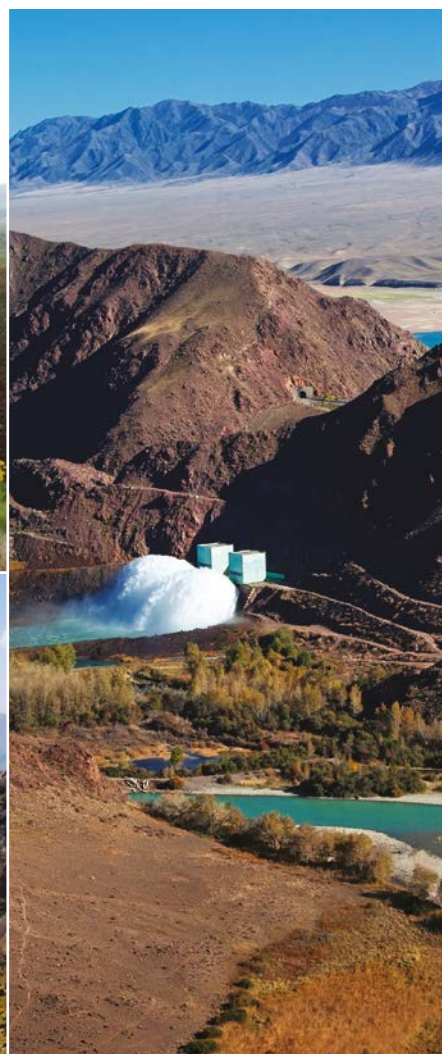


# **Reconciling resource uses in transboundary basins: assessment of the water-food-energy-ecosystems nexus in the Syr Darya River Basin**

(shared by Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan)



**UNITED NATIONS**



UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

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LIST OF COUNTRY CODES

KG	Kyrgyzstan
KZ	Kazakhstan
TJ	Tajikistan
UZ	Uzbekistan

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank	MEWR	Ministry of Energy and Water Resources (Tajikistan)
ALRI	Agency for Land Reclamation and Irrigation (Tajikistan)	MRWR	Ministry of Land Reclamation and Water Resources
BWO	Water Basin Organization	NUMP	National Utilities Modernization Programme
CAPS	Central Asian Power System	NWC	National Water Council (Kyrgyzstan)
CDC	Coordinating Dispatch Centre	NWEC	National Water and Energy Council (Tajikistan)
CEP	Committee for Environmental Protection	SDG	Sustainable Development Goal
CIS	Commonwealth of Independent States	SIC ICWC	Scientific-Information Center of the Interstate Commission for Water Coordination of Central Asia
EBRD	European Bank for Reconstruction and Development	SPECA	United Nations Special Programme for the Economies of Central Asia
EC-IFAS	Executive Committee of the International Fund for Saving the Aral Sea	UNDP	United Nations Development Programme
FAO	Food and Agriculture Organization of the United Nations	UNECE	United Nations Economic Commission for Europe
GEF	Global Environmental Facility	UNFCCC	United Nations Framework Convention on Climate Change
GWP	Global Water Partnership	USAID	United States Agency for International Development
INDC	Intended Nationally Determined Contributions	WEC	Water-Energy Council
ICSD	Interstate Commission for Sustainable Development	WUA	Water Users Associations
IWRM	Integrated Water Resources Management		

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SUMMARY

The Syr Darya Basin, shared by Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, represents a classic example for exploring the interlinked and often competing inter-sectoral and cross-border claims to common resources. Such claims often create sources of real or likely tensions, but also, at the same time, opportunities for optimizing the shared use of water, energy and food resources in the basin and – in a wider context – the whole of Central Asia. Centralized Soviet planning, which was predicated on the interests of the entire union – and not specifically the interests of Central Asia or its constituent countries – prioritised agricultural production, and in particular the strategic growing of cotton on newly irrigated lands. At the same time, Central Asia as a whole contained sufficient fossil fuel resources to cater for the energy needs of the republics. With independence came new challenges, and fuel and energy quickly became commodities less willingly traded for water. The changed use of upstream hydropower had consequences for water access of irrigated agriculture, the importance of which grew even further as regional trade slumped and the countries had to rely more on their own production.

The increasing inter-sectoral and upstream-downstream challenges that have developed over the past 25 years also indicate that significant benefits can be reaped from a strengthened cooperation among the different sectors and countries. The 21st century offers technological solutions such as more efficient irrigation, laser levelling of crop fields and local-scale water-efficient management, which save water so that more fibre and food can be produced with less water. Increasing overall energy efficiency in the countries and using cost-efficient alternative or complementary technology for energy production may make upstream countries less dependent on hydropower with improved access to water for agriculture downstream as a consequence. Potentially this may also improve economic performance as excess electricity could be exported to South Asia neighbours. Lowering regional barriers to food trade makes it possible to produce food where the conditions are more favourable, thus lowering pressure on agriculture in water-deficit areas – hence saving water and reducing energy use for pumping it. All this increasingly matters in the context of changes in the global climate that will undeniably put greater pressure on these sectors not only globally, but also in Central Asia and in the basin of its Syr Darya River.

The specifics of understanding and exploiting synergies in the “water-food-energy-ecosystems” nexus in the Syr Darya Basin of Central Asia are the essence of this report, which is a result of a participatory assessment process following a methodology developed under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention). The assessment’s main objectives were to foster transboundary cooperation by joint identification of inter-sectoral synergies and measures to reduce tensions; and assisting countries in their resource use optimization with an improved knowledge base and capacity. The assessment process for the Syr Darya Basin, which included a workshop for the identification of the main inter-sectoral issues and possible solutions, was detailed by a subsequent analysis that was followed by consultations with the various sectoral authorities concerned.

The report offers specific recommendations for how actions in the water, food production and energy sectors and across the state border can mutually reinforce each other – and how water, energy and agricultural practitioners, and the environment, can benefit from them by seeking trade-offs among various sectoral and country needs by seizing existing and future opportunities.

The report specifically suggests:

- improving energy efficiency, reducing dependency on water for energy (diversification of sources), and rationalizing water use (esp. in agriculture);
- developing a regional energy market and exploring opportunities for energy-water exchanges, the development of alternative energy sources and improving overall energy efficiency;
- lowering barriers to trading food and agricultural goods, thus promoting their more cost-, water- and energy-efficient production and exchange within the region;
- developing mechanisms to incorporate wider impacts in sector-based policy development, and improving inter-sectoral coordination at the basin level by increasing representation of and consultation with the relevant ministries;
- improving basin-wide monitoring, data verification and exchange, and knowledge-sharing, including joint monitoring (e.g. of water flows and quality) and joint forecasting.

Adoption of the nexus approach has the potential to improve resource use efficiency and security in the riparian countries. In contrast to national approaches presently employed, cooperation involving all the countries and sectors has significant potential to optimize the use of resources in the basin. Applying certain solutions at the country level – including, among others, improvement of efficiency in water and energy use, as well as well-targeted economic and policy instruments – can gradually build more favourable conditions for transboundary cooperation.

We hope that the assessment will be an inspiration for all those who from their sectoral perspective want to better understand and broaden the impact and benefits of their policies across sectoral boundaries and to eventually contribute to a better management of the common river basin across the borders of the Syr Darya countries. Functioning transboundary, and inter-sectoral cooperation, is a prerequisite for the efficient management of existing infrastructure and optimization of new investments and trade opportunities.

BACKGROUND TO THE NEXUS ASSESSMENT

Objectives and scope of the assessment

The Nexus Assessment of the Syr Darya River Basin aims to support policy and technical reforms, improve transboundary dialogue and cooperation among the Syr Darya countries – Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan<sup>1</sup> – and contribute to the sound management of water and energy resources, sustainable food production and ecosystems conservation.

The assessment is part of a broader UNECE process<sup>2</sup>, which covers a number of international river basins with the aim of:

- (a) fostering transboundary cooperation by identifying intersectoral synergies that could be further explored and utilized, and by determining policy measures and actions that could alleviate tensions or conflict related to the multiple uses of and needs for common resources;
- (b) assisting countries in optimizing their use of resources, to increase efficiency and to ensure greater policy coherence and co-management;
- (c) building capacity to assess and address intersectoral impacts.

The specific objectives of the assessment of the Syr Darya Basin are:

- (a) to paint a picture of the status and trends of resource needs and the environmental impact of the main economic activities in the basin;
- (b) to identify the main intersectoral challenges that call for integrated – or at least coordinated – planning and management involving different sectors, as well as transboundary cooperation;
- (c) to identify current opportunities to improve resource efficiency, reduce negative impacts across sectors and/or countries, and increase sustainability with an emphasis on practical, mutually-beneficial opportunities.

The assessment follows on from and builds on the study *Strengthening Cooperation for Rational and Efficient Use of Water and Energy Resources in Central Asia* developed within the framework of the United Nations Special Programme for the Economies of Central Asia (SPECAs) in 2004 and other studies and publications by the World Bank, the Asian Development Bank (ADB) and the United Nations Development Programme (UNDP).<sup>3</sup>

The scope of this Nexus Assessment is limited to providing a preliminary overview of the relevant issues, while exploring some potential solutions. This largely qualitative analysis can serve as the basis for more detailed and quantitative assessments.

Assessment process

This assessment follows the methodology developed under the UNECE Water Convention,<sup>4</sup> in terms of resource base, socio-economy, governance and policy directions:

- (a) a desk study to review and analyse relevant documentation (resource base and resource uses, the socio-economic situation, governance and policy framework);
- (b) a participatory workshop jointly organized in Almaty (Kazakhstan) on 2–4 December 2014 by UNECE and the Global Water Partnership (GWP), in close cooperation with the Food and Agriculture Organization of the United Nations (FAO). Representatives of various ministries (Natural Resources, Agriculture, Energy, Environment) from Kazakhstan, Kyrgyzstan and Tajikistan, regional organizations based in Uzbekistan, as well as NGOs and academia participated;
- (c) drafting the assessment based on the findings of the desk study and the workshop, complemented with an analysis of the jointly identified issues; and
- (d) consideration of inputs from local experts and officials of the Syr Darya countries provided in the framework of the meeting of the Task Force on the Water-Food-Energy-Ecosystems Nexus (Geneva, 28–29 April 2015) and the Working Group on Integrated Water Resources Management (Geneva, 24-25 June 2015), as well as consultations held in 2015 with Kazakhstan, Kyrgyzstan and Tajikistan, linked to the EU’s Water Initiative National Policy Dialogues.

Assessment results<sup>5</sup> featured at the Seventh Meeting of the Parties to the UNECE Water Convention in November 2015.

This report takes stock of the result of the assessment process and of comments received as well as additional contributions, and further includes additional information collected in the course of 2016 in order to fill identified gaps and demonstrate the possible effects of some of the measures.

<sup>1</sup> It should be noted that Uzbekistan does not associate itself with the nexus assessment of the Syr Darya.  
<sup>2</sup> Available from: <http://www.unece.org/env/water/hexus>.  
<sup>3</sup> World Bank, *Water and Energy Nexus in Central Asia, Improving Regional Cooperation in the Syr Darya Basin*, (Washington D.C., World Bank, 2004).  
United States Agency for International Development, Central Asia Natural Resources Management Program, in *Transboundary Water and Energy Project. Final Report*, (Washington D.C., USAID, 2005).  
Asian Development Bank project *Improvement of Shared Water Resources Management in Central Asia* (RETA 6163).  
David Sedik, Guljahan Kurbanova and Gabor Szentpali, *The Status and Challenges of Food Security in Central Asia*. Background material for the third Central Asia Regional Risk Assessment. (CARRA) Meeting in Astana, Kazakhstan, 14–15 April 2011, (Budapest, FAO Regional Office for Europe and Central Asia, 2011).  
<sup>4</sup> United Nations Economic Commission for Europe. *Methodology for assessing the water-food-energy-ecosystems nexus in transboundary basins*. Document ECE/MP/WAT/WG.1/2015/8, (Geneva, UNECE, 2015).  
<sup>5</sup> United Nations Economic Commission for Europe. *Reconciling resource uses in transboundary basins: assessment of the water-food-energy-ecosystems nexus*. (New York and Geneva, United Nations, 2015).



CHAPTER 1

# Introduction

The Syr Darya Basin is an example of a river basin in which there are evident trade-offs across sectors, resulting in environmental degradation and tension between riparian countries. Transboundary cooperation would benefit from an improved understanding of the different sectoral needs and how these needs can be reconciled. For this reason, previous initiatives aimed at improving the basin's environmental situation and livelihoods have been based on integrated approaches. See, for example, the SPECA approach on strengthening cooperation for the rational and efficient use of water and energy resources in Central Asia,<sup>6</sup> the efforts of the World Bank and the United States Agency for International Development in studying the Energy-Water Nexus in Central Asia,<sup>7 8</sup> as well as the work of the ADB,<sup>9</sup> FAO and UNDP on food and energy security in the region.<sup>10</sup> Previous cooperative solutions among riparian countries have also involved multi-sectoral cooperation, for example the Framework Agreement of 1998, which focused on energy exchanges and the regulation of water discharges.

The aim of the nexus assessment of the Syr Darya is to identify opportunities to reduce the negative transboundary impacts while at the same time making it possible to progress towards national development targets and improved efficiency in the use of resources. By means of a participatory process of consultations and joint discussion, opportunities have been identified in the different sectors and their applicability is explored within the governance setting, including institutional and legislative frameworks. Those opportunities identified and selected for further analysis would automatically benefit more than one sector and country and can therefore contribute to increased cooperation and coordination.



<sup>6</sup> United Nations Economic Commission for Europe and United Nations Economic and Social Commission for Asia and the Pacific, *Strengthening cooperation for rational and efficient use of water and energy resources in Central Asia. Special Programme for the Economies of Central Asia* (SPECA), (New York, United Nations, 2004).

<sup>7</sup> World Bank, *Water and Energy Nexus in Central Asia, Improving Regional Cooperation in the Syr Darya Basin*. (Washington D.C., World Bank, 2004).

<sup>8</sup> United States Agency for International Development, Central Asia Natural Resources Management Program, in *Transboundary Water and Energy Project. Final Report*, (Washington D.C., USAID, 2005).

<sup>9</sup> Asian Development Bank project *Improvement of Shared Water Resources Management in Central Asia* (RETA 6163).

<sup>10</sup> David Sedik, Guljahan Kurbanova and Gabor Szentpali, *The Status and Challenges of Food Security in Central Asia*. Background material for the third Central Asia Regional Risk Assessment (CARRA) Meeting in Astana, Kazakhstan, 14-15 April 2011, (Budapest, FAO Regional Office for Europe and Central Asia, 2011).

CHAPTER 2

# Basin description and resource base

## 2.1. Geography

The Syr Darya is not only the longest river in Central Asia (3,019 km from the headwaters of the Naryn) but also the second largest (after the Amu Darya) in terms of water quantity, with an annual average runoff 36.57 km<sup>3</sup>.<sup>11</sup> It is shared by Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. Its hydrological basin forms, together with the Amu Darya, the main water resource system of Central Asia: the Aral Sea Basin. The sources of the river lie high in the glacier and snow-capped Tien Shan Mountains of Kyrgyzstan, where most of the run-off is generated.

The basin of the Syr Darya is often divided into geographically distinct parts: 1) the upper reaches, consisting of the Naryn and the Kara Darya tributaries and the Fergana Valley; 2) the middle part; 3) the sub-basins of the Chirchik, Ahangarana and Keles; and 4) the lower part, delta and the Northern Aral Sea fed by the Syr Darya.<sup>12</sup>

TABLE 1  
The resource base in the Syr Darya Basin and the riparian countries' dependency on it: <sup>a</sup>

	Kazakhstan	Kyrgyzstan	Tajikistan <sup>f</sup>	Uzbekistan
Country areas in the basin (as the percentage of total country areas) <sup>b</sup>	12.7	55.3	11.0	13.5
Country areas in the basin of total country area (sq. km)	345,000 of 2,724,900	110,570 of 199,950	15,680 of 142,550	60,040 of 447,400
Population living in the basin (as the percentage of the total national population) <sup>c</sup>	20.0	56.6	21.2	51.4
Population living in the basin of total national population (million inhabitants)	3.4 of 17.0	3.2 of 5.7	1.7 of 8.2	15.5 of 30.2
Surface water resources in the basin (as the percentage of total resources at country level) <sup>d</sup>	13.3	24.1	6.7	36.5
Total (actual) Surface Water Resources (RSWR) (km <sup>3</sup> /year): within the Syr Darya Basin of the national total	13.3 of 99.6	5.1 of 21.2	1.3 of 18.9	15.4 of 42.1
Irrigated land in the basin (as the percentage of total irrigated land at the country level) <sup>e</sup>	59.3	37.3	39.3	54.4
Irrigated land in the basin of total irrigated land at the country level (thousand hectares)	750 of 1,265	381 of 1,021	265 of 674	2,012 of 3,700

<sup>a</sup> The calculations of shares have been made using more precise values of the parameters. Due to the rounding of figures shown, minor deviations may occur.

<sup>b</sup> Karen Franken, ed., *Irrigation in Central Asia in Figures. AQUASTAT Survey 2012*. In *FAO Water Reports 39*. (Rome, FAO, 2012). The estimated total area of the basin does however vary in different sources, from between 200,000 to 400,000 sq. km.

<sup>c</sup> World Bank. World Development Indicators database, available from <http://wdi.worldbank.org/tables>; Scientific Information Centre of the Interstate Commission for Water Coordination. CAWATER Info database, available from [www.cawater-info.net](http://www.cawater-info.net)

<sup>d</sup> Karen Franken, ed. (2012). Total actual renewable water resources are calculated as the sum of internal renewable resources and external renewable resources, taking into consideration the quantity of flow reserved to upstream and downstream countries through formal or informal agreements or treaties.

<sup>e</sup> Calculated as: [(Irrigated land) / (Area equipped with irrigation actually irrigated (country))]. Sources: Area equipped with irrigation actually irrigated (country). Karen Frenken (ed.) (2012); and Irrigated land – Oblast (Kazakhstan) and national level statistics offices of the riparian countries (2012), quoted by SIC-ICWC

<sup>f</sup> In 2015, Tajikistan submitted alternative figures that differ somewhat from those in the table based on international sources:

- country area in the basin 12,672 sq. km or 8.89% of total country area;
- population living in the basin 2,084,000 or 25% of total national population;
- irrigated land in the basin 259,000 ha or 34.6% of total irrigated land at the country level;

<sup>11</sup> Food and Agriculture Organization of the United Nations, Aral Sea Basin in AQUASTAT database, 2012. Available from: [www.fao.org/nr/water/aquastat/basins/aral-sea/index.stm](http://www.fao.org/nr/water/aquastat/basins/aral-sea/index.stm).

<sup>12</sup> The Chu and the Talas rivers are a transboundary sub-basin (Kazakhstan and Kyrgyzstan) of the Syr Darya, but these rivers have lost connection to the main stream of the Syr Darya. For this reason, the Chu and Talas basins are not taken into account in this assessment.



2.2. Socio-economic dynamics

In 2015 the population of the basin exceeded 24,000,000 people. Its distribution by country and provinces is presented in table 1. More than half of the population is concentrated in the Fergana Valley, the most important agricultural and most densely populated area in the basin.<sup>13</sup> Large parts of the population are either working in the agricultural sector or are dependent on subsistence agriculture. Despite significant economic growth and diversification improvement in the region in the past 15 years, poverty is still widespread in Kyrgyzstan and Tajikistan.<sup>14</sup> Both countries are relying on remittances from migrants, and the economic turbulence in Russia and Kazakhstan in 2014-2015 – the main recipient countries for migrants – has adversely affected the flow of remittances, local businesses and sources of family income.

Tajikistan is the least urbanized nation of the four, followed by Kyrgyzstan, Uzbekistan and Kazakhstan. The Syr Darya Basin has been populated since ancient times and several cities – for example Tashkent and Khujand – have a vibrant history stretching for two millennia. All areas of the river basin exhibit population growth. Given that the population in the arid and most densely populated part of the basin is growing, adequate and secure provision and production of food, as well as the employment prospects of the rural population, both depend on the availability and productivity of the irrigated land.



However, there are marked differences between urban and rural living standards, availability of services and dependence on natural resources. The rural population tends to be the poorest in these areas and may have more limited access to safe piped water resources, sanitation facilities, constant clean, regular and secure energy supplies as well as food supplies. Severe power cuts and high food prices in the period 2007-2010 and 2015 brought entire communities to a state of emergency (particularly in Kyrgyzstan and Tajikistan) because of a combination of low water levels in the rivers and reservoirs (which generate the bulk of electricity), harsh winters, volatile food prices and the various episodes of the global economic crisis.<sup>15</sup> The impact of extreme weather events on food production in the basin can be severe. In 2008, the Sogd province of Tajikistan, suffered a huge loss of cattle, sheep and goats - 50% of the national figure – because of the harsh winter. The complicated border relations in the Ferghana Valley area add constraints to local trade, water sharing, land use and the transportation of people and goods.

2.3. Water resources

The flow of the river is supplied by melting water from glaciers, snow and rainfall and is variable both seasonally and between years. The extremes include dry years characterized by droughts and high-flow years characterized by floods,<sup>16</sup> with both extremes damaging to the economy in the basin.<sup>17</sup>

The operation schedule of the reservoirs on the Naryn river (a major tributary located in Kyrgyzstan and Uzbekistan), and in particular the Toktogul reservoir in Kyrgyzstan, is crucial both for the provision of water to the large irrigation schemes for cotton and – to a smaller extent – food production in the Fergana Valley as well as downstream in Uzbekistan and Kazakhstan. It is also vital for power production upstream, mainly in Kyrgyzstan. Other important large reservoirs in the basin are the Andijan on the Kara Darya (Uzbekistan), Kayrakkum on the Syr Darya (Tajikistan), the Charvak on the Chirchik (Uzbekistan) and Chardara and Koksarai on the Syr Darya (Kazakhstan). They are used primarily for irrigation, and flood control though some of them produce electricity. About 90% of the Syr Darya’s mean annual flow is regulated by reservoirs.

2.4. Ecosystems

The Syr Darya Basin features a high diversity of ecosystems. These include the glacier and snow-capped mountains of Kyrgyzstan – the habitats of the snow leopard and mountain sheep – as well as the flat and harsh deserts and lowlands of the lower Syr Darya in Kazakhstan, with saiga antelope ranges. The agricultural developments over millennia transformed the Ferghana Valley into a massive man-made oasis. The Western Tien Shan Mountains host many endemic and endangered species. The growing network of nature reserves and the Ramsar sites protects them and supports nature conservation efforts. Wild fruit and nut forests around the Ferghana Valley support rich biodiversity and are used by local population.

However, the environment of the Syr Darya Basin has been continuously under pressure since the advent of industrialization and large-scale irrigation. The seasonal changes in water flow due to dam capacity growth and operation have had an impact on ecosystems in many areas along the river. Water diversion for irrigated agriculture and land use changes created equally significant challenges for the ecosystems. The rare riparian forest cover is under stress.<sup>18</sup> Some flagship species, such as the Syr Darya Shovelnose Sturgeon, the Syr Darya endemic fish found in the middle and lower reaches, has not been recorded since the 1960s. It is suspected that the species is on the verge of extinction.

While dam operations had implications for agriculture and winter flooding downstream, they also led to the appearance of new sites with a rich biodiversity and fishery such as the Aydar-Arnasay Lakes in Uzbekistan. Construction of another dam, the Kok-Aral in 2005 in Kazakhstan, has raised and stabilized the water level in the troubled Northern Aral Sea and led to the revival of the fishing industry there.<sup>19</sup>

<sup>13</sup> Environment and Security Initiative, *Environment and Security: Transforming risks into cooperation – Central Asia – Ferghana / Osh / Khujand area*, (Geneva, UNEP, 2005).

<sup>14</sup> World Development Indicators of the World Bank: about 35% of the population in both countries live in poverty.

<sup>15</sup> United Nations Development Programme, *Central Asia Regional Risk Assessment: Responding to Water, Energy, and Food Insecurity*, (New York, UNDP, Regional Bureau for Europe and CIS, 2009).

<sup>16</sup> The most flood-prone area of the basin in Kazakhstan is now better protected by the recently built Koksarai dam.

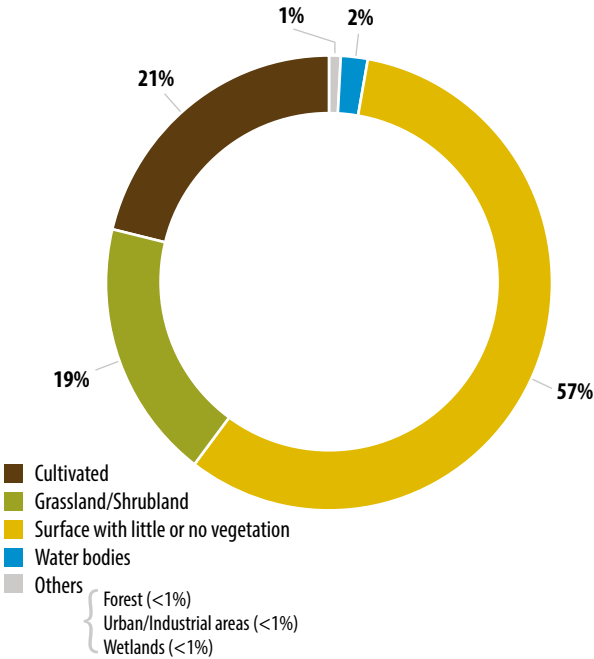
<sup>17</sup> United Nations Economic Commission for Europe, *Strengthening Water Management and Transboundary Water Cooperation in Central Asia: the role of UNECE Environmental conventions*, (New York and Geneva, United Nations, 2011).

<sup>18</sup> Ramsar Convention, *Ramsar Convention Guidelines for wetlands in Central Asia*, (Gland, Ramsar Convention Secretariat, 2012 [in Russian]).

<sup>19</sup> United Nations Economic Commission for Europe. *Second Assessment of Transboundary Rivers, Lakes and Groundwaters*, (New York and Geneva, United Nations, 2011). Kazakhstan plans to continue from 2015 to 2020 in the first phase of the North Aral Sea project carried out in cooperation with the World Bank.

2.5. Landscape features and land resources

FIGURE 1  
Land resources in the Syr Darya Basin



The basin is characterized by mountains in the east and flat areas with decreasing altitudes in the west. Its main geographic features are the mountain ranges of Tien Shan (over 5,000m high, mainly in Kyrgyzstan), the Fergana Valley (a depression at an altitude of 250-500m shared by Kyrgyzstan, Tajikistan and Uzbekistan), the lowlands of Gooday Steppe in Uzbekistan, and the Kyzyl-Kum desert in Kazakhstan.<sup>20</sup>

Half of the agricultural land is found in naturally drained oases while the other half is the result of reclamation projects – that is, drainage, land levelling and improvements to the soil structure – largely completed in the Soviet era, which can be expensive in terms of construction and maintenance. Kazakhstan has a healthy availability of agricultural land, while Kyrgyzstan and Tajikistan, and parts of Uzbekistan, have less ample land resources suitable for agriculture.<sup>21</sup>



<sup>20</sup> O. Savoskul et al. Water, Climate, Food, and Environment in the Syr Darya Basin, Contribution to the project ADAPT: *Adaptation strategies to changing environments. An adaptation framework for river basins*. (Amsterdam, Institute of Environmental Studies, 2003).

<sup>21</sup> Food and Agriculture Organization of the United Nations. *The Status and Challenges of Food Security in Central Asia*, (Budapest, FAO Regional Office for Europe and Central Asia, 2011).

<sup>22</sup> Energy Charter Secretariat, *In-Depth Energy Efficiency Review: Tajikistan*. (Brussels, Energy Charter Secretariat, 2013). Due to Uzbekistan’s withdrawal from the CAPS network, Tajikistan can no longer import electricity from Uzbekistan or Turkmenistan that transits through Uzbekistan.).

<sup>23</sup> Chen Yang and Liang Fei, Regional Grid Connection Planned. In *Global Times*, 2014.

<sup>24</sup> Environment and Security Initiative, *Environment and Security: Transforming risks into cooperation – Central Asia – Ferghana / Osh / Khujand area*, (Geneva, UNEP, 2005).

In addition to agricultural lands, rangelands and forestlands in the upper mountain part of the basin, especially in Kyrgyzstan, are essential resources for food production and livelihoods. Soil degradation is significant in some parts of the basin (Uzbekistan Geographic Atlas 2010, Kazakhstan National Atlas 2012).

2.6. Energy and mineral resources

Relatively large oil, coal, and natural gas resources, as well as uranium deposits, are found in Kazakhstan and Uzbekistan and exploited by the extractive industries of both countries. Existing and planned pipelines and power line cross the basin and deliver fossil fuels and power to the neighbouring Russian Federation, China and South Asia. Hydropower contributes to the energy mix in all basin countries, but it is most important for the economies of Kyrgyzstan and Tajikistan. Thermal power plants running on coal and gas constitute the main power production capacities of Uzbekistan and Kazakhstan.

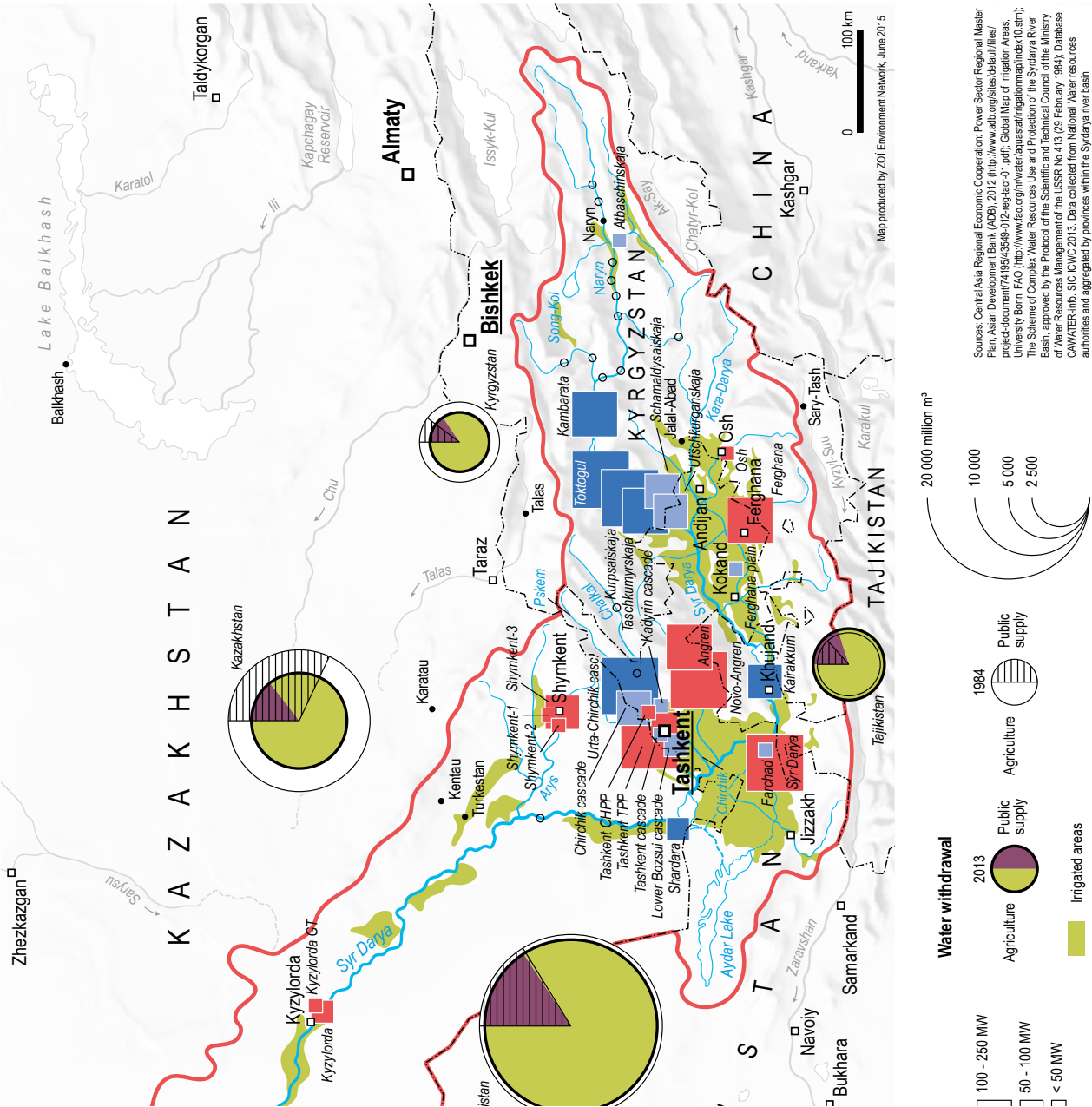
The regional electricity grid, the Central Asian Power System (CAPS), connects all the countries in the basin, but at present is fragmented and not fully functional.<sup>22</sup> High voltage transmission lines are being planned or built for the export of power produced in Kyrgyzstan and Tajikistan to Afghanistan, Pakistan and China.<sup>23</sup> These new connections will allow for the sale of surplus energy outside the region in summer, when demand both for South Asia, and power generation for Syr Darya itself, is at its highest.

The Syr Darya Basin is rich in mineral resources – gold, silver, mercury, antimony, copper, coal amongst others – which have been extracted and produced in the basin since ancient times. The largest gold mining sites are Chuuk in the central part of Uzbekistan’s Kyzylkum desert , Kumtor in Kyrgyzstan, and in the headwaters of the Naryn river in the glacier zone. Kazakhstan’s major in-situ uranium leaching operations are located in the lower part of the Syr Darya Basin. In Kyrgyzstan and Tajikistan, a significant number of uranium mines and tailing ponds are located upstream of the Ferghana valley<sup>24</sup>. The Soviet-era mining practices, improper mining waste storage and the neglected uranium and other mining tailings, led to industrial pollution hotspots that pose an ecological risk to the ecosystems and the river basin and need to be properly monitored and addressed. Work is underway to ensure the monitoring and safety of the ecosystems and river basins and to develop plans for their rehabilitation.



**FIGURE 2**  
**NEXUS ELEMENTS IN THE SYR DARYA BASIN**

Distribution of selected elements relevant to the nexus: water bodies, irrigated areas, power plants; water withdrawals for agriculture; and water supply.



## CHAPTER 3

# Governance and water resources management

### 3.1. Regional and basin level governance

#### Water resources

In the Soviet era, the Syr Darya Basin was managed as an integrated economic unit with agricultural production given higher priority over hydropower generation. The 'Syr Darya basin organisation' was created in 1986 to manage all water facilities on the major canals on the main stream of the river, and to develop – in partnership with the riparian republics – flow regulation plans. Compensation and exchange schemes centrally planned and managed by the Soviet government ensured a compromise between the riparian states in the development of the agriculture, energy and other sectors and competition for water resources between them was consequently minimized or avoided altogether.<sup>25</sup> It is important to note that the Soviet State Planning Committee prioritized distribution of water resources for large-scale agricultural production, especially cotton, whilst hydropower generation was a lower priority. Mismanagement and overuse of water led to environmental degradation and the crippling Aral Sea crisis.

Following the independence of the former republics, each country began to review and revise its own economic priorities. It soon became clear, particularly to hydropower-dependent states, that the Soviet-era system of water use in terms of both quantities and timing, was increasingly suboptimal in a rapidly changing geopolitical and local economic context in satisfying their needs for economic development and poverty alleviation.

Initially, as reflected in the 1992 Agreement on cooperation in the joint management of use and protection of transboundary water resources, at basin level, the Aral Sea countries decided to continue the use of water management principles inherited from the Soviet era and pledged to comply with the agreed procedures. But energy realities and pricing policies beyond national borders soon changed in line with market forces. Shortly after independence, therefore, the former system of water management in the Syr Darya started to change as large dams and associated hydropower stations began to serve national needs and energy security interests, rather than regional agricultural priorities. In contrast, water pricing, and new market approaches to water resource allocation and use became more sensitive both domestically – since water pricing remained tightly linked with food production and rural wellbeing – and internationally, between the upstream and downstream countries over the costs of water regulation and provision. While energy price adjustments and other market reforms have continued, adequate water pricing remains a sensitive issue in the basin.

After independence, new institutions were established, particularly the Inter State Commission for Water Coordination (ICWC) under the International Fund for Saving the Aral Sea (IFAS). In 1999, following the signing of the so-called Ashgabat Declaration, the four nations, as well as Turkmenistan, agreed to the following distribution of responsibilities among the basin organizations, that:

- (a) The IFAS Board is the highest level body for decision-making.
- (b) The Executive Committee of IFAS (EC-IFAS) implements the decisions taken by the IFAS Board through the national branches of IFAS, including through donor financed projects.
- (c) ICWC is responsible for the management of transboundary water resources in terms of the allocation and approval of national quotas for water use.
- (d) The basin water organizations, the Scientific-Information Centre of the ICWC, and the ICWC Secretariat are the executive bodies of the ICWC.

There are concerns that this governance system is not working as well as it should be (in terms of clarity of roles, division of responsibilities and coordination) and that – as a consequence – regional water resources are not managed effectively.<sup>26</sup>

Ideally the regional level institutions should help to balance the countries' divergent interests and coordinate plans that may not be fully compatible at all times. Concerned about suboptimal efficiency in the cooperation within the IFAS framework, the heads of states – at their meeting in 2009 – expressed their intention to improve the organizational structure and legal framework of IFAS, noting especially the need to develop a mutually acceptable mechanism for the integrated management of water resources and environmental protection in the Aral Sea Basin.<sup>27</sup> The fact that the energy authorities are only marginally involved in inter-sectoral and inter-state coordination of water management in the Syr Darya Basin has remained a shortcoming since the Soviet period.

As clear evidence of this complexity, Kyrgyz authorities declared in May 2016<sup>28</sup> that the country was to suspend its participation in the IFAS processes. They stated that the current frameworks were not sufficiently in line with Kyrgyzstan's national priorities, in particular the interests of the hydropower sector and certain aspects that are not considered in the regional water management.

The mandate of the Syr Darya Water Basin Organization (BWO Syr Darya) includes:

- 1. preparing and coordinating with ICWC the water use quotas for all major users in the Syr Darya River Basin;
- 2. developing plans for the main water intake structures and modes of operation of cascades of reservoirs;
- 3. measuring water flows at the border hydrometric stations jointly with national hydro-meteorological services;
- 4. providing a water supply to users in compliance with the quotas established by ICWC.

<sup>25</sup> United Nations Economic Commission for Europe and the United Nations Economic and Social Commission for Asia and the Pacific. *Strengthening cooperation for rational and efficient use of water and energy resources in Central Asia, United Nations Special Programme for the Economies of Central Asia (SPECA)*, (New York, United Nations, 2004).

<sup>26</sup> Sergei Vinogradov and Vance P.E. Langford (2001). Managing Transboundary Water Resources in the Aral Sea Basin. In search of a solution. *International Journal for Global Environmental Issues*, vol. 1, nos. 3/4, pp. 345–362; Strengthening the Institutional and Legal Frameworks of the International Fund for Saving the Aral Sea: Review and Proposals. Discussion paper dated 31 January 2010.

<sup>27</sup> idem

<sup>28</sup> Kyrgyzstan "Freezes" its Participation in Saving the Aral. Sputnik news, Bishkek, May 20, 2016 [in Russian].

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