RIVERS WITHOUT BOUNDARIES

HYDROPOWER DEVELOPMENT IN THE WESTERN TIAN SHAN MOUNTAINS: POTENTIAL THREATS TO THE WORLD HERITAGE PROPERTY

Considering the "Western Tien-Shan" World Heritage Property for Inclusion on the List of World Heritage in Danger

ANALYTICAL REPORT

April 2025

I. Increased Hydropower Development in the "Western Tien-Shan" World Heritage Property and Surrounding Areas

An analysis of potential threats to freshwater biodiversity in Central Asia, conducted by the Rivers without Boundaries International Coalition (RwB) as part of a project supported by the Critical Ecosystem Partnership Fund (CEPF) between 2023 and 2025, identified the Western Tien Shan as one of Central Asia's natural areas most significantly threatened by hydropower and related water infrastructure development. This analytical report provides an overview of the current situation and discusses in detail three areas facing the most significant and immediate threats to biodiversity.

Outstanding Universal Value of the Western Tien Shan

A segment of the Central Asian Tian Shan (Tengir-Too) mountain ecosystem, spanning the territories of Uzbekistan, Kazakhstan, and Kyrgyzstan, was inscribed on the UNESCO World Heritage List in 2016 as the transboundary serial property "Western Tien-Shan" (WTS)[1].

The property comprises components within several protected areas: Aksu-Zhabagly State Nature Reserve, Karatau State Nature Reserve, and Sairam-Ugam State National Nature Park (Republic of Kazakhstan); Sary-Chelek State Biosphere Reserve, Besh-Aral State Nature Reserve, and Padysha-Ata State Nature Reserve (Kyrgyz Republic); and Chatkal State Biosphere Reserve (Republic of Uzbekistan). Nominated jointly by the three nations, these areas represent the most characteristic and best-preserved parts of the unique natural complex of the Western Tian Shan mountains. Each of the 13 property components possesses unique features, collectively contributing to the conservation of exceptional biodiversity and outstanding landscapes.

The property was recognized as World Heritage under criterion (x) for its exceptional species diversity and the presence of crucial natural habitats. The flora and fauna exhibit a high degree of endemism, including at least 14 plant species and 18 animal species listed as threatened on the IUCN Red List. However, this figure likely underestimates the actual number of threatened species, particularly concerning fish fauna, as recent research and ongoing habitat pressures suggest.

The nomination dossier for the WTS World Heritage property briefly notes that the rivers of the Western Tien Shan "are populated with approximately 20 species of fish and almost all of these occur in the area of the nominated property," mentioning only one fish species as threatened on the IUCN Red List at the time. Based on current data compiled in the Rivers without Boundaries (RwB) database on key freshwater habitats, which identifies 31 river stretches in the Western Tien Shan as crucial for freshwater biodiversity conservation, the situation is more complex. This database incorporates information from 21st-century publications and research reports, supplemented by expert judgment from ichthyologists working in the region. New species have recently been described from Western Tien Shan rivers, with more likely to follow. As of the last IUCN review (2020-2022), five fish species native to the area are recognized as threatened or vulnerable. The rapid destruction of river habitats by infrastructure development will inevitably elevate the threat status of additional species, potentially leading to their endangerment or extinction during the ongoing dam-building expansion.

Native fish species identified within the WTS region, listed by IUCN as threatened and/or endemic to Central Asia or the wider Inner Asia region, are presented in Table 1.

Table 1. Endemic, Rare, and Threatened Fish Species of the Western Tian Shan

Latin Name	IUCN Status	Comment
Cottus nudus	n/a	Newly described sculpin species, potentially a local endemic
Cottus jaxartensis	LC	Likely endemic to the WTS region
Cottus nasalis	LC	Endemic to Central Asia
Cottus spinulosus	LC	Endemic to Central Asia
Luciobarbus brachycephalus	EN	Endemic to the Central Asia-Caspian region
Luciobarbus capito	VU	Endemic to the Central Asia-Caspian region
Schizothorax intermedius (Schizothorax curvifrons)	LC	Snow trout – Endemic to Central Asia, heavily fished
Glyptosternon oschanini	LC	Turkestan catfish - endemic to Central Asia/Syr Darya basin
Glyptosternon reticulatum	LC	"Turkestan catfish" also found in Indus basin. WTS records may be misidentified *G. oschanini*.
Triplophysa sewerzowi	VU	Endemic to Central Asia
Iskandaria kuschakewitschi	LC	Endemic to Central Asia
Triplophysa stolickai	LC	Likely represents several distinct species
Triplophysa coniptera (T. salari)	EN	Endemic to WTS and Talas River Basin
Triplophysa dorsalis	LC	Endemic to Central Asia. Found in rivers downstream of WTS foothills
Triplophysa elegans	LC	Endemic to Central Asia. Taxonomic doubts exist regarding specimens found in WTS.
Phoxinus poljakowii	LC	Single record for WTS is likely erroneous.
Alburnus (Alburnoides) oblongus	n/a	Data Deficient, endemic to Central Asia

Gobio lepidolaemus	LC	Endemic to Central Asia
Diptychus sewerzowi	LC	Endemic to Central Asia
Gymnodiptychus dybowskii	LC	Tibetan species experiencing rapid decline in Central Asia
Aspiolucius esocinus	EN	Pike asp – Endemic to Central Asia. Found in Boralday River. Likely extinct elsewhere in Syr Darya basin.

(IUCN Status: EN=Endangered, VU=Vulnerable, NT=Near Threatened, LC=Least Concern, DD=Data Deficient, n/a=Not Assessed by IUCN)

Significant portions of the World Heritage site, particularly the core protected area of the Ugam-Chatkal National Park ("Maidantal" section) in Uzbekistan and the "Besh-Aral" and "Sandalash" areas in Kyrgyzstan (both part of the Besh-Aral State Nature Reserve), are located within the Chatkal River basin. The Chatkal River flows into the Charvak Reservoir and is a major tributary of the Chirchik River, which originates below the Charvak Dam. The southern part of the Sairam-Ugam National Park in Kazakhstan lies within the Ugam River basin, the first major tributary of the Chirchik below the Charvak Reservoir. Other sections of the Sairam-Ugam National Park and the adjacent Aksu-Zhabagly Reserve are situated in the Arys River basin. The Arys and Chirchik rivers are major tributaries of the Syr Darya River, which flows towards the remnants of the Aral Sea. Although the components of the WTS World Heritage site are geographically separated, their ecological integrity and connectivity are maintained by the Syr Darya river network and the contiguous complex of major national protected areas across the three countries, primarily the Besh-Aral Reserve (Kyrgyzstan), Aksu-Zhabagly Reserve and Sairam-Ugam National Nature Park (Kazakhstan), and Ugam-Chatkal National Nature Park and Chatkal State Biosphere Reserve (Uzbekistan).

Hydropower Development and the Western Tien Shan World Heritage Property

During the 20th century, the ecosystems of the Syr Darya river basin suffered significant adverse impacts from the development of water infrastructure for energy generation and irrigation. This led to the degradation of numerous aquatic and riparian ecosystems, fragmentation of terrestrial habitats, and the decline and potential extinction of several endemic species, such as the near disappearance of the Syr Darya Shovelnose sturgeon (*Pseudoscaphirhynchus kaufmanni*) due to river fragmentation. While 20th-century dam and canal construction reached the foothills of the Western Tien Shan (e.g., the Charvak Reservoir on the Chirchik River), the mountainous areas remained largely unaffected. Between 1990 and 2020, no new major water or energy infrastructure was constructed in this mountain region.

However, over the past five years, all three countries sharing the Western Tien Shan have significantly accelerated hydropower development on both small and large rivers originating in the Western Tian Shan Mountains. This trend threatens to cause further degradation and fragmentation of freshwater and terrestrial ecosystems, including those within protected areas and the World Heritage property itself.

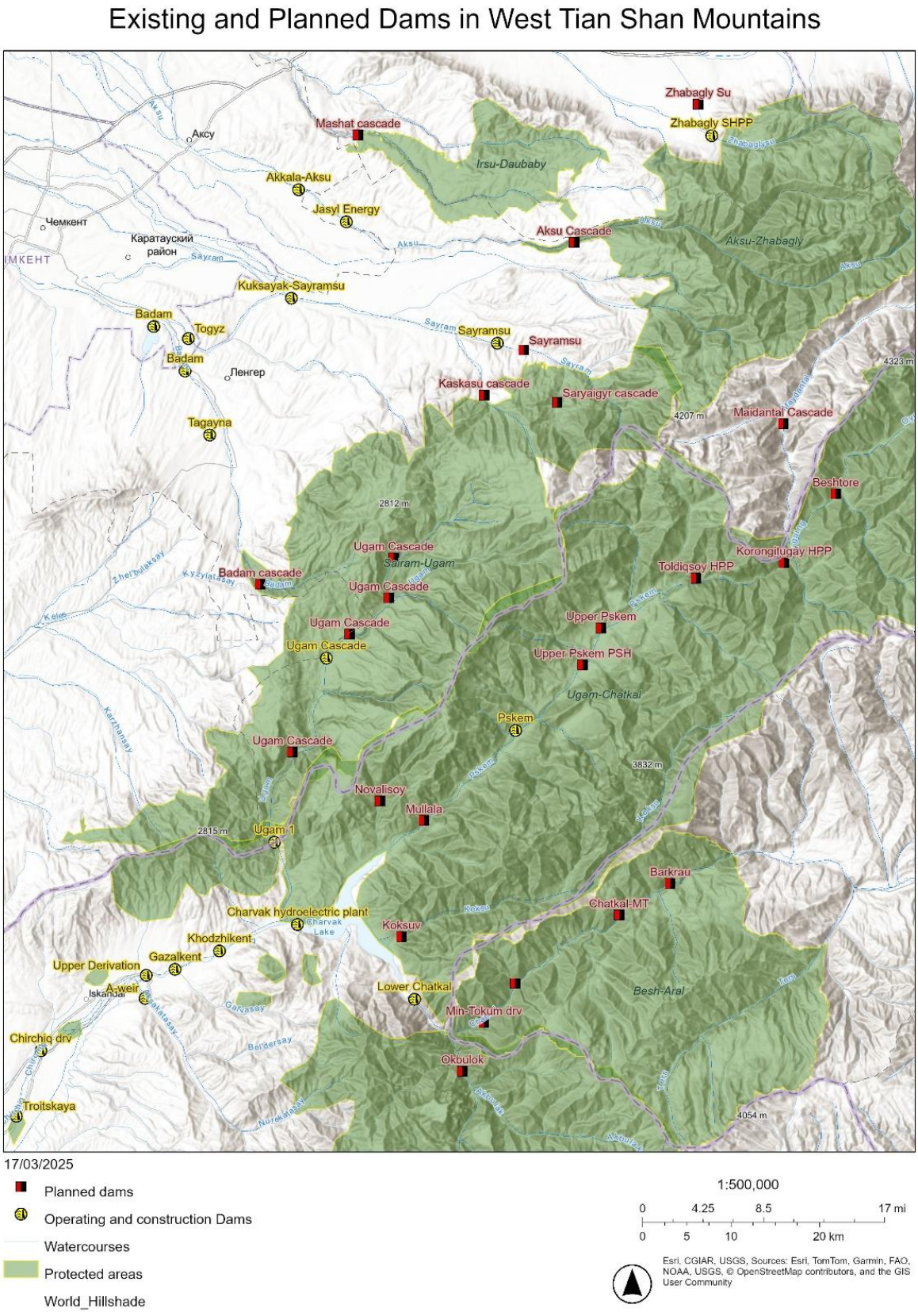


Figure 1. Existing and Planned Hydropower Projects in the Central Part of the Western Tian Shan Mountains. *Source: Rivers without Boundaries online interactive GIS map available at: https://arcg.is/0fDfGP0*

- **Kazakhstan:** Is implementing a renewable energy auction program[2], supported by the "Hydropower Development Program 2020-2030." Several small hydropower plants (HPPs) have recently been subsidized and constructed in the foothills. Cascades of small HPPs are planned for nearly all rivers flowing from the Kazakh Western Tien Shan (e.g., Ugam, Mashat, Aksu, Arys, Sairamsu, Sariaygyr, Badam, Kaskasu). The most potentially damaging project for the protected areas and World Heritage site is the revival in 2021 of a Soviet-era plan to construct an HPP cascade on the Ugam River, involving reservoirs and a water supply pipeline to six districts of the Turkestan region.
- **Uzbekistan:** Has launched an extensive program for large and small hydropower development managed by the state company UzHydroenergo. This includes dam construction on rivers feeding the Chirchik River (Pskem, Ugam, Chatkal, Koksu). The lower reaches of the Chatkal and Pskem rivers are already being dammed. Preparations are underway for a cascade of 4-6 dams on the upper Pskem River and HPPs on the Akbulak and Koksu rivers. While none of these projects are located *inside* the WTS World Heritage Property boundaries, they severely fragment rivers and landscapes within protected areas that connect different components of the property.
- **Kyrgyzstan:** Is actively planning an HPP on the Chatkal River within the Besh-Aral Nature Reserve – a component of the WTS World Heritage property. Additionally, plans exist for developing up to five more HPPs upstream on the Chatkal and Sandalash (Chandalash) rivers.

In total, on watercourses directly connected with the components of the WTS property and the protected areas containing them, at least five dams have been constructed recently. According to official state programs of the three countries, an additional 15 to 40 dams and cascades of large and small HPPs are either under construction or have been announced. This represents a dramatic increase from just five years ago when no HPPs existed on the mountain rivers of this region upstream of the Charvak Reservoir.

Potential Impacts on Key Biodiversity Areas (KBAs)

The construction of new hydropower cascades will inevitably lead to the fragmentation and destruction of freshwater habitats and river valley ecosystems. It will also increase disturbance levels for rare wildlife, impede or block species migration and dispersal routes, and degrade ecosystem functions and services. Associated infrastructure, such as roads and power lines, will further exacerbate these negative impacts, jeopardizing the region's unique flora and fauna.

The most recent identification of Key Biodiversity Areas (KBAs) in the mountains of Central Asia, supported by the Critical Ecosystem Partnership Fund (CEPF)[3], was completed in 2017. At least 12 KBAs (listed in Table 2) within the river basins of the Western Tien Shan, associated with the WTS World Heritage property, are potentially seriously affected by current hydropower development programs.

KBA Methodology Note: The map below distinguishes between "Wetland KBAs" and "Other KBAs" based on Rivers without Boundaries expert analysis to highlight areas where freshwater biodiversity values (rare fish, floodplain forests, waterbirds, etc.) were explicitly identified in the KBA description. Relatively few Central Asian KBAs explicitly list important freshwater biodiversity, although many contain significant or last remaining populations of rare freshwater species. This likely reflects a paucity of data on river biodiversity and the KBA identification methodology used for the Mountains of Central Asia, which was heavily biased towards terrestrial ecosystems and species.

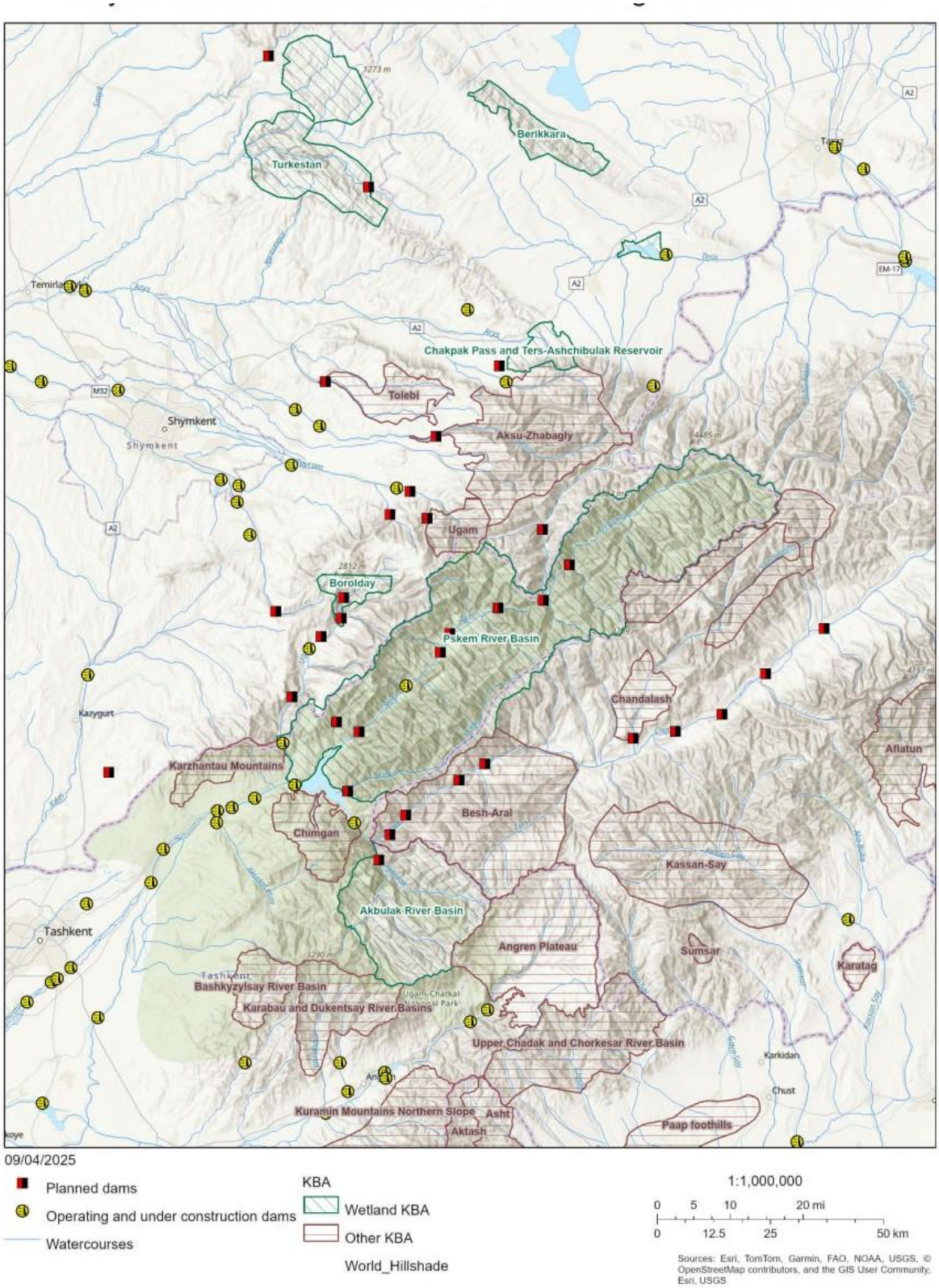


Figure 2. Key Biodiversity Areas of the WTS Region. *Information on existing and planned dams and their relationship to biodiversity values can be accessed via the Rivers without Boundaries online interactive GIS map: https://rivers.help/map*

Table 2. Key Biodiversity Areas Potentially Affected by Hydropower Development

KBA_ID	Local Protection Category (**Bold** = WTS Component)	KBA International_Name	Area (km^2)	Number of Dams of Concern
KAZ05	Sairam River basin in Sairam-Ugam National Park*	Ugam	110	3-5
KAZ06	Irsu-Daubaba cluster of **Sairam-Ugam National Park***	Tolebi	170	1-3
KAZ07	Ugam River basin in Sairam-Ugam National Park*	"Boralday" (erroneously mapped WHS component)	80? (>150)	5-7
KAZ08	Aksu-Zhabagly Strict Nature Reserve*	Aksu-Zhabagly	700	2???
KAZ--	Boralday cluster of **Sairam-Ugam National Park** (omitted in error)	(Not officially designated KBA due to 2016 error)	108	1
KAZ04	Turkestan Regional Park	Turkestan	574	1-3
KGZ02	**Sandalash** (Part of Besh-Aral Reserve)*	Chandalash	140	1
KGZ01	Besh-Aral Reserve*	Besh-Aral	1320	1-6
UZB01	Ugam-Chatkal National Nature Park* (part)	Pskem River Basin	2550	5-9
UZB02	Ugam-Chatkal National Nature Park*	Karzhantau Mountains	150	1-2
UZB03	Ugam-Chatkal National Nature Park* (part)	Chimgan	200	1
UZB07	Angren Plateau* (partially overlaps Ugam-Chatkal NNP)	Angren Plateau	700	1-2
UZB04	Ugam-Chatkal National Nature Park* (part)	Akbulak River Basin	650	1

Note: Dam construction is planned or in process in the areas marked with an asterisk.

Species Under Threat: Example 1 - Chatkal Sculpin (*Cottus jaxartensis*)

The threats posed to endemic fish species can be illustrated by the Chatkal sculpin (*Cottus jaxartensis*), a relict species with a narrow range in the Western Tien Shan. According to experts from Uzbekistan, this species undertakes seasonal migrations from lower mountain areas to the headwaters of the Pskem, Ugam, Koksu, and Chatkal rivers. Although IUCN assessed the species

as Least Concern (LC) in 2020, the subsequent and planned severe habitat fragmentation caused by dams could rapidly push it towards extinction. Most significant threats have emerged since 2020, necessitating urgent conservation measures to prevent habitat destruction and an updated IUCN assessment.

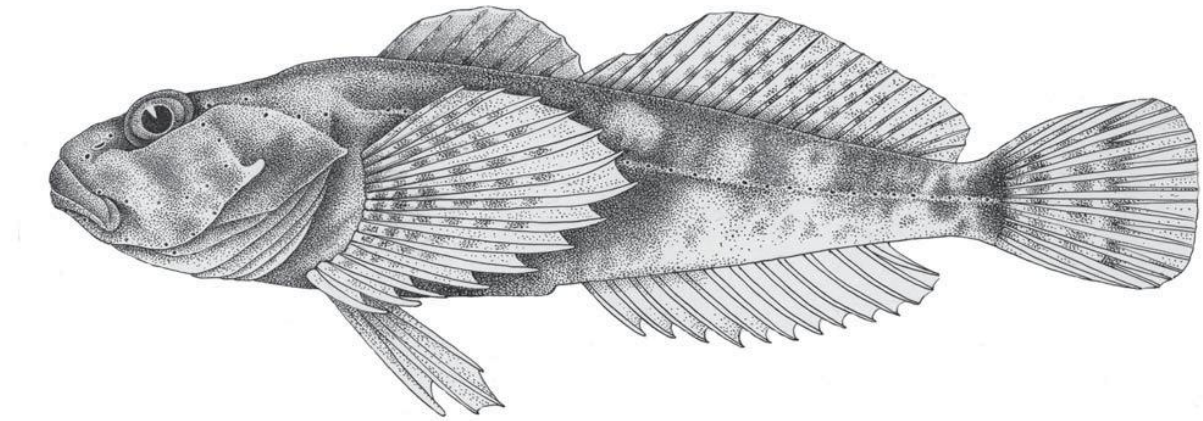


Figure 3. Chatkal Sculpin (Cottus jaxartensis). *(Source: Sideleva V.G. Review of cottoid fishes (Cottoidei) of Central Asia... Voprosy Ichthyologii Vol. 61 No. 3 2021).*

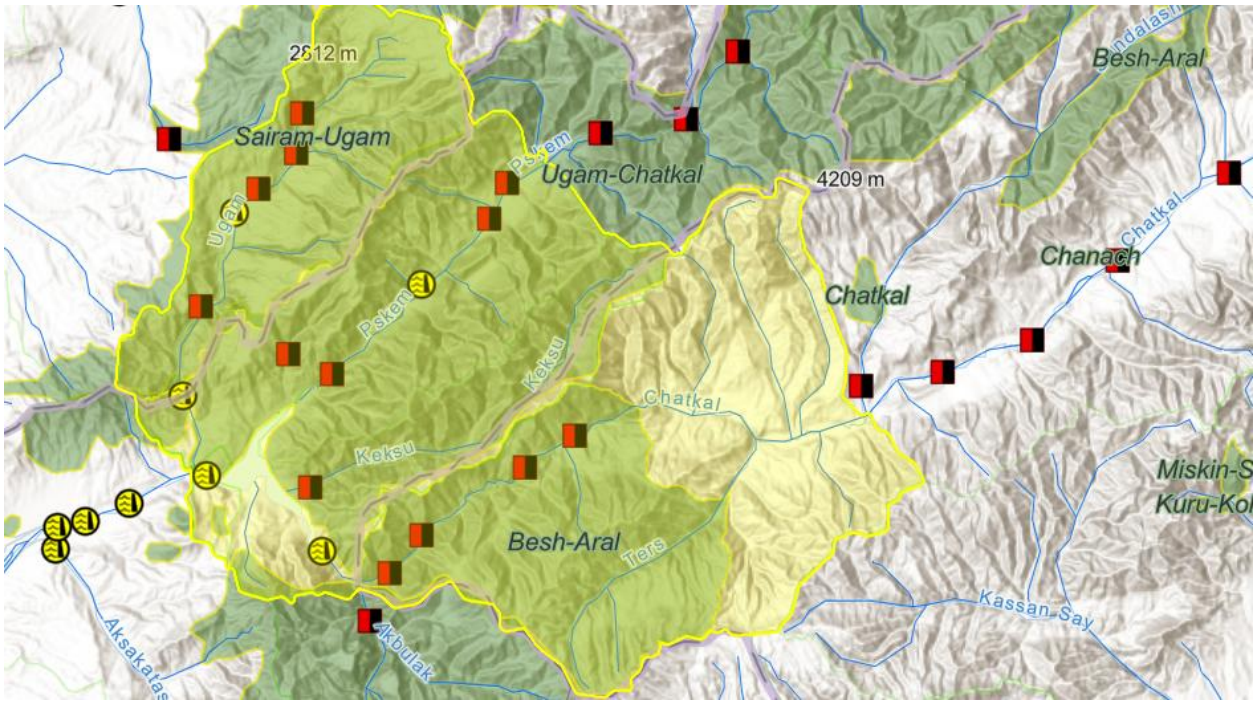


Figure 4. Range of Chatkal Sculpin (Cottus jaxartensis) according to IUCN[4], overlaid with planned hydropower projects. *Source: Rivers without Boundaries online interactive GIS map https://arcg.is/0fDfGP0*

According to IUCN data, the Chatkal sculpin is restricted to the upper Chirchik River basin, making it endemic to the WTS World Heritage property region and its immediate surroundings. The map highlights 4 newly built and 12 planned hydropower projects that will fragment the sculpin's habitat into potentially more than 20 small, isolated sub-basins. This fragmentation will severely compromise the species' ability to survive, particularly when compounded by the effects of climate change.

Species Under Threat: Example 2 - Snow Leopard (Panthera uncia)

The snow leopard (*Panthera uncia*), an IUCN Red Listed species (Vulnerable), is another species particularly vulnerable to hydropower impacts in the region. It actively utilizes the valleys of mountain rivers where HPP cascades are planned, such as the Pskem, Chatkal, and Ugam. Construction and operation of large hydropower complexes will introduce significant disturbance factors affecting both the ungulates (the snow leopard's primary prey) and the predator itself. The impact is expected to be greater for hydropower plants constructed at higher elevations.

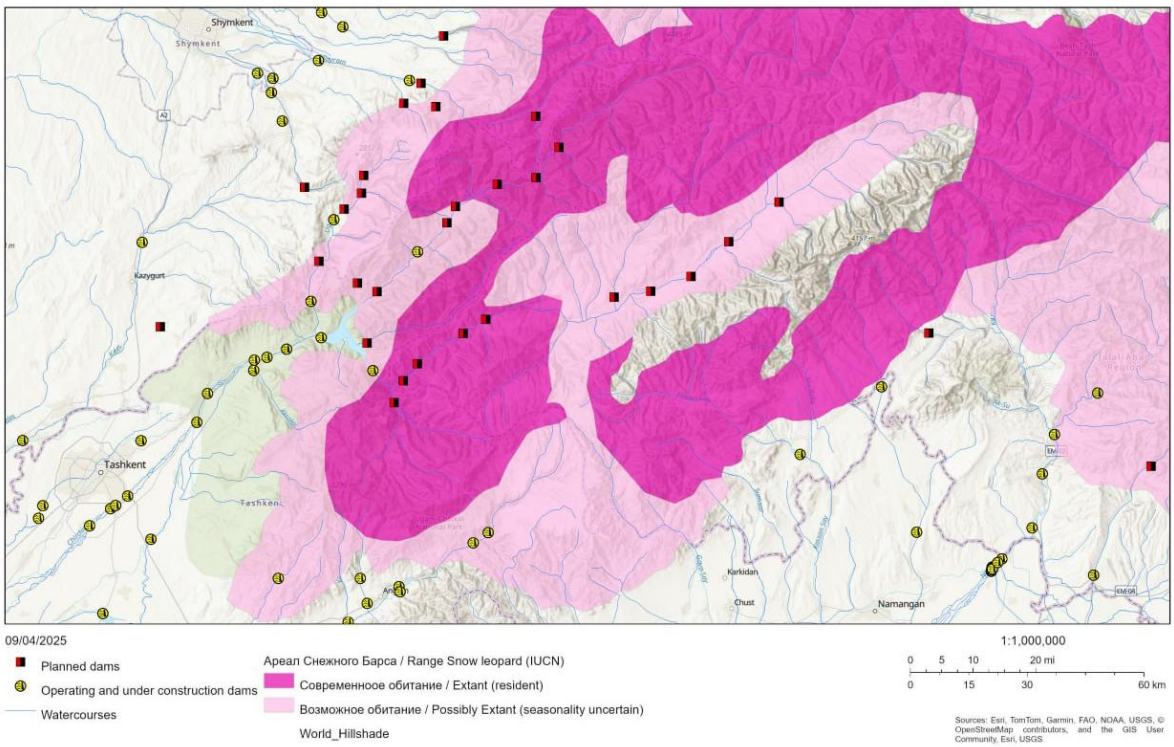


Figure 5. Planned Dams within the Snow Leopard Range in the Western Tien Shan. *(IUCN species range data). Source: Rivers without Boundaries online interactive GIS map https://arcg.is/0fDfGP0*

The following potential risks associated with high-altitude reservoirs in snow leopard habitats were identified in a 2023 report "Risks of creation of high-mountain reservoirs in habitats of snow leopard and its food base" by M. Gritsyna and A. Ten (Institute of Zoology, National Academy of Sciences, Republic of Uzbekistan)[5]:

- **Construction Phase Disturbance:** Significant disruption to snow leopards and their prey, potentially forcing large animals to abandon habitats. Less mobile animals face higher mortality risks. Poaching by construction workers and human-induced fires are additional risks during this period.
- **Habitat Loss (Riparian Forests):** Construction of reservoirs in the Western Tien Shan will inundate unique riparian forests, leading to the loss of characteristic plant and animal species, including crucial prey for snow leopards.
- **Habitat Loss (Other Areas):** Reservoir filling and construction activities outside riparian zones will reduce overall habitat availability, diminish snow leopard feeding grounds, and likely decrease snow leopard populations directly.
- **Increased Competition for Pastures:** Reduction of grazing land due to infrastructure development and improved access to high mountain areas will intensify competition

between livestock (whose numbers are increasing) and wild ungulates for pastures, negatively impacting the snow leopard's prey base.
- **Increased Human-Wildlife Conflict:** A decline in wild ungulate numbers may lead to increased predation on livestock by snow leopards and other predators, potentially escalating retaliatory killings of snow leopards by local communities.
- **Loss of Critical Wintering Grounds:** Ungulates often move to lower elevations in winter seeking reduced snow cover and forage, where human disturbance is currently limited. Reduction or degradation of these areas due to development will force ungulates into less suitable areas, likely reducing winter survival rates.
- **Water Access and Ice Hazards:** Fluctuations in reservoir water levels and altered ice conditions could impede access to water for ungulates and other vertebrates, and potentially create ice traps.

Additional risks arise from the construction of new access roads associated with hydropower plants:

- **Increased Poaching Access:** High-mountain areas, particularly in Uzbekistan, are currently difficult to access by vehicle, limiting poaching primarily to local residents. New roads will significantly improve access for hunters and poachers from across the country.
- **Potential Increase in Snow Leopard Poaching:** While currently infrequent, the ease of access may increase instances of snow leopard poaching for pelts or the illegal capture of live animals.
- **Unsustainable Tourism Development:** Mass tourism is expanding annually. New roads will open up previously undisturbed habitats to increased visitor pressure.
- **Induced Development Pressure:** New roads often catalyze further development, including agriculture, hunting concessions, private estates, and other activities, placing additional pressure on natural territories.

Questionable Economic Utility of Planned Hydropower

The economic rationale and energy contribution of many planned hydropower projects warrant scrutiny. For the most part, these plants do not represent a critical source of energy for the region compared to other available options.

- In **Kazakhstan**, within the renewable energy auctions program, failures and delays for solar and wind projects are significantly less frequent (2-3 times lower) than for HPP proposals. Most planned HPPs are on relatively small mountain rivers with highly variable and uncertain flows and limited energy potential (typically 2-20 MW). In contrast, solar and wind farms tend to have larger capacities (often >50 MW each) with more predictable year-round generation profiles.
- In **Kyrgyzstan** (and Tajikistan), the energy system's primary weakness is its over-reliance on hydropower, which leads to generation deficits during low-flow periods and winter. This necessitates diversification towards other renewable sources, rather than constructing more HPPs. Regular electricity shortages in these countries stem from this lack of diversification in energy systems that are 85-95% reliant on hydropower.
- In **Uzbekistan**, the additional capacity from new HPPs will be relatively insignificant compared to the planned large-scale deployment of solar and wind farms. Furthermore, unlike large Soviet-era dams like Charvak, these new, mostly smaller HPPs possess limited reservoir storage and thus cannot provide substantial grid balancing or maneuvering capacity for regional energy systems.

Recent reports from the International Renewable Energy Agency (IRENA) demonstrate that global renewable energy growth is not dependent on hydropower; HPPs contributed only 1-7% of new

global renewable capacity annually in recent years[6]. A key factor is the rising cost of new hydropower compared to other renewables. In 2023, the global average levelized cost of electricity (LCOE) from new utility-scale solar PV was 4.4 US cents/kWh, whereas for new hydropower it was approximately 30% higher at 5.7 US cents/kWh[7]. This cost gap is widening rapidly: in 2022, the difference was only 20%, and back in 2014, hydropower was four times cheaper than solar PV (3.7 vs. 17.7 US cents/kWh).

Beyond cost, developing a sizeable hydropower plant typically takes 5-15 years, compared to 1-2 years for solar and 2-4 years for onshore wind. Cost and time overruns are also a common feature of most hydropower projects globally.

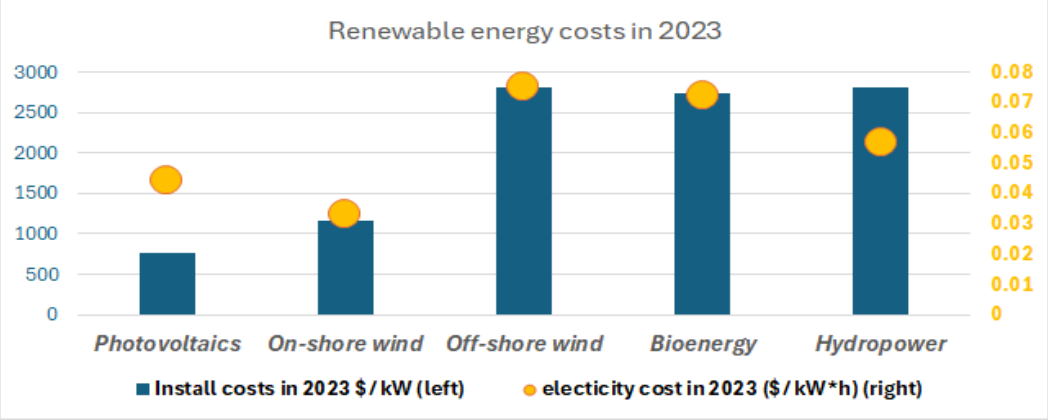


Figure 6. Levelized Cost of Electricity (LCOE, USD/kWh, right axis) and Investment Costs (USD/kW, left axis) for New Renewable Energy Projects, Global Average 2023. *Source: International Renewable Energy Agency (IRENA).*

The World Heritage Convention and Dam Construction

The construction of hydraulic structures represents one of the most severe threats to natural World Heritage sites, often causing irreversible damage to river ecosystems. A 2019 report by the Rivers without Boundaries coalition and international partners highlighted the global dam-building crisis on rivers within and flowing into World Heritage sites[8].

The World Heritage Convention explicitly states the incompatibility of constructing large dams and reservoirs within the boundaries of World Heritage properties. This principle directly applies to HPPs planned on the Chatkal River in Kyrgyzstan and the Ugam River in Kazakhstan. Furthermore, the Convention requires States Parties to conduct thorough Heritage Impact Assessments (HIAs) for dam projects located outside a property but on rivers flowing through it, or otherwise potentially impacting its Outstanding Universal Value (OUV). These HIAs must be submitted to the World Heritage Centre and IUCN for review *before* any decisions are made regarding project approval or implementation.

Several World Heritage Committee decisions reiterate this stance. For example, Decision **40 COM 7** (2016), paragraph 17: "The Committee notes with great concern that an increasing number of properties are potentially threatened by large dam projects, considers that the construction of dams with large reservoirs within the boundaries of World Heritage properties is incompatible with their status, and urges States Parties to ensure that the impact of dams that may affect properties located upstream or downstream within the same river basin is carefully assessed in order to avoid impacts on the Outstanding Universal Value of the World Heritage property, and urges States Parties to ensure that the dams that may affect properties located upstream or

downstream within the same river basin are carefully assessed in order to avoid impacts on the Outstanding Universal Value of the World Heritage property."[9]

Constructing hydraulic structures within World Heritage properties constitutes a gross violation of Convention obligations and can lead to the property's inscription on the List of World Heritage in Danger, potentially followed by its delisting. Failure to properly assess impacts on heritage sites from projects outside their boundaries but affecting shared river systems is also a serious violation, particularly when negative impacts are evident, and can similarly result in an "In Danger" listing. The inscription of Lake Turkana National Parks (Kenya) on the List of World Heritage in Danger due to impacts from Ethiopia's Gibe III dam on the Omo River provides a recent precedent[10].

States Parties often abandon planned hydropower projects to avoid violating Convention rules. Russia, for instance, recently cancelled plans for HPPs near the Volcanoes of Kamchatka[11].

Diplomatic and scientific discussions concerning hydropower projects affecting World Heritage sites can extend for years, significantly delaying planning and development. For example, Mongolia's Egiin Gol hydropower project and two other dams potentially affecting the Lake Baikal World Heritage site (Russia) were halted in 2016[12] following concerns raised through UNESCO and the withdrawal of international financiers pending further assessment. Mongolia continues efforts to demonstrate the project's compatibility with Baikal's OUV[13].

Avoiding potential conflicts with World Heritage Convention requirements is not only crucial for conserving ecosystems but can also lead to more efficient and cost-effective development pathways by redirecting projects away from sites where they pose unacceptable risks to World Heritage properties.

The following sections detail the situation in three sub-basins where hydropower development poses the most significant threats to the natural complexes of the Western Tian Shan mountains.

II. Chatkal River Basin, Kyrgyzstan: Besh-Aral Reserve

Figure 7. Chatkal River in Besh-Aral State Nature Reserve. *Source: Institute of Biology of the National Academy of Sciences of the Kyrgyz Republic (Facebook).*

The Besh-Aral State Nature Reserve, located in the Chatkal District of Jalal-Abad Province, covers 112,463 hectares[14] and is entirely included within the Western Tien Shan World Heritage property.

According to a 2010 inventory conducted prior to nomination, the reserve hosts 65 plant species endemic to the Western Tien Shan and approximately 80% endemic to Central Asia overall. Five species are listed as globally threatened by IUCN: Knorring's hawthorn (*Crataegus knorringiana*, CR), Korshinsky's pear (*Pyrus korshinskyi*, CR), Sievers' apple (*Malus sieversii*, VU), and Walnut (*Juglans regia*, NT). Besh-Aral is also a KBA for rare and endemic plants like *Juno orchioides*, *Potentilla kamelinii*, *Thesium minkwitzianum*, *Tulipa kaufmanniana*, and *Tulipa greigii*, some of which are endemic specifically to the Chatkal river valleys.

Besh-Aral contains plant communities endemic to the Western Tien Shan dominated by large *Prangos* and *Ferula* species. It also harbours the only well-preserved floodplain forests formed by Tien Shan birch (*Betula tianschanica*) in Kyrgyzstan. This floodplain forest on the Chatkal River is a unique remnant of lowland riparian forest, particularly valuable for conserving cavity-nesting birds like the White-winged Woodpecker (*Dendrocopos leucopterus*), an endemic of Central Asia, listed in the Red Book of the Kyrgyz Republic.

The reserve lies at the core of the current range of the Menzbier's marmot (*Marmota menzbieri*), a narrow-range endemic of the Western Tien Shan listed as Endangered (EN) by IUCN, and contains a major portion of the species' global population. Besh-Aral also forms part of the range of the snow leopard (*Panthera uncia*, VU).

The fish fauna of the Chatkal River and its tributaries within the Reserve remains understudied but may comprise up to 12 species, including snow trout (*Schizothorax* sp.), naked osman (*Gymnodiptychus dybowskii*), scaly osman (*Diptychus* sp.), Turkestan catfish (*Glyptosternon* sp.), and the endemic Chatkal sculpin (*Cottus jaxartensis*)[15], a rare relict species from the Tertiary period. A field survey in October 2023 identified four fish species, including the Chatkal sculpin[16].

The Chatkal River system serves as the ecological backbone connecting all ecosystems within the Reserve, and its valley provides critical habitat for a significant proportion of the area's endemic and Red Listed species. It represents one of the largest relatively intact river and valley ecosystems in the region, despite past impacts from gold mining. The river system also links two Kyrgyz components of the WTS property (Besh-Aral and Sandalash) and potentially influences the Maidantal component in Uzbekistan, located in the Akbulak River basin, a tributary of the Chatkal.

Past and Planned Activities Potentially Contravening the World Heritage Convention

In 2023, several actions taken by the Government of the Kyrgyz Republic appear to contravene its obligations under the World Heritage Convention regarding the conservation of the WTS property (1490), threatening the natural ecosystems of two components within Kyrgyzstan. Preparations are now underway for a fourth, potentially highly damaging action: the excision of land from the Besh-Aral State Nature Reserve for hydropower construction.

1. **Removal of Protection Status from a World Heritage Component:** Government Resolution No. 359 (July 12, 2023) authorized the transfer of 19,396 hectares in the northeast of the "Sandalash" site from the category of "Lands of specially protected natural territories" to "Reserve lands"[17]. This area is part of the Besh-Aral Nature Reserve and a component of the WTS World Heritage property. The decree effectively abolishes protection for the entire Sandalash section (originally 25,800 hectares), leaving this part of the World Heritage property vulnerable. The primary stakeholder appears to be the mining company Chaarat Zaav[18], which holds

exploration licenses and is constructing roads and infrastructure within and around the World Heritage site. Reported accessible gold reserves are up to 25 tons, with less accessible reserves estimated at 85 tons. The ultimate owner, Chaarat Gold Holdings Ltd (listed in London), stated in a November 2023 investor presentation that the "Besh Aral (reserve) issue has been finally resolved" and a contract signed with Power China Corporation for mining and infrastructure completion[19].

2. **Road Construction within the Reserve:** Government Decree No. 124 (March 3, 2023) authorized the withdrawal of 200 hectares from the Besh-Aral Nature Reserve for the construction (termed "renovation") of a road crossing the entire reserve from Ak-Tash village to the Uzbek border[20]. Road works, potentially linked to interests of the mining company MURAS SYNTHES LLC[21], have reportedly been ongoing illegally since 2018. The road is also used to support surveys for planned large HPPs and placer gold prospecting.

3. **Placer Gold Prospecting within the Reserve.** Order No. 290-r (May 30, 2023) granted the State Enterprise "Kyrgyzgeologiya" rights for geological exploration of placer gold deposits at Naiza-Tugai and Arab[22], located within the Besh-Aral Reserve in the Chatkal River valley. Issuing licenses for mineral exploration and mining within a state nature reserve violates national laws and the World Heritage Convention. Analysis of satellite imagery (Google Earth) by Rivers without Boundaries revealed unusually high turbidity in the Chatkal River near the Uzbek-Kyrgyz border starting around September 2023. This corresponds with active mineral exploration and excavation at the Naiza-Tugay site. By August 2024, earthworks extended over 1.5 kilometers along the river, destroying at least 30 hectares of riparian (tugai) floodplain ecosystems.

Figures 8 and 9. Google Earth Imagery of Naiza-Tugay Placer Gold Deposit on the Chatkal River. *Left: August 2019 (undisturbed). Right: August 2024 (active mining).*

4. **Planned Hydropower Cascade Inside the Reserve.** In late 2023, the Kyrgyz government revealed plans for two HPPs within the Besh-Aral Reserve: "Barkrau" (350 MW) and "Min-Tukum" (700 MW), totaling 1050 MW capacity with an estimated annual output of 2.0 billion kWh. This initial plan involved flooding approximately 15 km of the river valley with two reservoirs and dewatering a further 25 km downstream via diversion pipes. On December 12, 2023, the Vice-Minister of Energy circulated a draft Decree "On exclusion of lands from Besh-Aral State Nature Reserve for construction of hydropower on Chatkal River." This draft proposed excising 1,250 hectares from the Reserve, offering 20,846 hectares of high-mountain terrain east of the Chatkal headwaters as "compensation." This proposed compensation area consists largely of monotonous ecosystems lacking known significant biodiversity values comparable to the river valley.

Following protests from scientists and NGOs and negative media coverage, the government proposed an alternative design featuring a single, larger dam and reservoir. However, this revised plan appears likely to cause similar or potentially greater damage to the World Heritage property. The new design involves utilizing the entire length of the Chatkal River within the Besh-Aral Reserve for the reservoir and a derivation tunnel. The reservoir, moved further downstream inside the World Heritage property to avoid flooding Ak-Tash village located upstream, the reservoir inside the nature reserve would be approximately 15 km longer than previously planned.

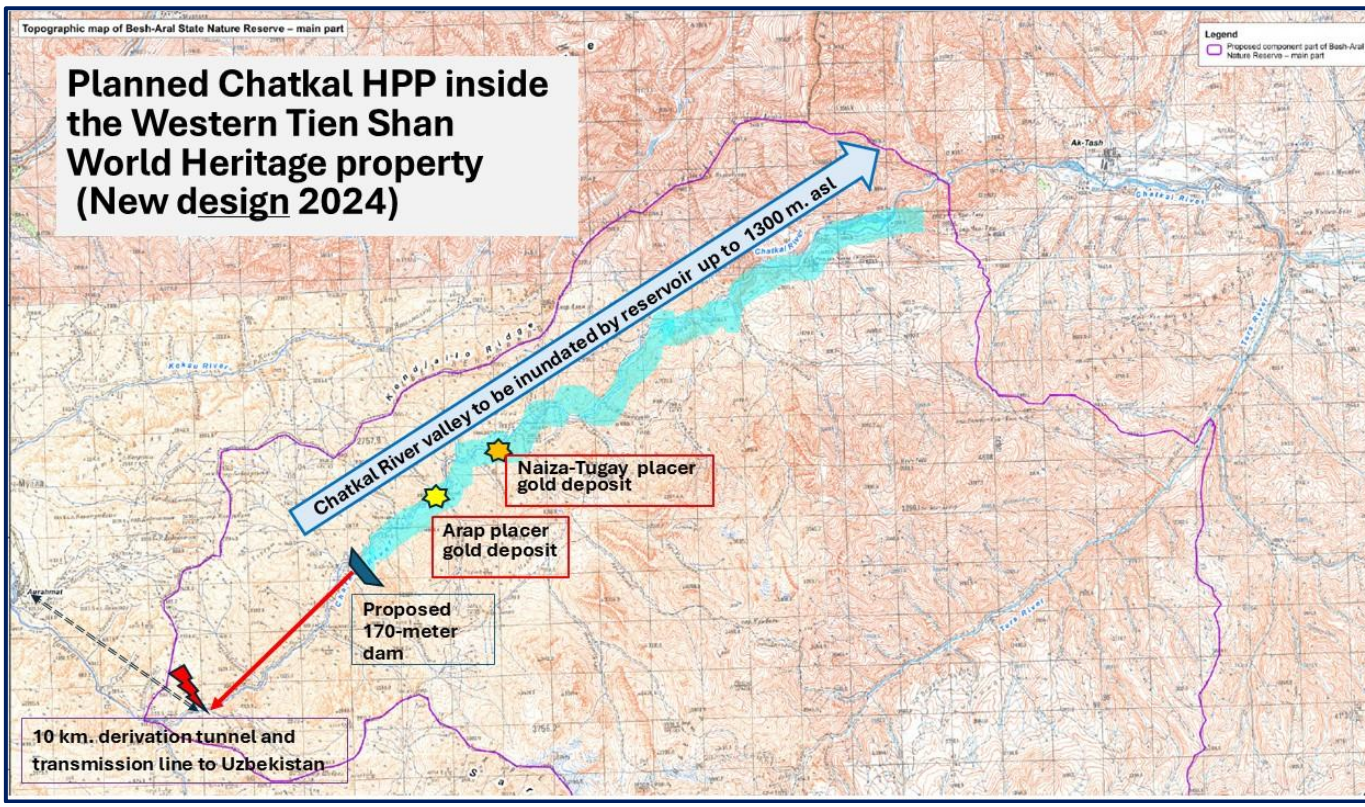


Figure 10. Revised Chatkal HPP Design and Placer Gold Mining Deposits. *Source: Rivers without Boundaries 2024, based on investment brochure presented in June 2024.*

This revised "nature-friendly" design was presented at the World Bank-sponsored Kyrgyzstan Energy Investment Forum in Austria (June 2024)[23]. An accompanying brochure indicated a smaller capacity of 251 MW and annual production of 1.7 billion kWh[24]. The brochure claims the reservoir, situated in the narrow Chatkal canyon, would minimize ecosystem damage, an assertion contradicted by its scale. A single dam downstream of the Khargush tributary, potentially 170 meters high, would inundate and fragment the Chatkal River valley ecosystem throughout almost the entire Besh-Aral Reserve, effectively bisecting the protected area and eliminating critical river-valley habitats. Therefore, the revised project may be even more detrimental to the World Heritage property's integrity than the initial two-dam proposal.

Biodiversity Values at Risk

Although the flooded area might constitute only about 1% of the Besh-Aral Reserve's total territory, the destruction of the central river ecosystem would have devastating consequences for the entire natural complex. Fragmentation of the Chatkal River, dewatering by derivation, and reservoir creation will severely degrade aquatic ecosystems and their biota, including narrow-range endemics like the Chatkal sculpin.

A field survey by the Institute of Biology of the Kyrgyz Republic in October 2023 observed numerous rare fauna species in the potentially affected area, including Golden Eagle (*Aquila chrysaetos*), Cinereous Vulture (*Aegypius monachus*), Eurasian Griffon Vulture (*Gyps fulvus*), Himalayan Vulture (*Gyps himalayensis*), Bearded Vulture (*Gypaetus barbatus*), White-winged Woodpecker (*Dendrocopus leucopterus*), Eurasian Lynx (*Lynx lynx*), and Brown Bear (*Ursus arctos*). In total, 1 reptile, 18 bird, and 7 mammal species recorded in the valley are listed in the Red Data Book of the Kyrgyz Republic. At least one additional bird species, the Common Turtle Dove (*Streptopelia turtur*, VU), is listed on the IUCN Red List.

Most rare and endangered vertebrates in Besh-Aral inhabit the area planned for HPP construction or utilize it as a critical foraging zone. The construction of overhead power lines within the reserve poses a significant collision risk for large birds of prey.

The project would destroy the unique floodplain complex, including the last remnants of lowland Tien Shan birch forests, crucial for the White-winged Woodpecker and other cavity-nesting birds. The Chatkal floodplain also supports numerous rare plants, including local endemics and wild relatives of domesticated fruit trees.

Figure 11. Floodplain Forest on the Chatkal River. *Source: Institute of Biology of the National Academy of Sciences of the Kyrgyz Republic (Facebook).*

Despite suboptimal timing for botanical surveys, the October 2023 expedition identified several Kyrgyz Red Data Book plant species threatened by the proposed flooding and construction:

- Tulipa kaufmanniana Regel
- *Amygdalus petunnikowii* Litv. (Petunnikow's almond)
- *Sorbus persica* Hedl. (Persian rowan)
- *Malus sieversii* (Ledeb.) M. Roem (Sievers' apple)
- Allochrusa gypsophiloides (Regel) Schischk.
- Lepidolopha komarovii C.Winkl.
- *Potentilla kamelinii* Lazkov (Camelina cinquefoil - endemic to Chatkal valley) A comprehensive survey during the spring/summer growing season is required to fully assess the presence of Red Data Book plant species.

Scientists involved in the 2023 survey concluded that degradation of the Chatkal River floodplain valley, the reserve's "core axis," would destroy the integrity of this World Heritage site component and likely facilitate further destructive activities[25]. Overall, if the proposed hydropower project proceeds, this component of the WTS property is highly likely to lose the Outstanding Universal Value for which it was inscribed.

Concerning Enabling Activities

In 2023, the Cabinet of Ministers of Kyrgyzstan adopted a special decree declaring an "emergency in the energy sector" for 2023-2026[26]. This decree permits bypassing numerous national laws and regulations, including requirements for public consultations and rigorous Environmental and Social Impact Assessments (ESIAs), when allocating land for power plants and associated facilities.

The Kyrgyz government is actively considering over 30 large hydropower projects. While this may present opportunities to prioritize projects with lower environmental impacts and avoid conflicts with global biodiversity values, the current political climate strongly promotes hydropower as a primary driver of national economic development. The total scale of proposed projects far exceeds the country's capabilities, domestic needs, and potential export markets, suggesting that prioritization based on environmental and social criteria remains feasible.

International and regional engagement is also promoting the Chatkal HPP project. On November 10, 2023, Kyrgyz President Sadyr Zhaparov met with the CEO of Électricité de France (EDF) in Paris, urging the company's participation in the Chatkal HPP[27].

On January 27, 2023, the Energy Ministries of Kyrgyzstan and Uzbekistan signed a Memorandum of Understanding for a joint feasibility study of the Chatkal HPP cascade[28]. In 2022, the Tashkent-based engineering firm JSC "Gidroproject" (Uzbekistan) updated the Soviet-era hydropower scheme for the Chatkal River. Uzbekistan is concurrently constructing a medium-sized HPP on the lower Chatkal River just upstream of the Charvak Reservoir (see Section III). Uzbekistan employs such "hydropower diplomacy" with neighbours (including Tajikistan on the Zeravshan River and Kyrgyzstan on the Naryn River) to advance broader regional cooperation goals.

Throughout 2024, further Kyrgyz-Uzbek meetings at ministerial and prime ministerial levels discussed cooperation on the Chatkal HPP[29], construction of the Talas-Chatkal-Tashkent Road (potentially crossing the Besh-Aral Reserve)[30], and the creation of a large mountain resort named "Chatkal"[31]. An October 2024 meeting between energy ministers reportedly included discussions on "preliminary studies and future plans for the construction of a hydroelectric power plant on the Chatkal River... with representatives of the Chinese company CEEC [China Energy Engineering Corporation]"[32].

If Uzbekistan participates in constructing the HPP within the Besh-Aral Reserve, it would also violate its obligations under Article 6 of the World Heritage Convention, which requires States Parties not to take actions that could damage heritage sites in neighboring countries. Since transmitting electricity generated by the plant would necessitate a transmission line likely crossing into Uzbekistan, virtually any Uzbek cooperation on this project could implicate Uzbekistan in violating the Convention, potentially attracting significant international scrutiny.

III. Uzbekistan: Hydropower Expansion in the Core of the Protected Mountain Landscape

Figure 12. Construction Site of the Lower Chatkal Hydropower Plant, Uzbekistan*. Source: Rivers without Boundaries.*

Within Uzbekistan's Ugam-Chatkal National Park, the state company UzHydroenergo is actively constructing at least five HPPs and preparing for the construction of six more dams. While these dam sites are located *between* the designated components of the WTS World Heritage property, not directly inside them, their potential impacts warrant formal Heritage Impact Assessments (HIAs) due to their proximity and influence on landscape connectivity and river basin integrity. The most problematic projects include:

1. **Pskem River Hydropower Cascade:** A series of 5-6 dams planned to utilize the Pskem River valley fully, from the Charvak Reservoir up into high-mountain snow leopard habitat.
2. **Akbulak HPP:** Planned downstream from the Maidantal component of the World Heritage property, potentially blocking connectivity within its river basin.
3. **Ugam Cascade:** A cascade of three small HPPs completed in 2024 on the Ugam River, downstream of Kazakhstan's Sairam-Ugam National Park component.
4. **Koksu River Dam:** A planned dam on the Koksu River, currently the only major tributary flowing freely into the Charvak Reservoir, potentially providing upstream migration routes for fish spawning.

5. **Lower Chatkal HPP:** Under construction on the Chatkal River immediately downstream of Kyrgyzstan's Besh-Aral Nature Reserve, with potential to inundate a portion of the World Heritage property in Kyrgyzstan.

Large Dams Threatening Landscape Integrity

There is substantial reason to believe that by initiating construction of the Lower Chatkal HPP, the Government of Uzbekistan may already be contravening the World Heritage Convention. The dam and its reservoir on the Chatkal River will inevitably have negative impacts on two upstream components of the WTS World Heritage property – Besh-Aral (Kyrgyzstan) and Maidantal (Uzbekistan) – by blocking the river basins that contain them. This impedes organism migration along the rivers and valleys and disrupts crucial ecosystem processes. Furthermore, according to information from the Ministry of Energy of Kyrgyzstan, the reservoir created by this dam in Uzbekistan could flood part of the Chatkal valley *inside* the Besh-Aral Nature Reserve, directly impacting the territory of the World Heritage property[33].

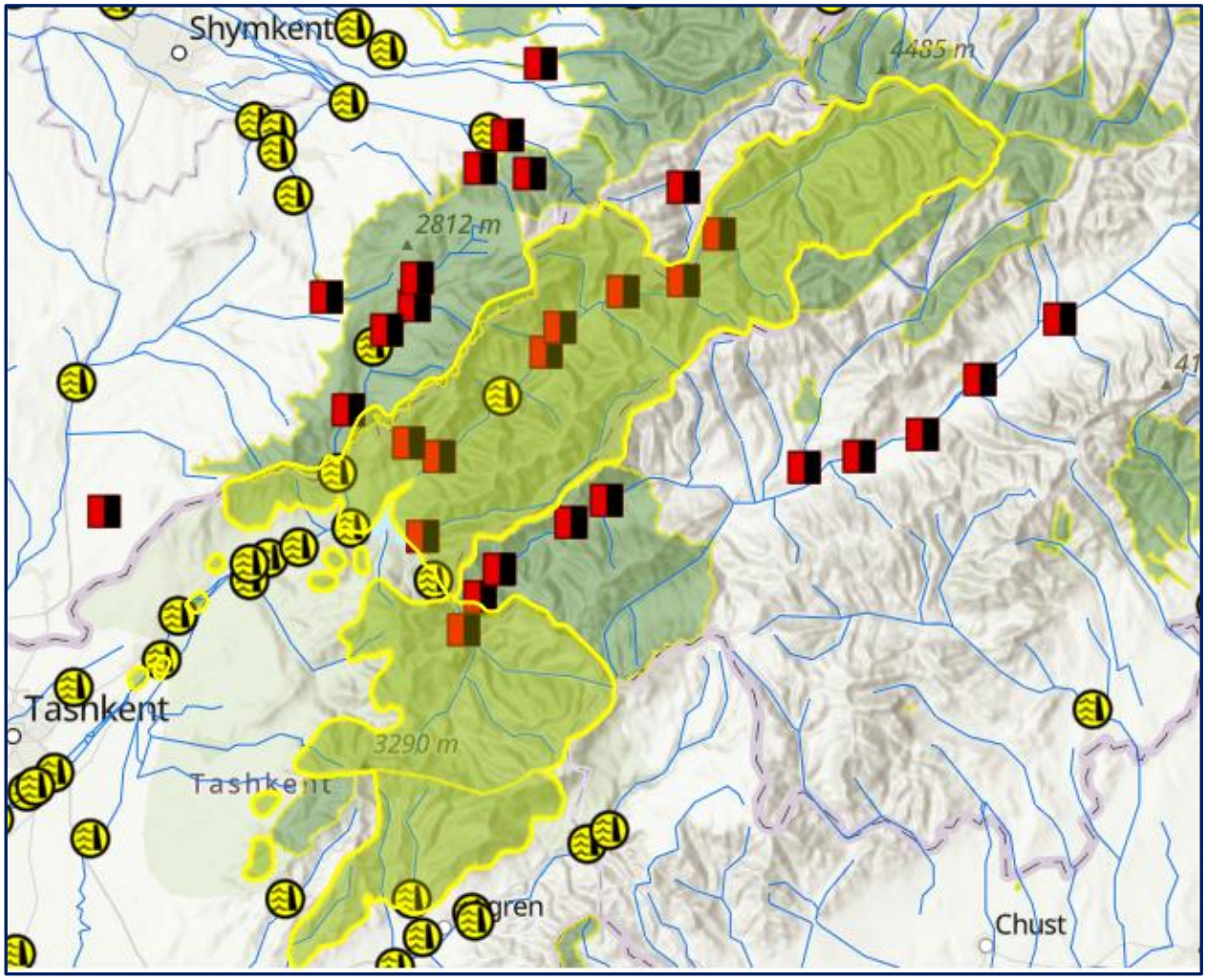


Figure 13. Existing (yellow circles) and Planned (red squares) Hydropower Dams on Rivers within Ugam-Chatkal National Park (yellow contour), Uzbekistan*. Source: Rivers without Boundaries online interactive GIS map.*

According to Uzbekistan's Presidential Decree of March 30, 2023, hydropower development programs include the construction of the Akbulak HPP (50 MW capacity) on the Akbulak River, a

tributary of the Chatkal. This project would further block the river basin containing the Maidantal WTS component, impeding organism migration and potentially causing other negative impacts due to its close proximity to the World Heritage site. Such projects require early and thorough assessment of potential heritage impacts.

Within the broader context of the entire WTS property and the landscape connecting its components, the construction of a cascade of 5-9 HPPs on the Pskem River and its tributaries, situated in the middle of the Ugam-Chatkal National Park, represents a significant threat to the overall integrity of the mountain ecosystem. This development will contribute substantially to landscape fragmentation, particularly concerning the Koksu River and the upper, more mountainous sections of the Pskem cascade (dams planned on Upper Pskem, Oigaing, Nuvalysai rivers). These areas contain relatively intact natural complexes supporting snow leopards and their prey base[34].

Figure 14. Pskem HPP Construction in the Pskem River Valley, 2023*. Source: Rivers without Boundaries.*

Consequently, Uzbekistan must assess the impacts of HPPs currently being built and planned within its territory on individual components of the WTS World Heritage property and the surrounding protected areas. Furthermore, collaborative assessment with Kyrgyzstan and Kazakhstan is needed to evaluate the cumulative impacts of the entire planned hydropower complex on the integrity of the WTS property as a whole.

Small Dams – Significant Problems

The adverse impacts of new dams in this part of Uzbekistan extend beyond the major rivers flowing into the Charvak Reservoir. The completion in 2024 of a cascade of three small HPPs (total capacity approx. 4 MW) on the lower reaches of the transboundary Ugam River provides a stark example. This project poses a severe threat to, and has certainly isolated, populations of 4-5 rare and endemic fish species known to inhabit this mountain river. Given that a component of

the World Heritage property (in Kazakhstan's Sairam-Ugam National Park) is located just 10-20 km upstream, damming the river downstream necessitates, according to World Heritage Convention guidelines, an assessment of impacts on the World Heritage property. It also triggers requirements for assessing transboundary impacts (Espoo Convention).

Rivers without Boundaries representatives visited the Ugam Valley in autumn 2023 and September 2024. Observations on September 11, 2024, confirmed that construction proceeded without apparent planning or implementation of measures to protect biodiversity or ecosystem functions. The river valley ecosystem has been severely disrupted; the river transformed into a muddy channel confined by concrete flumes, eliminating habitat and migration pathways for endemic fish. Derivation pipes traverse the grounds of local sanatoriums, and downstream water quality appeared seriously degraded. This extensive damage was incurred to generate a negligible amount of electricity, which plays no significant role in the Tashkent regional energy grid.


Figures 15 and 16. Ugam River, Uzbekistan. *Left: Lower reaches in autumn 2023. Right: September 11, 2024, showing construction impacts.*


Figures 17 and 18. Newly Built 4.5 MW Hydropower Cascade on the Ugam River, Uzbekistan. *Located immediately downstream of the border with Kazakhstan, effectively blocking fish migration towards the World Heritage property. Source: Website of the President of Uzbekistan, December 6, 2024*[35]*.*

Plans for hydropower development in Uzbekistan continue to expand annually, often with insufficient consideration for freshwater biodiversity conservation. A new Presidential Decree issued on April 3, 2025, mandates the development of up to 3,000 "micro-hydropower stations." While many will be located on irrigation canals, at least 100 dam sites are reportedly planned on natural rivers[36]. As of the writing of this report, the specific locations of these micro-HPPs remain unclear, preventing detailed assessment of their potential impacts on specific protected areas or the World Heritage property. However, such a large-scale program, if implemented without

rigorous, site-specific environmental impact assessments, clearly poses a serious threat to remaining freshwater biodiversity. It is important to note that in Uzbekistan's highly modified landscapes, some rare and endemic species, including newly discovered ones, inhabit not only natural rivers but also irrigation systems[37], making impact assessment across diverse water bodies crucial.

Uzbekistan currently possesses the most developed and apparently well-funded program for new hydropower construction in the region. The country is also actively pursuing "water-energy diplomacy," offering assistance to neighbors in developing hydropower projects on their territories. Regrettably, this policy currently lacks robust ecological safeguards. Without such safeguards, ongoing and planned developments are already causing significant damage to biodiversity, disrupting ecosystem services, and potentially undermining the development of sustainable tourism and recreation sectors.

IV. Kazakhstan: Impacts on Sairam-Ugam National Park

Figure 19. Ugam River Gorge in the Western Tian Shan. *Source: Ugam LLC website.*

Kazakhstan nominated components such as the Aksu-Zhabagly State Nature Reserve, Karatau State Nature Reserve, and Sairam-Ugam State National Nature Park as representing the most characteristic and best-preserved natural areas of the Western Tian Shan mountains for the WTS World Heritage inscription.

In September 2024, Rivers without Boundaries experts attended a meeting in Shymkent, Kazakhstan, convened during the UNESCO/IUCN Reactive Monitoring Mission to the WTS property (Rivers without Boundaries Coalition was the sole NGO representative present). This meeting provided direct information regarding proposed boundary modifications for the World Heritage property within Kazakhstan and the justifications presented for planned dam and reservoir construction in the heart of the Sairam-Ugam National Park. This information significantly informed the analysis presented below regarding hydropower impacts.

River-Dependent Biodiversity Values

Sairam-Ugam National Park hosts a rich biodiversity, with 1,635 plant species, 60 mammal species, and over 200 bird species recorded to date. Sixty plant species are listed in the Red Book of Kazakhstan. A significant portion of the park's endemic flora, including wild ancestors of cultivated fruit trees, is concentrated at lower elevations within river valleys.

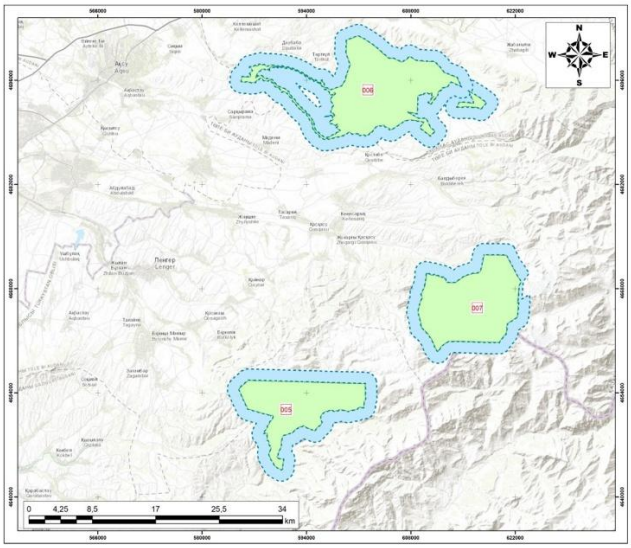
Until potentially impacted by recent developments (including the downstream Ugam cascade in Uzbekistan, completed 2024), the waters of the Ugam and other rivers within the park supported nearly the full complement of the Western Tian Shan's endemic fish fauna[38]. A new endemic sculpin, *Cottus nudus*, was recently described from this area[39]. Unfortunately, systematic fish population monitoring and research are currently lacking within Sairam-Ugam National Park and adjacent protected areas.

Zoologist Elena Chalikova identified floodplain and riverine forests along the Ugam River as critical habitats for native bird species within the basin[40]. Research indicates significant transformation and impoverishment of the avifauna due to increased tourism development and improved accessibility throughout the park. Historically, the human population in the Kazakh part of the Ugam basin was minimal, estimated at no more than 300 people[41].

Proposed Reduction of the World Heritage Property Area

Issues surrounding the WTS property in Kazakhstan emerged at the time of its inscription in 2016. The World Heritage Committee inscribed the property despite IUCN recommendations for deferral due to concerns about the property not meeting integrity and protection management requirements. IUCN specifically warned that "*a number of the components of the protected areas in Kazakhstan do not have boundaries which are based on ecological principles, or which follow natural features* ***such as contours or watercourses****: for example, Karatau SNR and parts of* ***Sairam-Ugam SNNP***"[42].

Between 2018 and 2023, the World Heritage Committee repeatedly expressed concern over uncoordinated changes to the boundaries and zoning of the World Heritage site, particularly within Sairam-Ugam National Park, where the designated core zone had been significantly reduced[43]. The maps submitted with the original nomination dossier contained numerous errors, contradicting textual descriptions of boundaries and misrepresenting the locations of several property components. At the September 2024 meeting in Shymkent, experts representing Kazakhstan acknowledged these past errors but proposed to rectify them by drastically reducing the World Heritage property area within Sairam-Ugam National Park by two- to three-fold.



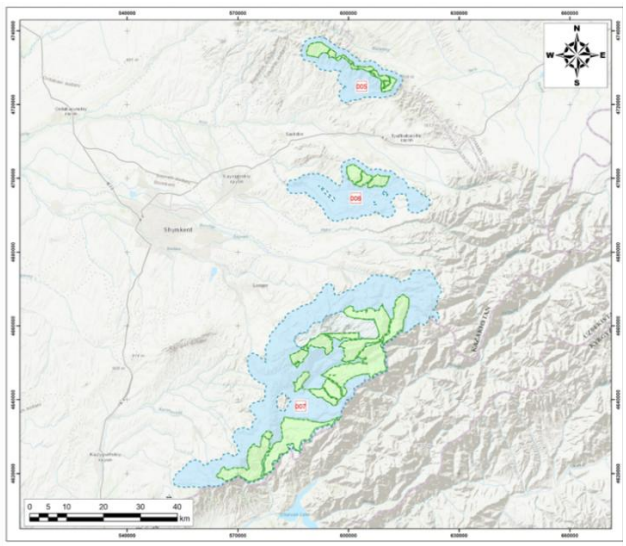


Figure 20 (Left). Deficiencies in 2016 World Heritage Maps. *Incorrectly mapped clusters of Sairam-Ugam National Park (005 Boraldaitau, 006 Irsu-Daubabin, 007 Sairam-Ugam). Green = World Heritage Property, Blue = Buffer Zone.*

Figure 21 (Right). Deficiencies in the 2024 World Heritage Zoning Proposal. *"Corrected" boundaries presented at the Shymkent meeting. While buffer zone outer boundaries*

align better with protected cluster descriptions, the World Heritage property (green) is reduced and fragmented, reflecting problematic zoning. Source: Presentation at Shymkent meeting, September 22, 2024.

This proposal effectively shrinks the designated World Heritage area to align with the current functional zoning plan of the national park. However, this zoning plan is subject to frequent changes, often accommodating development projects, most recently the Ugam hydropower cascade. The proposed "core zones" consist of disconnected patches that fail to ensure the conservation of landscape integrity or ecosystem processes. Reducing the size and fragmenting this component contradicts the Operational Guidelines for the Implementation of the World Heritage Convention, as noted by IUCN in 2016[44].

Table 3. Comparison of Sairam-Ugam NP Cluster Areas: Nomination vs. 2024 Proposal (hectares)

World Heritage Clusters of Sairam-Ugam NP	Original WH Area (2016 Dossier)	Original Buffer Zone (2016 Dossier)	Proposed WH Area (2024)	Proposed Buffer Zone (2024)
Boraldaitau	26,971	4,900	4,467	18,658
Irsu-Daubabin	45,509 (or 14,343)	8,200 (or 22,448)	3,697	14,343
Sairam-Ugam	76,573	13,900	45,117	100,951
Total	**149,053 (or 118,000)**	**27,000 (or 41,000)**	**53,300**	**134,000**

Sources: 2016 Nomination Dossier[45], presentations at Shymkent meeting, September 2024.

Planned Water Infrastructure and Deficiencies in the Heritage Impact Assessment (HIA)

A project proposed in 2021 by a subsidiary of the South Oil Company involves constructing a cascade of 2-5 hydropower reservoirs on the Ugam River within the Sairam-Ugam National Park, coupled with a 210 km water supply pipeline to downstream populated areas. The total hydropower capacity is projected at 72-165 MW, with the largest reservoir having a volume of 30 million cubic meters and planned water supply abstraction of 3.5 cubic meters per second. South Oil Co. announced securing an EPC (Engineering, Procurement, Construction) contract with Power China Corp in May 2023[46]. The stated project aims are to provide drinking water to approximately one million residents in the Kazygurt, Saryagash, Keles, Zhetysai, and Maktaaral districts, and to alleviate electricity deficits.

The project is being implemented by Ocean Energy Company LLP, owned by prominent Shymkent businessman Serikzhan Seitzhanov and his family (whose primary holdings include Ontustik Financial Trade and Industrial Corporation and South Oil Exploration Company). An application for financing is reportedly under assessment by the Development Bank of Kazakhstan (as of March 2025)[47]. Project cost estimates vary widely, from USD 550 million (Kazakhinvest prospectus, 2021) to USD 1.3 billion. The project was presented at the Central Asia Hydropower Congress in March 2023[48].

The government of Turkestan Province requested assistance from the Ministry of Environment to adjust the functional zoning of Sairam-Ugam National Park and allocate 850.9 hectares of land from its territory for project structures. This allocation reportedly involves 70.2 ha from the protected core zone, 63.2 ha from the ecological stabilization zone, and the remainder (717.5 ha) from tourism, recreation, and limited economic activity zones[49].

An "Adjustment of the Master Plan of Sairam-Ugam SNNP infrastructure development" was prepared in 2021-2022 by "Center of Remote Sensing and GIS 'Terra' LLP" under commission from "Ocean Energy Company" LLP[50]. The Committee of Forestry and Wildlife of the Ministry of Ecology, Geology and Natural Resources approved this adjustment via Order No. 27-5.275-IK dated October 31, 2022.

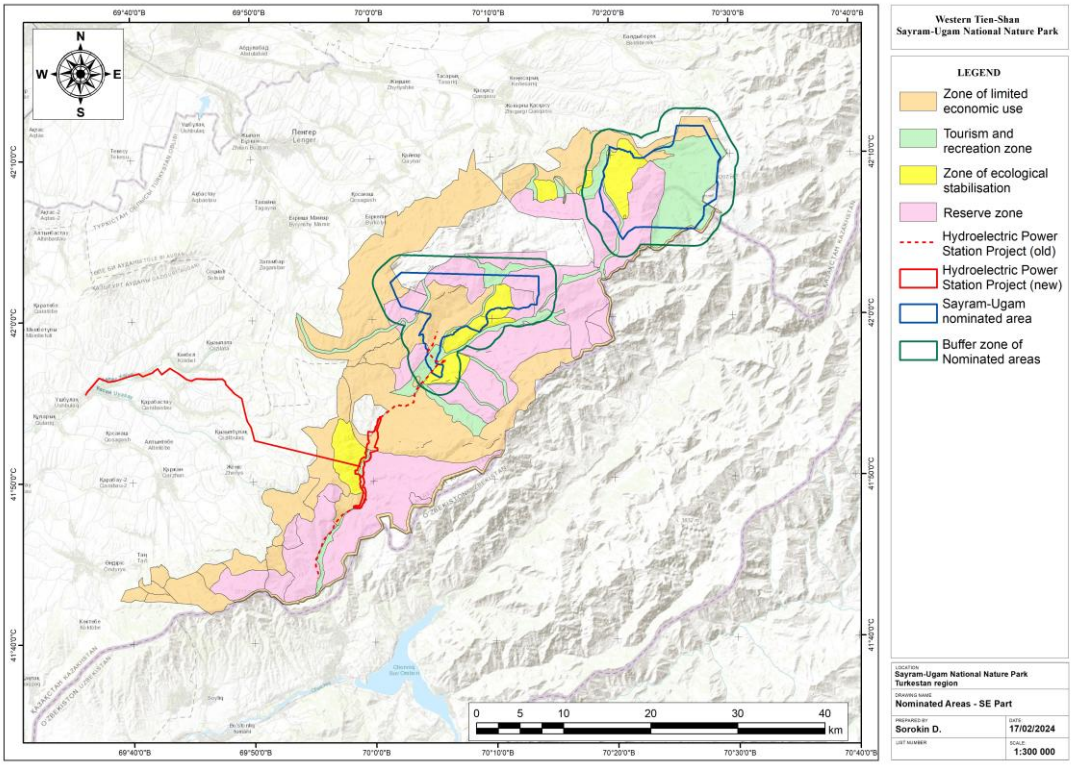


Figure 22. "Original Ugam Hydro Project Area" (Red) Overlaid on National Park Zoning*. Dashed red line indicates parts of the project later removed from the immediate plan. The presented erroneous World Heritage components misleadingly minimize apparent conflict between the property and the infrastructure project. Source: Presentation at Shymkent meeting, September 22, 2024.*

Crucially, such zoning adjustments and the construction of hydropower facilities within a national park appear to contradict Kazakhstan's national legislation. The official Management Plan for Sairam-Ugam National Park, published in June 2024, acknowledges that national law strictly prohibits "change of hydrological regime (construction of dams, dikes, water infrastructure and other projects resulting in changing of water flows)" within national parks. The same prohibition applies to the "introduction of alien species of animals and plants." Paradoxically, page 30 of the same plan states: "In 2024, work will begin on the construction of small reservoirs in Ugam Gorge for trout fish farming and fish tourism will be organized in 2025."[51]

On June 26, 2024, the Government of Kazakhstan issued a Decree [52] authorizing direct negotiations for a public-private partnership (PPP) for the project with the proposing company. On January 14, 2025, Kazakhstan's Investment Promotion Council approved the project, described as involving a water pipeline with an HPP cascade on the Ugam River, with a total

investment cited around 190 billion tenge (approx. USD 360 million)[53]. The announcement reiterated the goals of providing drinking water and addressing electricity deficits, implying significant state financial support or subsidies for a private company to develop infrastructure potentially damaging to a World Heritage property.

At the September 2024 Shymkent meeting, it was stated that the current, apparently reduced, project design includes two reservoirs (see Figures 22 and 23). This change may reflect attempts to improve the project's economic feasibility (particularly for smaller HPP components in the headwaters) and present a more cooperative stance towards UNESCO and IUCN concerns. However, the primary economic driver appears to be the substantial government support for the water supply component.

If constructed, this project would degrade the Ugam River and its valley, the central ecological element of this part of the national park, through damming and reservoir creation. Planned water abstraction will reduce downstream river flows. Endemic fish like sculpins will lose critical habitat and migration routes, while reservoirs risk invasion by exotic species and are explicitly planned for non-native trout farming.

The Heritage Impact Assessment (HIA) presented in Shymkent, commissioned by the project proponents, exhibited serious flaws. It lacked coherent integration with the overall project Environmental Impact Assessment (EIA), completely neglected landscape connectivity and ecosystem functions, and failed to assess impacts on aquatic biodiversity. The indicators selected for the HIA (e.g., Argali sheep, which do not inhabit the Ugam basin) were largely irrelevant to the potential impacts of water infrastructure. This HIA presentation appeared to be a misuse of the official "Guidance and Toolkit for Impact Assessments in a World Heritage Context"[54].

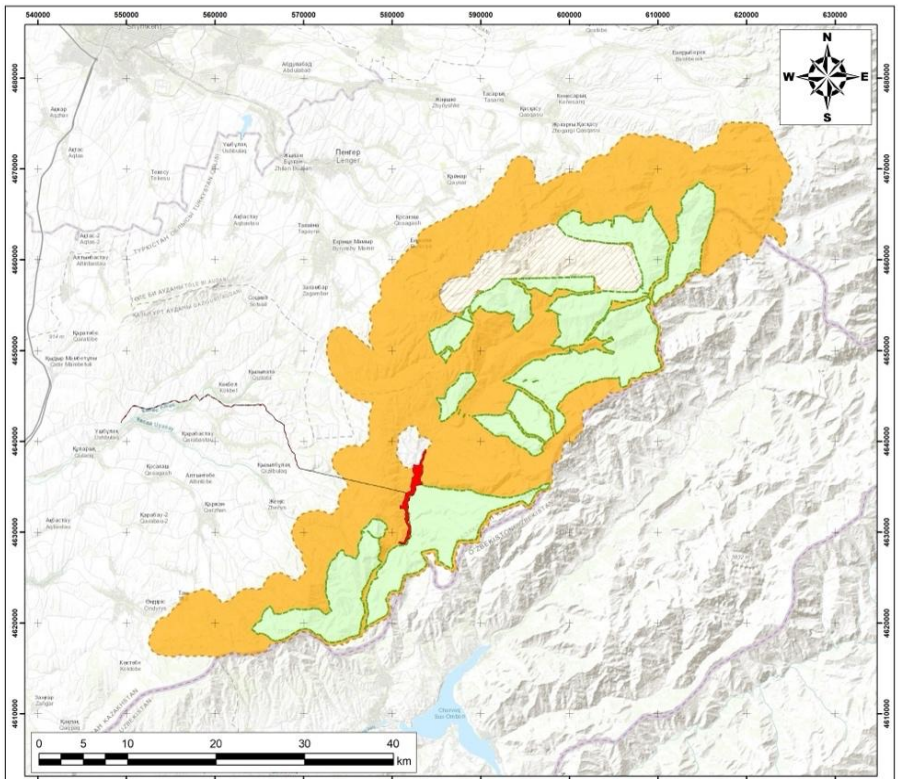


Figure 23. "Updated Ugam Hydro Project Area" (Red) Overlaid on Proposed World Heritage Zoning. Green = proposed WH property, Orange = proposed buffer zone. *Source: Presentation at Shymkent meeting, September 22, 2024.*

A critical omission in the HIA and related documentation is the analysis of alternatives to destroying the central part of the Sairam-Ugam National Park. Such analysis should be conducted independently of entities with vested interests in the project. While proponents cite shortages of drinking water and electricity as justification, available documents do not provide sufficient evidence that this specific project offers an effective or efficient solution. The cost per unit of installed HPP capacity appears exceptionally high (estimated between USD 5,000 and USD 9,400 per kW, compared to a 2023 global average of USD 2,800/kW for new HPPs). The water supply component also appears expensive relative to the proposed volume, suggesting less damaging and substantially cheaper alternatives may be available. Furthermore, potential conflicts between optimizing water supply delivery and hydropower generation could reduce the overall economic and social efficiency of the dual-purpose project.

Other Hydropower Projects Threatening the "Western Tien-Shan" in Kazakhstan

Beyond the Ugam project, Kazakhstan is actively developing hydropower on its remaining free-flowing rivers, primarily through small, often inefficient projects. The national renewable energy auction scheme, offering attractive feed-in tariffs ("green tariffs"), has incentivized the development of over 40 small HPP projects between 2017 and 2024. International donors, including USAID, EBRD, and ADB, have supported the establishment and operation of this scheme. However, decisions on siting these "renewable" power plants are frequently made without adequate consideration of biodiversity impacts or the value of ecosystem services provided by intact rivers. Kyrgyzstan and Uzbekistan are pursuing similar approaches to hydropower development.

In addition to the highly alarming situation in the Ugam River basin, the Arys River Basin, which encompasses the remaining Kazakhstan components of the WTS World Heritage property, faces cumulative impacts. This basin already has at least 13 existing dams (mainly for irrigation), two dams under construction in 2024, and eight new hydropower projects announced, some involving cascades of multiple dams. Many of these planned dams and cascades are located on rivers flowing directly from the WTS property, including the Sairamsu, Badam, Zhabagly, Aksu, and Mashat rivers. These projects will almost certainly have direct negative impacts on aquatic biodiversity, landscape integrity, and the recreational values of the ecosystems within the Western Tien-Shan World Heritage property[55].

V. Conclusion and Recommendations

Access to official information regarding recent developments affecting the Western Tien-Shan World Heritage property remains limited. The report of the joint World Heritage Centre/IUCN Reactive Monitoring mission conducted from September 16-25, 2024, had not been publicly released as of April 15, 2025. While the three States Parties submitted a joint State of Conservation (SoC) report, only a brief (1.5 pages) Executive Summary has been made available on the UNESCO website[56]. This summary mentions that the States Parties have prepared a joint boundary clarification proposal (which is not publicly accessible) and asserts that "As regards other current conservation issues... the State Parties report that there are no such issues to be addressed."

This official stance sharply contrasts with the findings of this report, raising concerns that, under the guise of "correcting nomination errors," the States Parties may propose excluding areas from the World Heritage property specifically where hydropower, tourism facilities, roads, or other developments are planned. Allowing such modifications to a recently inscribed World Heritage

property would set a detrimental precedent and undermine the credibility of the Convention as an effective tool for long-term nature conservation.

In view of the imminent and severe threats identified across the Western Tien Shan World Heritage Property in all three participating countries, **it is recommended that the World Heritage Committee inscribe this property on the List of World Heritage in Danger** at its next session and mandate the development of a binding corrective action plan as a matter of urgency.

This case also underscores the importance of the World Heritage Committee adhering strictly to the technical evaluations and recommendations provided by its advisory bodies (IUCN and ICOMOS) during the nomination process, avoiding decisions potentially influenced by political considerations that could compromise the long-term integrity and protection of nominated sites.

To ensure the proper conservation of the property's OUV, particularly its freshwater biodiversity, the following actions are recommended:

1. **Biodiversity Assessment and Monitoring:** Conduct a comprehensive, property-wide ichthyological inventory and establish a long-term monitoring system for key aquatic and terrestrial species and habitats to inform conservation planning and management effectiveness.
2. **Strategic Environmental Assessment (SEA):** Request the States Parties, potentially with international support, to undertake a Strategic Environmental Assessment (SEA) of hydropower development plans within the river basins encompassing and influencing the Western Tien-Shan World Heritage Property. The SEA should establish clear procedures and limits for water infrastructure planning, provide guidance for project-level ESIAs, assess cumulative impacts, and analyze alternatives. The SEA report should be submitted to the World Heritage Centre for review by IUCN.
3. **Rigorous Project-Level Assessments:** Ensure that every proposed dam or water infrastructure project potentially affecting the property undergoes a thorough Environmental and Social Impact Assessment (ESIA), including a specific Heritage Impact Assessment (HIA) conforming to UNESCO/IUCN guidelines. These assessments must evaluate direct, indirect, and cumulative impacts on the property's OUV.
4. **Transparency and Public Participation:** Ensure all impact assessments (ESIA, HIA, SEA), including those already completed, are made publicly available and subject to meaningful public consultation processes, consistent with the requirements of the Aarhus Convention (to which all three States Parties are signatories). Assessment results should be submitted to the World Heritage Centre for IUCN review *prior* to irreversible decisions being made.
5. **Transboundary Impact Assessment:** Require Kazakhstan and Kyrgyzstan, as parties to the Espoo Convention, to undertake formal transboundary impact assessments for projects with potential cross-border effects, ensuring consultation with affected neighbouring States Parties.

All environmental impact assessments (including already completed) should be transparent and open for public participation according to requirements of the Aarhus Convention.

Unless the development of dams demonstrably impacting the ecosystems of the "Western Tien-Shan" World Heritage property is halted, and the measures outlined above are incorporated into a robust plan for corrective action, this globally significant site risks losing its Outstanding Universal Value.

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