 18 °C.

Observed summer surface water temperatures in the lake system typically reach 25-30 °C (Kurbanbaev, 2023).

**Concentration of bioelements:** Hydrochemical regime of the Sudochye Lake System is highly unstable, being entirely dependent on the volume and quality of water supplied through the collector–drainage network. Variations in inflow from these collectors directly determine the salinity, mineral composition, and overall water quality of the lake.

Furthermore, there is a significant difference in the concentrations of the bioelements and minerals in the water depending on the organization or expert collecting and analysis the water samples.

Thus, the results of the analysis of the water samples collected and analysed by the representatives the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Karakalpakstan has significantly lower mineralisation and other parameters compared to published data by other experts and organizations. For examples data for the total Dissolved Solids collected in Sudochye lake (no more details) for 4 years of data available range between 2.8 and 4.1 g/L could be compared only to the mineralization measured in KKS collector-drainage channel by other experts. In the lakes of the SLS mineralisation should reflect the salts that are continuously brought from the irrigated fields to the water bodies.

In the table presented data obtained from the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Karakalpakstan. Water samples are taken four times per year and in table the average for each year is presented.

Table 1. Water quality in the Sudochye Lake

Chemical parameters	Year			
	2020	2021	2022	2023
t°C	17	12	17	18
pH	6.9	7.6	8.3	8.2
<b>Chemical parameters, mg/L</b>				
Hardness	37.8	30.4	25	31.1
COD (Chemical Oxygen Demand)	15.5	40.3	40.4	62.8
BOD <sub>5</sub> (Biochemical Oxygen Demand, 5 days)	2.7	11.4	13.9	11
Ammonium ion (NH <sub>4</sub> <sup>+</sup> )	0.8	0.15	2.2	2.1
Nitrite ion (NO <sub>2</sub> <sup>-</sup> )	0.069	0.15	0.18	0.17
Chloride (Cl <sup>-</sup> )	812	788	755	920
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	168	439	398.7	353
Iron (Fe)		0.09	0.15	0.15
Total Dissolved Solids (TDS) / Dry Residue	3566	4123	3167	2785

Overall, the data received from the Ministry resembles a brackish, eutrophic waterbody with variable salinity and significant nutrient enrichment from agricultural drainage. Oxygen demand peaks and high ammonium in 2022–23 reflect low-flow stagnation.

Waterbody is still valuable for waterbirds tolerant of brackish conditions, but eutrophic blooms and ammonia peaks can reduce benthic food base and cause periodic habitat degradation.

Only euryhaline fish species (carp etc) can tolerate; high NH<sub>4</sub><sup>+</sup> and COD stress larvae and reduce spawning success.

Invertebrates are dominated by salt-tolerant chironomids and amphipods; periodic oxygen deficits may cause die-offs.

The likely pollution sources are (1) collector–drainage water from irrigated lands carrying nitrogen, organic matter, and salts, (2) Internal loading from decaying reedbeds and organic sediments during stagnation, (3) Reduced water exchange in 2022–23 increasing concentration of solutes and oxygen demand.

**pH:** Please see Table 1.

**Salinity:** According to the data of MoEEPCC of the Republic of Karakalpakstan, total dissolved solids (TDS) was between 2,8 g/L and 4,1 g/L in 2020-2023. According to the study conducted in SLS in May 2025 4,7 g/L was mineralisation of the water in collector – drainage canal KKC, while in Karateren lake close to Cape Urga the mineralization was from 7.4 to 8.5 g/l (Ruziev et al, 2025).

**Dissolved gases in water:** Please see Table 1.

**Dissolved or suspended nutrients in water:** Please see Table 1.

**Dissolved organic carbon:** no data

**Redox potential of water and sediments:** no data

**Water conductivity:** The latest published EC measurements (1999–2002 monitoring) range from ~3–16 mS/cm in the right-bank lakes and up to ~40–83 mS/cm in the left-bank lakes (Akushpa/Taily) during drought conditions.

### Ecosystem processes

**Primary production:** Production in reed (Phragmites) belts and periphyton; pelagic production directly depends on the salinity, it limited in turbid basins and suppressed during hypersaline phases.

**Nutrient cycling:** Source of nutrients present from inputs from agricultural land, internal cycling of plant material, etc.

**Carbon cycling:** No data

**Soil forming processes, including peat accumulation:** Organic matter accumulates locally in reed marshes.

**Erosion and sedimentation:** No data.

**Hydrological processes, including flooding regime, hydroperiod and water balance:** Hydroperiod controlled by collector-drainage channels and high evaporation (~1200 mm/yr); episodic desiccation of basins in drought years; historically minor outflow to Adzhibay Bay.

**Animal reproductive productivity:** The system is a key breeding/stopover site on a world flyway (numerous waterbirds, including Nationally and globally endangered species), however due to mineralisation and thus drop in fish species, the areas is losing its importance as a breeding place for the pelicans, but gaining it importance for the nesting flamingos colonies.

**Vegetational productivity, pollination, regeneration processes, succession, role of fire etc.** Reed regeneration is observed with the increasing water levels in the lakes; reedbed fires recorded regularly and caused by the local population.

**Notable species interactions including grazing, predation, competition, diseases and pathogens:** No data.

## Ecosystem services

### Providing services

**Food for humans:** Fishing is present at very small scale due to very high mineralisation of the water. According to information from Khokimiyat (District Administration) of Muynak District, 34 local families benefit from Sudochye Lake system from fishing or using the area as pastures or for fodder production. Wetland supported 661 livestock animals of the local communities in 2024 (Kosnazarov, 2025).

**Fresh water:** Due to high water mineralization, we think that water of Sudochye Lake system could be important to the wildlife

**Wetland non-food products:** Tugai vegetation was cleared in the past.

**Biochemical products:** Medicinal plants *Capparis spinosa*, *Glycyrrhiza glabra*, *Péganum harmala* are collected by the local population

**Genetic materials:** Endemic species of the Priaralye region, listed in the Red Data Book of Uzbekistan (2009), is the paddle-footed copepod *Schizopera aralensis Borutsky*. This species has disappeared from the Aral Sea, and its presence in Lake Sudochye during monitoring 2001-2002. (Mirabdullayev et al, 2022)

### Regulating services

**Maintenance of hydrological regimes:** N/A

**Erosion protection:** N/A

**Pollution control and detoxification:** Wetlands absorb, and store runs outs from the agricultural fields, including salts and agricultural chemicals.

**Climate regulation:** Water continuously evaporates and thus, consequently reduces air temperatures, however the impact is neglectable.

**Biological control of pests and disease:** No data.

**Hazard reduction:** When covered with water reduces dust and salt-dust storms from the area of the wetlands.

### Cultural services

**Recreation and tourism:** Potential for eco-tourism; currently limited due to infrastructure. According to the information from Khokimiyat of Muynak District, the number of tourists is steadily growing. Thus, in 2022 there were 7 525 tourists, in 2024 this number has increased to 9 845 people. The colonies of pink flamingos (*Phoenicopterus roseus*) at Lake Sudochye attract ornithologists and photographers from around the world. A survey conducted among local tour operators and guides specializing in tours to Lake Sudochye show that 75% of the tours offered focus specifically on birdwatching (Kosnazarov, 2025)

**Spiritual and inspirational:** The region has leveraged its rich cultural heritage and unique natural landscapes to attract tourists.

**Scientific and educational:** Site of long-term research and monitoring

## Supporting services

**Biodiversity:** Sudochoye Lake System is important for sustaining the biodiversity of the area, however the importance is largely dependent on the amount and quality of water available. To reach the maximum of the biodiversity, SLS should be a mosaic of freshwater and brackish wetlands.

**Nutrient cycling:** Accumulate large quantities of the nutrients brought from the irrigated agricultural fields.

**Pollination:** According to the list of the species of State Nature Wildlife Sanctuary "Sudochoye-Akpetki" there might be 36 species of 13 plant families that require insects for the existence. However, there is no data on the list of the insect species, and it is also possible that the list of the plant species was not updated recently.

There are no crops nearby, so we think that the pollinators of the Sudochoye Lake System do not contribute towards food production in the area.

## Current scientific research and facilities

According to the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On Approval of the Environmental Monitoring Programme in the Republic of Uzbekistan for 2016–2020," quarterly monitoring of hydrochemical parameters of water was initiated at Lake Sudochoye (spelled as in the original document) (Item 49 of the Annex) (Cabinet of Ministers of the Republic of Uzbekistan, 2016).

However, Sudochoye is not mentioned among the water bodies where biodiversity monitoring is carried out (Item 51 of the Annex), which is probably due to the fact that, at the time of the Resolution's adoption, Sudochoye had not yet been designated as a Ramsar Site.

Biodiversity monitoring under the Programme includes the annual organization of field expeditions and bio-ornithological monitoring, as well as the development of recommendations for the conservation of biological diversity in the areas of the surveyed lakes. It was to be conducted at Lakes Dengizkul, the Aydar–Arnasay lake system, and the Tudakul and Kuymazar reservoirs, with the purpose, among others, of obtaining data on the abundance and species composition of waterbirds, incorporating monitoring results into reports, and fulfilling the obligations under the Ramsar Convention.

At the same time, Sudochoye was most likely included in the section "X. Monitoring of Flora and Fauna in the Republic of Karakalpakstan."

In 2021, a new Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 343 "On Further Improvement of the System for Assessing Environmental Pollution Levels" entered into force, which approved the Environmental Monitoring Programme of the Republic of Uzbekistan for 2021–2025 (Cabinet of Ministers of the Republic of Uzbekistan, 2021), under which monitoring at Sudochoye was maintained following a similar scheme to the previous programme.

Laboratory of the Ministry of Environment of Karakalpakstan quarterly takes water samples to measure several chemical parameters including total dissolved solids (mineralisation). Data obtained from 2020 to 2023 is shown in Table 1. However, it is not clear in which specific water body the measurements are taken and what are the methodology of the measurement. We suggest improving the methodology by establishing the semipermanent monitoring sites of the water quality in several water bodies to measure the water temperature, pH, total dissolved solids and water level to understand the correlation between the water level and mineralisation.

The validity of this Resolution expires in 2025, and we propose that the following amendments be introduced into the State Environmental Monitoring Programme:

- Clarify the provision on hydrochemical monitoring of lake systems in Uzbekistan. Instead of the term “Lake Sudochye,” which no longer exists as a single water body, specify the individual lakes Karateren, Tayly, Akushpa, and Bolshoye Sudochye. Responsibility for hydrochemical monitoring in Bolshoye Sudochye may be assigned to the Ministry of Emergency Situations, which, according to available information, is planning to develop aquaculture in this water body.
- Include the Ramsar Site “Sudochye Lake System” in the section of the plan referring to biodiversity monitoring, with an emphasis on the monitoring of bird species listed under the Ramsar nomination criteria — Dalmatian Pelican (*Pelecanus crispus*), Great White Pelican (*P. onocrotalus*), Glossy Ibis (*Plegadis falcinellus*), globally threatened White-headed Duck (*Oxyura leucocephala*), Greater Flamingo (*Phoenicopterus roseus*) — and on aggregations during migration. Bird counts should be scheduled to coincide with seasonal migration periods, and the number of field expeditions should be increased to twice per year (currently once).
- Review the hydrochemical monitoring programme for the lakes and update it according to the contemporary international standards like ISO 5667-4 (ISO, 2016). Include training for personnel responsible for hydrochemical monitoring of lakes and reservoirs in Uzbekistan. This should cover the following: correct formulation of monitoring objectives; adoption of standardized methodologies and quality assurance protocols for hydrological and hydrochemical monitoring; and designation of a responsible specialist for data analysis and reporting.

## Evaluation of the wetland ecological character features

Based on the information described above, we made a draft list of the importance Sudochoye Lake System features following the guidelines of the “Wetland Management Planning – A Practitioner’s Guide” by Matthew Simpson, published by the Ramsar Regional Centre – East Asia (RRC–EA, 2020). After compiling the list, we have evaluated it with the stakeholders during the Stakeholder meeting in Nukus, on October 30<sup>th</sup>, 2025.

Evaluation allowed to confirm the importance of ecosystem features (components, processes and services). During discussion only one feature – “Component Reedbeds” were removed by the stakeholders based on the argument that is the there will be a water supply of freshwater from the Amudarya River (indicated as a Process 1), then the reedbeds will be restores naturally, so Management plan should no focus on it separately.

Please find below the list of the important features after it was confirmed by the stakeholders.

### **List of important Sudochoye Lake System features (components, processes and ecosystem services) and a rationale for their importance.**

#### **Component 1: Freshwater wetlands**

The remaining freshwater areas within the Sudochoye complex are critical for sustaining biological productivity and species diversity in an otherwise arid landscape. They provide breeding and feeding habitats for fish, amphibians, and invertebrates and serve as essential drinking and foraging grounds for migratory birds during periods of low salinity. Wetlands are extremely shallow and with the increased number of the heat waves that will be evaporating even faster, so filling the shallow bodies with the water from the river may be too inefficient. One of the possible ideas to consider is deepening the certain parts of wetlands located close to the channel with the water from the river to create a smaller freshwater habitat, but with the possibility to maintain the water level through year-round.

#### **Component 2: Brackish wetlands**

The brackish and saline lakes of the system support specialized ecological communities adapted to fluctuating salinity. These wetlands are important for filter-feeding birds such as flamingos that rely on saline invertebrates. The presence of both freshwater and brackish zones creates mosaic habitats, enhancing biodiversity.

#### **Component 3: Abundance and diversity of waterbirds**

Sudochoye is one of the most important bird habitats in the South Priaralye, with up to 230 species recorded, including 12 globally threatened and 3 nationally threatened species. It supports large congregations during migration—over 80,000 individuals in some years—and provides breeding grounds for Dalmatian Pelican, White-headed Duck, and Greater Flamingo.

#### **Process 1: Constant supply with the water from the Amudarya**

Although now dominated by collector–drainage canals, the continuous inflow of water from the Amudarya River remains essential for the survival of the Sudochoye Lake System. It sustains freshwater levels, dilutes salts, and supports nutrient exchange. Maintaining sufficient inflow is therefore critical for preserving the ecological character of the Ramsar site.

#### **Process 2: Waterbird breeding**

Breeding of colonial and migratory waterbirds is a key ecological process that sustains regional populations. Sudochoye provides safe nesting sites, food resources, and shallow-water habitats

essential for reproductive success. The 2014 Greater flamingo colony (~7,000 birds, ~3,000 nests) illustrates the site's potential for large-scale reproduction when hydrological conditions are favorable. Protecting breeding habitats through water-level regulation and fire prevention in reedbeds is vital to maintain this process.

### **Process 3: Management system of the Sudochye-Akpetki Wildlife Sanctuary is in place**

An effective management system of the Sudochye–Akpetki Nature Wildlife Sanctuary and continues monitoring is essential to maintain the ecological character of the Ramsar Site and ensure the long-term conservation of biodiversity.

#### **Service 1: Maintaining threatened species**

The wetland functions as a refuge for globally threatened species, including the White-headed Duck (*Oxyura leucocephala*), Dalmatian Pelican (*Pelecanus crispus*), and the endemic copepod *Schizopera aralensis*. By supporting these species' life cycle needs—breeding, feeding, and resting—the SLS contributes to the implementation of Ramsar Criterion 2 and global biodiversity conservation goals.

#### **Service 2: Fisheries resource**

Although natural fisheries have declined due to salinization, Sudochye fisheries are important as a feeding ground for the waterfowl. In the light of the new development of the aquaculture in Bol'shoe Sudochye by the Ministry of Emergency situation the requirements for the fisheries development should be set to minimize the impact on area.

#### **Service 3: Cultural value including tourism**

Sudochye holds strong cultural and educational significance for local people and visitors. Its dramatic landscape, rich birdlife, and proximity to the Ustyurt Plateau attract eco-tourism and scientific interest. Promoting sustainable tourism and awareness supports both community engagement (CEPA goals) and long-term protection of the site.

## Objectives for the site features

The next step is to develop objectives for the important site features identified in the evaluation process. Objectives describe the desired state to be achieved for each key feature through wetland management.

To prepare objectives we have completed the following:

1. Described the ideal condition of the feature
2. Identified the factors that influence the feature's condition and consider how these may be changing
3. Identified indicators for monitoring the condition of the feature

Table with the description of the ideal conditions, influencing factors and performance indicators, please find below.

Table 2: ideal conditions of the features, influencing factors and indicators for monitoring,

Ideal condition of the feature	Factor influencing the feature's condition	Indicators for monitoring the condition of the feature
<b>Component 1: Freshwater wetlands</b>		
<p>Water from Amudarya enters Sudochye Lake System continuously through a year and supports freshwater habitat including reedbeds</p> <p>Monitoring system for the quarter chemical parameters updated to the international standards is in place.</p>	<p>Irregular water supply from Amudarya River,</p> <p>Rising salinity and poor water quality from collector-drainage (nutrients, agrochemicals),</p> <p>Illegal grazing,</p> <p>Data gaps on inflow volumes/water levels,</p> <p>Extremely shallow wetlands, prone to droughts.</p> <p>Increased number of the droughts related to climate change.</p>	<p>Hydrochemical parameters: pH, Chemical Oxygen Demand, Biochemical Oxygen Demand, 5 days, Ammonium ion (NH<sub>4</sub><sup>+</sup>), Nitrite ion (NO<sub>2</sub><sup>-</sup>), Chloride (Cl<sup>-</sup>), Sulfate (SO<sub>4</sub><sup>2-</sup>), Iron (Fe), Total Dissolved Solids are collected according to the international practices.</p> <p>Water samples are taken in 3 places of each of 4 lakes of the Sudochye Lake System at least 4 times per year.</p> <p>Water levels measured at the same place and time with the water samples for the hydrochemical analyses.</p> <p>Expansion of the reedbeds.</p>
<b>Component 2: Brackish wetlands</b>		
<p>The brackish wetlands provide habitat for Greater flamingo.</p>	<p>Extreme salinity spikes in low-inflow years (habitat collapse for invertebrates/fish).</p> <p>Pollutant accumulation (salts, nutrients) in closed basins.</p> <p>Limited monitoring of salinity/nutrients as well as benthic communities.</p>	<p>Hydrochemical parameters please see above</p> <p>Bentos study, including endemic species <i>Schizopera aralensis</i></p>
<b>Component 3. Abundance and diversity of waterbirds</b>		
<p>Sudochye Lake System provide a safe stop during the seasonal migrations with plenty of food and well as diverse safe</p>	<p>Irregular water supply from Amudarya River, and as result degradation of the habitats</p>	<p>Water levels</p>

<p>habitats for the breeding birds. Ramsar criteria connected to the birds are met.</p>	<p>Disturbance (fishing, tourists).  Fire cases caused by the local population, worsening reed beds  Lack of ornithological data and scientifically sound monitoring.  Increased number of the droughts related to climate change.</p>	<p>Ornithological surveys on migratory waterbirds species and on breeding bird species</p>
<p><b>Process 1. Constant supply with the water from the Amudarya</b></p>		
<p>Water from Amudarya enters Sudochye Lake System continuously through a year and supports freshwater habitat.</p>	<p>Overuse of the water for irrigation,  Competing upstream demands and inter-annual allocation variability.  Infrastructure bottlenecks/leakage in collectors and control structures.  Lack of assured environmental flows (no formal water quota for SLS).  Weak cross-agency coordination (water, environment, agriculture).  Increased number of the droughts related to climate change.</p>	<p>For the indicators, please see <b>Component 1: Freshwater wetlands</b></p>
<p><b>Process 2. Waterbird breeding</b></p>		
<p>Sudochye Lake System provides a safe habitat for the breeding birds. Ramsar criteria connected to the birds are met.</p>	<p>Degradation of the habitats due to the lack of freshwater.  Lack of ornithological data and scientifically sound monitoring.  Disturbance (fishing, tourists).</p>	<p>Hydrochemical water analyses (please see above).  Water levels.  Ornithological surveys on migratory waterbirds species and on breeding bird species.  Limiting disturbance cases are mentioned below.</p>

	<p>Fire cases caused by the local population, worsening reed beds.</p> <p>Increased number of the droughts related to climate change.</p>	<p>Number of fire cases.</p>
<p><b>Process 3. Management system of the Sudochoye-Akpetki Wildlife Sanctuary is in place</b></p>		
<p>The staff structure of the Sudochoye-Akpetki Wildlife Sanctuary includes specialists who are responsible for the environmental monitoring, CEPA (communication, capacity building, education, participation and awareness) etc.</p> <p>Specialists of the Sudochoye-Akpetki Wildlife Sanctuary participate in environmental monitoring, collecting and analysing data on the ecological character of SLS, run informational campaigns in the nearby settlements, provide services for the tourists.</p> <p>There is no garbage left on the site. Waste management system is in place.</p> <p>Sudochoye-Akpetki Wildlife Sanctuary receives official water quota, a guaranteed environmental flow to the Sudochoye part of the Sanctuary.</p>	<p>The existing management structure of the Sudochoye-Akpetki Wildlife Sanctuary lacks specialists, funding and thus technical capacity for effective site management.</p> <p>Weak integration with basin-level water management – the Sanctuary has no guaranteed water quota or participation in the Amudarya flow-allocation process, leaving ecological water needs unmet in dry years.</p> <p>Local communities and regional agencies have low awareness of the Sanctuary’s objectives and limited participation in its management; this reduces compliance and stewardship.</p> <p>Deficient monitoring and data management – absence of systematic biodiversity and hydrological monitoring prevents evidence-based decision-making and evaluation of management effectiveness.</p> <p>Increased number of the droughts related to climate change.</p>	<p>Team of Sudochoye-Akpetki Wildlife Sanctuary is strengthen with the new specialists.</p> <p>Support in implementation of the updated monitoring programme.</p> <p>There is no garbage on the territory of the Sudochoye-Akpetki Wildlife Sanctuary.</p> <p>Waste management of the Sudochoye-Akpetki system in place.</p> <p>Developed CEPA activities for the local communities and for tourists in place (not covered in the Management plan, because currently, office of the Sudochoye-Akpetki Wildlife Sanctuary does not have specialists to develop and implement CEPA activities)</p> <p>Environmental flow to the Sudochoye Lake System (not covered by Management Plan).</p>

	<p>Lack of resources to conduct CEPA activities with the local communities.</p> <p>Lack of resources to provide services for the tourists.</p>	
<b>Service 1 Maintaining threatened species</b>		
<p>Water from Amudarya enters Sudochye Lake System continuously through a year and supports freshwater habitat.</p> <p>The brackish wetlands provide habitat for Greater flamingo.</p> <p>Sudochye Lake System provides a safe stop for the migratory birds during the seasonal migrations with plenty of food and well as diverse safe habitats for the breeding birds.</p> <p>Specialists of the Akpetki-Sudochye Wildlife Sanctuary understands Ramsar criteria connected to the bird species.</p> <p>Ramsar criteria connected to the birds are met.</p> <p>Ornithological surveys aimed at the endangered bird species are conducted regularly and jointly with another organizations like BirdLife Uzbekistan, Academy of Science of the Uzbekistan (Karakalpak department) etc.</p> <p>Survey to understand the threat from the mammal predators for the endangered waterfowl species is conducted.</p>	<p>Habitat instability due to the lack of freshwater from Amudarya.</p> <p>Pollution/salinity thresholds exceeding species tolerances.</p> <p>Limited species-specific management (no action plans, weak monitoring).</p> <p>Disturbance from the tourists visiting SLS.</p> <p>Disturbance from the fishing activities.</p> <p>Possible threat from the predators (Golden jackal, wolf).</p>	<p>Water levels in the lakes of the Sudochye Lake System (please see above).</p> <p>Indicators of the monitoring of the chemical parameters of the water in the lakes of the Sudochye Lake System (please see above).</p> <p>Survey to understand the threat from the mammal predators for the endangered waterfowl species is conducted.</p> <p>Strict conservation zones (core areas) are designated, including major nesting colonies of Dalmatian Pelican, Flamingo, and White-headed Duck – where entry is prohibited year-round, except for scientific research with special permits.</p> <p>Buffer zones are defined (at least 500 m from active colonies and reedbeds) where boat approach and walking access are prohibited from April to July.</p> <p>Limitation for the visitors are set and tours operators are officially informed.</p> <p>Training on the endangered species for the rangers of the Sudochye-Akpetki Wildlife Sanctuary and eco-tourism guides are conducted.</p>

<p>Threats from the predators are minimized.</p> <p>Rules for visitors to limit the impact on the endangered bird species are set and officially adopted. Tour operators and tourist companies are officially informed. The limitations include the following:</p> <p>tourism within the Sudochye Lake System Ramsar Site shall be permitted only in designated observation zones and during non-breeding periods,</p> <p>all activities are complying with Ramsar Resolution XI.7 Tourism, recreation and wetlands (Ramsar Convention Secretariat, 2012) and national protected-area regulations,</p> <p>entry to breeding areas of Dalmatian Pelican, White-headed Duck, and Greater Flamingo is prohibited between April and July.</p>		
<p><b>Service 2 Fisheries resource value</b></p>		
<p>All activities are compiling with Ramsar Resolution IX.4 on “The Ramsar Convention and conservation, production and sustainable use of fisheries resources” Ramsar Convention Secretariat. (2005) and national protected-area regulations.</p>	<p>Salinization and water-quality decline reducing fish recruitment/survival.</p> <p>Desiccation events causing mass mortality.</p> <p>Waterfowl, including Nationally and Globally endangered colonies/species are disturbed by the leaser company activities and threatened by the fishing activities</p>	<p>Presence of the approved zoning scheme that covered the leased area. Leaser organization is officially informed.</p> <p>No fishing occurred in core bird areas: colony islets, major roosts, and key feeding shallows.</p> <p>Buffers zoned in place:</p>

<p>Zoning scheme for the Sudochoye-Akpetki Wildlife Sanctuary is developed, documents on zoning are officially adopted/approved. Organization that leases water body/bodies is officially informed.</p> <p>Conditions for the aquaculture/fishing in the Ramsar site are set, including the following:</p> <p>no fishing in core bird areas: colony islets, major roosts, and key feeding shallows are excluded from any aquaculture/fishing footprint,</p> <p>Buffers (minimum)</p> <p>≥500 m from pelican, ibis, heron colonies and from White-headed Duck core breeding bays.</p> <p>≥300 m from continuous reedbeds used by nesting/roosting birds.</p> <p>Closed season (no netting, harvest): 1 April – 31 July (peak breeding).</p> <p>Prohibit monofilament gillnets, hanging nets, and any entangling gear within the Ramsar boundary.</p> <p>Keep stable water levels in adjacent colony areas during Apr–Jul: no rapid drawdowns/flood pulses.</p> <p>Access only via designated routes; no off-road driving on salt flats or reed margins.</p>	<p>with the higher risks during breeding periods.</p>	<ul style="list-style-type: none"> <li>• ≥500 m from pelican, ibis, heron colonies and from White-headed Duck core breeding bays.</li> <li>• ≥300 m from continuous reedbeds used by nesting/roosting birds.</li> </ul> <p>Fishing season is closed (no netting, harvest): between 1 April – 31 July (peak breeding) every year.</p> <p>Prohibit monofilament gillnets, hanging nets, and any entangling gear within the Ramsar boundary.</p> <p>Water levels are kept stable in adjacent colony areas during April – July: no rapid drawdowns/flood pulses.</p> <p>Access is kept only via designated routes; no off-road driving on salt flats or reed margins.</p> <p>Staff of the leaser organization and Sudochoye-Akpetki Wildlife Sanctuary is trained annually on threatened species, breeding-season rules, safe net management, and emergency release.</p> <p>Leaser organization is reporting quarterly on water quality, operations, and wildlife interactions to the Sudochoye–Akpetki Wildlife Sanctuary and the Ministry.</p>
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<p>Mandatory annual training for staff on threatened species ID, breeding-season rules, safe net management, and emergency release.</p> <p>Quarterly reporting of water quality, operations, and wildlife interactions to the Sudochye-Akpetki Wildlife Sanctuary and the Ministry.</p>		
<p><b>Service 3 Cultural value including tourism</b></p>		
<p>Tourism may occur only where it maintains the site's ecological character (habitats, hydrology, key species) and is embedded in the site's management plan and zoning.</p> <p>Local communities, especially women are involved into the paid ecotourism activities and linked to the tour operators. Women have received training on the specific parts of the ecotourism and are capable of producing sustainable products and services that have demand among the eco-tourists.</p> <p>Adopted zones: (i) core no-access/no-disturbance areas (colonies, roosts, sensitive reedbeds), (ii) buffer zones with restricted use, and (iii) sustainable-use/visitor zones with defined routes, hides, and viewing towers.</p> <p>Seasonal closures or stricter limits during breeding, moulting, and peak</p>	<p>Nonregulated tourist activities.</p> <p>Poor tourist infrastructure.</p> <p>Garbage on the site.</p> <p>Local communities including women do not have knowledge and resources to be valuable part of the tourist infrastructure.</p> <p>Climate change manifested in increased temperature, extreme events, droughts etc make local communities, especially women more vulnerable.</p> <p>Insufficient CEPA resources (signage, guides, materials).</p>	<p>Number of the representatives of the local communities / women that are involved in eco-tourist activities in 2026 and in 2030.</p> <p>Number of the training received by the women on eco-tourism development with the elements of adaptation to climate change between 2026 and 2030.</p> <p>Gross of income of the local communities / woman from the eco-tourism between 2026 and 2030.</p> <p>The following are controlled by the Sudochye-Akpetki Wildlife Sanctuary rangers:</p> <p>Visitor access to designated observation points and trails available from the Ustyurt Plato, away from active roosts or foraging zones of the birds,</p> <p>Vehicle access is restricted to existing roads or dry corridors; off-road driving on salt flats, reedbeds, or shoreline is limited,</p> <p>Procedure of the closed season are maintained: From 1 April to 31 July, when most waterbirds are breeding. No tourist excursions, guided visits near colonies, only observations from Ustyurt Plato.</p>

<p>migration; reopen with low-disturbance rules the rest of the year.</p> <p>Vehicle access is restricted to existing roads or dry corridors; off-road driving on salt flats, reedbeds, or shoreline is limited,</p> <p>There is no waste and no garbage on the site.</p> <p>All tourism operators must apply “zero waste” principles — no littering and removal of all waste.</p> <p>Require all tour operators to undergo training on Ramsar values and species sensitivity.</p> <p>Educational materials about threatened birds, their Ramsar importance, and behavioural rules are available.</p>		<p>Low-impact visits are allowed: From August to March, only under supervision of the guide from Sudochoye-Akpetki Wildlife Sanctuary or local guide familiar with the Ramsar requirements. All tourism operators must apply “zero waste” principles — no littering, no campfires on shorelines, and removal of all waste.</p> <p>Require all tour operators to undergo training on Ramsar values and species sensitivity.</p> <p>Provide educational materials about threatened birds, their Ramsar importance, and behavioural rules.</p>
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## Action plan

Based on the Table with the description of the ideal conditions, influencing factors and performance indicators for the Ramsar site Sudochye Lake System, we have prepared a Management Plan for 2026-2030, which is presented below. While preparing the Plan, we tried to be realistic and to consider the existing situation with the SLS and capacities of the Sudochye-Akpetki Wildlife Sanctuary. However, even for the relatively small plan of actions prepared the additional professional capacities should be involved, especially for the development of the fishing and tourists' rules for the Sudochye Lake System Ramsar site. Several issues mentioned in the chapter earlier like improvements of the inflow from the Amudarya River are not covered, because we believe such issues require intersectoral cooperation and lie outside our mandate. For the list of the activities, please see the Table below.

Table 3: Action plan – work programme

#	Crucial feature	Management Action	Performance indicators	When	Where	Who
1	Component 1&2: Freshwater and brackish wetlands	Review and reconsider of the methodology of current state hydrochemical monitoring system of Sudochye lake system (implemented according to the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 343 “On Further Improvement of the System for Assessing Environmental Pollution Levels”	Current state hydrochemical monitoring system is reviewed based on the international guidelines for the water quality sampling like (ISO, 2016).	Jan-Jun 2026	Tashkent/Nukus	MoEEPCC of the Republic of Uzbekistan, MoEEPCC of the Republic of Karakalpakstan
2		Based on the existing procedure, set the objectives for monitoring of hydrochemical parameters in Sudochye Lake System, define monitoring sites (3 sites in each of four lakes), defining the person who will analyse the data and prepare chapter to the annual report on the findings	Objectives of the hydrochemical monitoring is defined, monitoring sites identified, responsible person selected.	Jan-Jun 2026	Tashkent/Nukus	MoEEPCC of the Republic of Uzbekistan, MoEEPCC of the Republic of Karakalpakstan
3		Establish water level monitoring sites to combine water level measurement with hydrochemical monitoring in 4 lakes (Bol'shoe Sudochye, Akushpa, Taily, Karateren)	Established hydrological monitoring sites to measure water levels in 4 lakes (Bol'shoe Sudochye, Akushpa, Taily, Karateren)	Every 4 months	4 lakes	MoEEPCC of the Republic of Karakalpakstan
4		Measure water level and hydrochemical parameters to understand the correlation between the water level and mineralisation among other tasks	Data collected: water level, chemical parameters according to the state monitoring system	Every 4 months	Flamingos' nesting lake	MoEEPCC of the Republic of Uzbekistan
5		Conduct study of the benthic communities on the Flamingos' nesting lake	Study on the benthic communities is conducted	once 2026-2030		MoEEPCC of the Republic of Uzbekistan
6	Component 3: Abundance and diversity of waterbirds	Include the Ramsar Site “Sudochye Lake System” in the section of the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 343 “On Further Improvement of the System for Assessing Environmental Pollution Levels” on the biodiversity monitoring	Sudochye Lake System is included into the state biodiversity monitoring	2026		MoEEPCC of the Republic of Uzbekistan
7		Support monitoring of waterfowl seasonal migrations	Total number of waterbirds (peak migration counts)	twice a year	SLS	MoEEPCC of the Republic of Uzbekistan
8		Support monitoring of the breeding population of the waterfowl	Number of breeding waterbird species and pairs	every year	SLS	MoEEPCC of the Republic of Uzbekistan

9	Process 2 Waterbird breeding	Continue patrol the area to prevent fires	Frequency of fires	regularly	Sudochoye- Akparki Wildlife Sanctuary	Sudochoye- Akparki Wildlife Sanctuary
10	Service 1 Maintaining threatened species	To conduct a survey to understand the threat from the mammal predators for the endangered waterfowl species. Develop and implement follow up activities.	Survey to understand the threat from the mammal predators for the endangered waterfowl species is conducted, follow up activities developed and implemented.	once	SLS	MoEEPCC of the Republic of Uzbekistan
11		Monitoring of bird species listed under the Ramsar nomination criteria	Presence and counts of key threatened species <i>Pelecanus crispus</i> , <i>P. onocrotalus</i> , <i>Plegadis falcinellus</i> , <i>Oxyura leucocephala</i> , <i>Phoenicopterus roseus</i>	every year	SLS	MoEEPCC of the Republic of Uzbekistan
12		Designate strict conservation zones (core areas) including major nesting colonies of Dalmatian Pelican, Flamingo, and White-headed Duck – where entry is prohibited year-round, except for scientific research with special permits.	Strict conservation zones (core areas) are designated, including major nesting colonies of Dalmatian Pelican, Flamingo, and White-headed Duck – where entry is prohibited year-round, except for scientific research with special permits.	2026	SLS	MoEEPCC of the Republic of Uzbekistan
13		Designate a buffer zone (at least 500 m from active colonies and reedbeds) where boat approach and walking access are prohibited from April to July.	Buffer zones are defined (at least 500 m from active colonies and reedbeds) where boat approach and walking access are prohibited from April to July.	2026	SLS	MoEEPCC of the Republic of Uzbekistan
14		Provide training on the endangered species for the rangers of the Sudochoye- Wildlife Sanctuary and eco-tourism guides.	Training on the endangered species for the rangers of the Sudochoye-Akparki Wildlife Sanctuary and eco-tourism guides are conducted.	Annually	SLS	MoEEPCC of the Republic of Karakalpakstan
15		To set limitation for the visitors and inform tour operators.	Limitation for the visitors are set and tours operators are officially informed.	2026	Tashkent/Nukus	MoEEPCC of the Republic of Uzbekistan / MoEEPCC of the Republic of Karakalpakstan
16		Process 3 Management system of the Sudochoye- Akparki Wildlife Sanctuary is in place	Team of Sudochoye-Akparki Wildlife Sanctuary is strengthen with the new specialists	New specialists are joining the team	as required	Sudochoye- Akparki Wildlife Sanctuary
17	Support in implementation of the updated monitoring programme	Support to the monitoring teams provided	annually	Sudochoye- Akparki Wildlife Sanctuary	Sudochoye- Akparki Wildlife Sanctuary	
18	Major clean-up event to collect all the wastes accumulated in the site	All the garbage is collected and transport from the SLS	2026	Sudochoye- Akparki Wildlife Sanctuary	MoEEPCC of the Republic of Karakalpakstan	

19		Setting the waste management system in Sudochoye-Akpetki Wildlife Sanctuary	System of waste management is in place	2026	Sudochoye-Akpetki Wildlife Sanctuary	MoEEPCC of the Republic of Karakalpakstan
20	Service 2 Fisheries resource value	Zoning scheme for the leased area is developed and approved. Leaser organization is officially informed.	Presence of the approved zoning scheme that covered the leased area. Leaser organization is officially informed.	2026	SLS	MoEEPCC of the Republic of Uzbekistan
21		Include in to zoning scheme requirements that no fishing occurred in core bird areas: colony islets, major roosts, and key feeding shallows.	No fishing rule included into the requirements of the fishing	2026	SLS	MoEEPCC of the Republic of Uzbekistan
22		Include in to zoning scheme requirements of the buffers zoned in place: ≥500 m from pelican, ibis, heron colonies and from White-headed Duck core breeding bays, ≥300 m from continuous reedbeds used by nesting/roosting birds.	Buffer zones are in place	2026	SLS	MoEEPCC of the Republic of Uzbekistan
23		To close fishing season (no netting, harvest): between 1 April – 31 July (peak breeding) every year.	Fishing season is closed (no netting, harvest): between 1 April – 31 July (peak breeding) every year.	2026	SLS	MoEEPCC of the Republic of Uzbekistan
24		To prohibit monofilament gillnets, hanging nets, and any entangling gear within the Ramsar boundary.	Monofilament gillnets, hanging nets, and any entangling gear are prohibited within the Ramsar boundary.	2026	SLS	MoEEPCC of the Republic of Uzbekistan
25		To keep water levels stable in adjacent colony areas during April – July: no rapid drawdowns/flood pulses.	To keep water levels stable in adjacent colony areas during April – July: no rapid drawdowns/flood pulses.	2026	Leased lake	MoEEPCC of the Republic of Uzbekistan
26		To ensure access to the site only via designated routes; no off-road driving on salt flats or reed margins.	To ensure access only via designated routes; no off-road driving on salt flats or reed margins.		SLS	MoEEPCC of the Republic of Uzbekistan
27		Provide visitor access to designated observation points and trails available from the Ustyurt Plato, away from active roosts or foraging zones of the birds.	Visitor access to designated observation points and trails available from the Ustyurt Plato, away from active roosts or foraging zones of the birds is provided.	2026	SLS	MoEEPCC of the Republic of Uzbekistan
28		To set the rules to restrict the vehicle access to existing roads or dry corridors; off-road driving on salt flats, reedbeds, or shoreline is limited.	Vehicle access is restricted to existing roads or dry corridors; off-road driving on salt flats, reedbeds, or shoreline is limited,	2026	SLS	MoEEPCC of the Republic of Uzbekistan
29	To develop procedure of the closed season: from 1 April to 31 July, when most waterbirds are breeding. No tourist excursions, guided visits near colonies, only observations from Ustyurt Plato.	Procedure of the closed season are maintained: From 1 April to 31 July, when most waterbirds are breeding. No tourist excursions, guided visits near colonies, only observations from Ustyurt Plato.		SLS	MoEEPCC of the Republic of Uzbekistan	

30		To develop procedure of low-impact visits from August to March, only under supervision of the guide from Sudochye-Akpetki Wildlife Sanctuary or local guide familiar with the Ramsar requirements.	Procedure of low-impact visits from August to March is developed and brought to power.	2026	SLS	MoEEPCC of the Republic of Uzbekistan
31		To develop “zero waste” principles on the territory of SLS (no littering and removal of all waste) and all tourism operators are informed.	“Zero waste” principles on the territory of SLS (no littering and removal of all waste) are developed and all tourism operators are informed.	2026	SLS	MoEEPCC of the Republic of Uzbekistan
32		To develop a training on Ramsar values and species sensitivity and require all tour operators to undergo training	All tour operators to undergo training on Ramsar values and species sensitivity.	2026-2030	SLS	MoEEPCC of the Republic of Uzbekistan
33		Produce educational materials about threatened birds, their Ramsar importance, and behavioural rules.	Educational materials about threatened birds, their Ramsar importance, and behavioural rules are evaluable.	2026	SLS	MoEEPCC of the Republic of Uzbekistan
34	Management tasks	To review of the management plan and adjusting plans for the next year	Management plan is reviewed annually and adjustments for the next year are prepared	Annually		MoEEPCC of the Republic of Uzbekistan
35		To prepare a management plan for 2031-2035	Management plan for 2031-2035 is prepared	2030		MoEEPCC of the Republic of Uzbekistan

## References

- Ametov, Y., Jumanov, M. & Arepbayev, I. (2018) 'The results of ornithological survey in the Sudochoye lake system (2014–2015)', *European Science Review*, December, pp. 13–15. doi: 10.29013/ESR-18-9.10.1-13-15.
- Aparin, V.B. (2022) 'Hydrochemical characteristics of the Sudochoye wetlands under ecological stress conditions', *Nauchnye Trudy Dalrybvtuz (Scientific Works of Dalrybvtuz)*, 39, pp. 363–368. ISSN 2222-4661. [In Russian].
- Aripdjanov, Sh. (2025) *Report of the legal expert of the project "Development of wetlands specific strategic documents for Ramsar Sites in Uzbekistan: National Ramsar strategy for Uzbekistan and a management plan and visitor concept for Sudochoye Ramsar site"* (contract no. 81312962 with Michael Succow Foundation). [In Russian].
- Bailey, R.G. (1989) *Ecoregions: The Ecosystem Geography of Oceans and Continents*. New York: Springer-Verlag.
- Bakhiyeva, L.A. (2018) 'Environmental monitoring of Priaralya wetlands', *Ekonomika i Sotsium (Economics and Society)*, 4(47), pp. 107–110. [In Russian].
- Boere, G. & Stroud, D. (2006) 'The Flyway Concept: What it is and what it isn't', in Boere, G.C., Galbraith, C.A. & Stroud, D.A. (eds.) *Waterbirds around the World*. Edinburgh: The Stationery Office, pp. 40–47.
- Cabinet of Ministers of the Republic of Uzbekistan (2016) *Resolution No. 273 on Approval of the Programme of Environmental Monitoring in the Republic of Uzbekistan for 2016–2020*. Tashkent. Available at: <https://lex.uz/ru/docs/3019801> (Accessed: Sept 15, 2025).
- Cabinet of Ministers of the Republic of Uzbekistan (2021) *Resolution No. 343 on Measures to Improve the System of Environmental Monitoring in the Republic of Uzbekistan*. Tashkent. Available at: <https://lex.uz/ru/docs/5446445> (Accessed: Sept 15, 2025).
- Encyclopædia Britannica (2025) *Ustyurt Plateau*. Available at: <https://www.britannica.com/place/Ustyurt-Plateau> (Accessed: 11 September 2025).
- Eshmurodova, N.S. (2025) 'Development dynamics of diatom algae based on hydrological indicators of the Sudochoye lake system', *Ekologiya Xabarnomasi (Ecology Bulletin)*, 1, pp. 70–75.
- Fayziev, E.A. (2024) *Izmeneniye landshaftov delty Amudar'i v svyazi s melioratsiyey: Avtoreferat dissertatsii na soiskaniye uchenoy stepeni doktora filosofii (PhD) po geograficheskim naukam* [Change of landscapes of the Amu Darya delta due to reclamation: Dissertation abstract for the degree of Doctor of Philosophy (PhD) in Geographical Sciences]. Samarkand: Samarkand State University, pp. 37–42. [In Russian].
- GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit (2025) *Conduction of a climate risk analysis in the Sudochoye Lakes System, Uzbekistan. Climate Risk Report* (unpublished).
- GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit (2025) *Inception Report: Development of wetlands-specific strategic documents for Ramsar Sites in Uzbekistan – National Ramsar Strategy for Uzbekistan and a Management Plan and Visitor Concept for the Sudochoye Ramsar Site*.

- International Organization for Standardization (2016) *ISO 5667-4:2016. Water quality – Sampling – Part 4: Guidance on sampling from lakes, natural and man-made*. 2nd edn. Geneva: ISO.
- Khozhamuratova, R.T. & Kalenderova, K.T. (2024) 'Hydroecology of lakes of the Amu Darya delta (based on the example of Sudochoye and Zhylytyrbas)', *Ekonomika i Sotsium*, 3(118)-1, pp. 1022–1026. (in Russian).
- Kosnazarov, M. (2025) *Report of the socio-economic expert of the project "Development of wetlands-specific strategic documents for Ramsar Sites in Uzbekistan: National Ramsar Strategy for Uzbekistan and a Management Plan and Visitor Concept for the Sudochoye Ramsar Site"* (contract no. 81312962 with Michael Succow Foundation). Unpublished project report.
- Kreitsberg-Mukhina, E.A., Mirabdullaev, I.M. & Talskikh, V.N. (2003) 'Main results of ecological monitoring on the Sudochoye Wetland', in *Ecological Sustainability and Advanced Approaches to Water Resources Management in the Aral Sea Basin: Proceedings of the International Central Asian Scientific and Practical Conference*, Almaty–Tashkent, 5–8 May 2003, pp. 355–363. (Cited in: *Uzbekistan's Third National Communication to the UNFCCC*, Ref. 125).
- Kreitsberg, E.A. (2008) 'Lake Sudochoy', in *Important Bird Areas in Uzbekistan*. Tashkent, pp. 68–71.
- Kurbanbaev, S.E., Karimova, O.Yu., Turlibaev, Z. & Baimuratov, R.A. (2023) 'History of Lake Sudochoya and development perspective', *IOP Conference Series: Earth and Environmental Science*, 1284, 012036. doi: 10.1088/1755-1315/1284/1/012036.
- Mirabdullaev, I.M., Ginatullina, E.N., Kuzmetov, A.R., Musaev, A.K., Saparov, K.A. & Mustafaeva, Z.A. (2022) 'Plankton communities of the hydroecosystems of the Sudochoye Wetland (Priaralye, Uzbekistan)', *Nauchnye Trudy Dalrybvtuz (Scientific Works of Dalrybvtuz)*, 39, pp. 38–48. ISSN 2222-4661.
- Mitropolskiy, O., Kashkarov, R., Ten, A., Atakhodjaev, A. & Sudarev, V. (2009) *Vidovoy sostav i chislennost' ptits Priaral'ya* [Species composition and abundance of birds in the Priaralye]. Tashkent. (in Russian).
- Ministry of Ecology, Environmental Protection and Climate Change (MoEEPCC) (2021) *Management Plan for the "Sudochoye–Akpetki" State Reserve for the Period 2022–2026*. Tashkent.
- Olson, D.M. et al. (2001) 'Terrestrial ecoregions of the world: A new map of life on Earth', *BioScience*, 51(11), pp. 933–938. Available at: <https://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world> (Accessed: 26 October 2025).
- Ramsar Convention Secretariat (2023) *Information Sheet on Ramsar Wetlands (RIS): Sudochoye Lake System, Uzbekistan (Site no. 2522)*. Gland, Switzerland: Ramsar Convention Secretariat. Available at: <https://rsis.ramsar.org/ris/2522> (Accessed: 21 October 2025).
- Ramsar Convention Secretariat (2005) *Resolution IX.4: The Ramsar Convention and conservation, production and sustainable use of fisheries resources*. 9th Meeting of the Conference of the Contracting Parties (COP9), Kampala, Uganda, 8–15 November 2005. Available at: [https://www.ramsar.org/sites/default/files/documents/pdf/res/key\\_res\\_ix\\_04\\_e.pdf](https://www.ramsar.org/sites/default/files/documents/pdf/res/key_res_ix_04_e.pdf).
- Ramsar Convention Secretariat (2012) *Resolution XI.7: Tourism, recreation and wetlands*. 11th Meeting of the Conference of the Parties (COP11), Bucharest, Romania, 6–13 July 2012. Available at:

<https://www.ramsar.org/sites/default/files/documents/pdf/cop11/res/cop11-res07-e.pdf>.

- Ramsar Regional Centre – East Asia (2020) *Wetland Management Planning – A Practitioner’s Guide*. Seoul: RRC-EA.
- Republic of Uzbekistan (2021) *Fourth National Communication of the Republic of Uzbekistan under the United Nations Framework Convention on Climate Change*. Tashkent: Ministry of Natural Resources, Ecology and Technical Supervision. Available at: [https://unfccc.int/sites/default/files/resource/4NC\\_Uzbekistan\\_ENG\\_14%2010\\_SEC.pdf](https://unfccc.int/sites/default/files/resource/4NC_Uzbekistan_ENG_14%2010_SEC.pdf) (Accessed: 11 September 2025).
- Rogov, M.M. (1957) *Gidrologiya del’ty Amu-Dar’i: geograficheskiye i gidrologicheskiye kharakteristiki* [Hydrology of the Amu Darya Delta: Geographical and hydrological characteristics]. Leningrad: Gidrometeorologicheskoye Izdatel’stvo. [In Russian].
- Rogov, M.M., Khodkin, S.S. & Revina, S.K. (1968) *Gidrologiya pridel’tovoy oblasti Amu-Dar’i* [Hydrology of the Amu Darya delta estuarine region]. *Trudy Gosudarstvennogo Okeanograficheskogo Instituta* [Proceedings of the State Oceanographic Institute], Issue 94. [In Russian]
- Ruziev, I.B., Masumov, R.R., Ruziev, I.I. & Sychugova, L.V. (2025) ‘Monitoring the main lake systems of the Amu Darya River delta’, *Ekonomika i Sotsium*, 6(133)-2. [In Russian].
- Saparov, A.D., Kuzmetov, A.R., Matmuratov, M.A. & Mirabdullayev, I.M. (2019) ‘Rotifera of the wetland Sudochie (South Aral Sea Region, Uzbekistan)’, *Arkhivarius (Archivarius)*, 5(10[43]), pp. 5–10. [In Russian].
- Scientific Information Center of ICWC (SIC ICWC) (2008) *Comprehensive remote sensing and ground-based studies of the dried Aral Sea bed*. Edited by V.A. Dukhovny. Tashkent: SIC ICWC, 172 pp.
- Udvardy, M.D.F. (1975) *A classification of the biogeographical provinces of the world*. IUCN Occasional Paper No. 18. Morges, Switzerland: IUCN. Map supplement: *World Biogeographical Provinces*. Sausalito, California: *CoEvolution Quarterly*. Available at: <https://portals.iucn.org/library/node/6848>.
- Vereshchagina, N.G., Chub, V.E., Shchetinnikov, A.A. & Mukhametzyanova, A.M. (2015) ‘The hydrographic system in the Amu Darya delta (current anthropogenic state)’, *Hydrometeorology and Ecology*, (3), pp. 118–126. [In Russian].
- Zhang, X-X., Claiborn, C., Lei, J-Q., Vaughan, J., Wu, S-X., Li, S-Y., Liu, L-Y., Wang, Z-F., Wang, Y-D., Huang, S-Y. & Zhou, J. (2020) ‘Aeolian dust in Central Asia: Spatial distribution and temporal variability’, *Atmospheric Environment*, 238, 117734. doi:10.1016/j.atmosenv.2020.117734. Available at: <https://www.sciencedirect.com/science/article/pii/S1352231020304660>.
- Yandex Dzen (2024) ‘Locals burn reeds at Sudochye Lake: Scientists warn of harm to nesting waterbirds’, *Yandex Dzen*, 26 April. Available at: <https://dzen.ru/a/XSBr8zNPVQCt4naC> (Accessed: 26 October 2025).

