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### **Enhancing the resilience and sustainability of national agri-food systems through integrated land and water resources management in Europe and Central Asia**

#### **Executive Summary**

This paper emphasizes the necessity for integrated land and water management in Eastern Europe and Central Asia, presenting two case studies: the European Union Water Framework Directive and the management of transboundary impacts of agricultural production in the Aral Sea Basin. The European Union Water Framework Directive is highlighted as a successful example of integrated land and water management, fostering improved cooperation among member countries and better coordination of land and water management, and enhancing environmental sustainability. It points out the significant benefits gained from better integration and underscores the potential of strengthening European Union policy and institutions to continue advancing integrated land and water management.

On the other hand, Central Asia's transboundary basins, despite having a history of cooperation on water resource management, face limitations due to a lack of integrated consideration of land, water and other topical issues. The region's largely irrigation-focused approach, while crucial in preserving its integrated water infrastructure, does not fully reflect the changing economic structure or the national interests of upstream countries. The report suggests the region is missing opportunities that improved coordination would entail, estimating that the costs of insufficient cooperation across the water, land and energy sectors amount to more than USD 4.5 billion annually.

The paper concludes by highlighting the importance of harmonized policies and regulations across sectors and countries, advocating for the establishment of appropriate financial incentive structures to encourage sustainable practices. It also provides recommendations for enhancing integrated land and water management in the region, emphasizing the need for intersectoral coordination mechanisms, improved national policy frameworks and capacity development to finance integrated land and water management activities. The report further underscores the need to ensure the inclusion of women and minority groups – who are often marginalized in agricultural and water institutions – in the process.

## I. Introduction

1. As of early 2023, global agricultural commodity conditions have stabilized, but food prices remain significantly higher than before the COVID-19 pandemic and the invasion of Ukraine by the Russian Federation. This situation is impacting food security in many countries worldwide. The Europe and Central Asia region, like much of the world, has experienced notable inflation in food prices. The region is home to major grain and oilseeds exporters, including the Russian Federation, Kazakhstan, Serbia and Ukraine, while countries in Central Asia and the Western Balkans rely on imports (Jungbluth and Zorya, 2023). Both exporters and importers in the region have faced high domestic food price inflation driven by the transmission of elevated international prices to domestic markets and the impacts of national policies and climate change. Consequently, food insecurity poses a growing concern throughout the region, particularly in Central Asia.

2. Under these conditions, ensuring sustainable food systems will require land and water management practices that are more resilient and sustainable than those we observe today. Coordination and integrated planning and management between the water and land sectors are crucial.<sup>1</sup> By integrating water and land policies and management practices, we can optimize resource management, foster sustainable agricultural practices, build resilience to climate change, protect water quality, reduce land degradation and reap synergistic benefits for food security, nutrition and a better life. Additionally, a coordinated water and land management approach will also contribute to promoting environmental conservation, safeguarding ecosystems and biodiversity, and benefitting nature and the well-being of communities alike.

3. Against this background, the present paper aims to introduce the topic of integrated land and water management. Chapter 2 will set the scene by outlining key challenges faced by countries in the region with regard to ensuring food security. This will be followed by a summary in Chapter 3 of how integrated land and water management can benefit food security and present some key principles. Chapter 4 presents selected examples on regional approaches for integrated land and water management and highlight the need for more harmonized regional frameworks. Chapter 5 summarizes key takeaways and shares recommendations for further work.

## II. Key challenges facing national agrifood systems

4. In the past two decades, countries of the Europe and Central Asia region have made significant progress in combating food insecurity and undernourishment. As a result, malnutrition and food insecurity rates in the region are generally lower than in the rest of the world. However, since the onset of the COVID-19 pandemic, the number of people affected by food insecurity has increased from 9.8 percent in 2019 to 12.4 percent in 2021 (FAO *et al.*, 2023). Additionally, this figure hides subregional differences. While the number is low in the European Union, the numbers in the Caucasus, Central Asia and the Western Balkans are higher and have increased in the past couple of years (FAO *et al.*, 2023). Since the beginning of the invasion of Ukraine, supply chain disruptions have caused food prices to increase in the region and beyond, further aggravating food security challenges (Jungbluth and Zorya, 2023).

5. These hurdles are further complicated by several concurrent factors.

### Climate change

6. Climate change is one of the key challenges affecting agrifood systems in Europe and Central Asia. The region has witnessed average temperature increases by 0.5 °C in the south and up to 1.6 °C in the north of the region. An overall increase of 1.6 °C to 2.6 °C is expected by the middle of the century (FAO *et al.*, 2023).

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<sup>1</sup> The need to promote integrated land and water management is emphasized in a recently published FAO report on the state of the world's land and water resources for food and agriculture, available online at <https://www.fao.org/land-water/solaw2021/en/>.

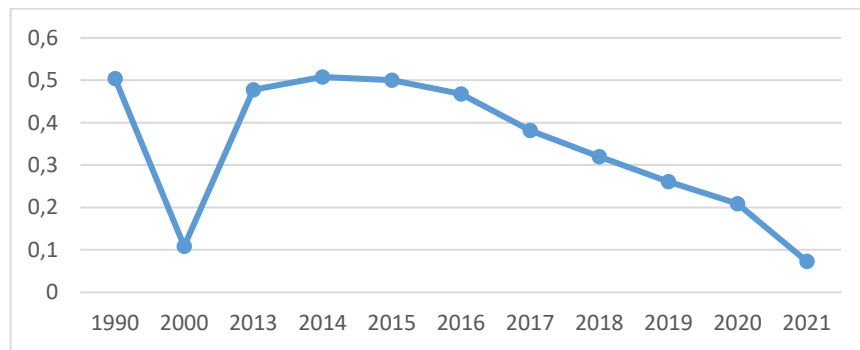
7. Central Asia is particularly vulnerable to the impacts of climate change its detrimental effects on the agrifood sector. The region has already experienced increased temperatures, altered precipitation and more frequent heat extremes. Projections show that average temperatures in Central Asia could increase by up to 6.5 °C by the end of the century, compared to pre-industrial levels (Reyer *et al.*, 2017). Trends for precipitation are much more uncertain and vary across the region (and microregions).<sup>2</sup> These shifts in climate affect the ability to produce food and add a burden to the costs of agricultural production, ultimately affecting consumer prices.

8. The World Bank estimates that if no action is taken, economic damages from droughts and floods in Central Asia could reach up to 1.3 percent of the gross domestic product per year, while crop yields may decrease by 30 percent by 2050 — resulting in as many as 5.1 million internal climate migrants by that time (World Bank, 2022). In the European Union, it is estimated that more than 400 000 jobs could be lost annually by 2050, with the overall cost of climate-related extreme weather reaching EUR 170 billion by the end of the century (World Bank, 2022).

#### Population growth and increasing water demand

9. The rate of population growth in the Europe and Central Asia region has witnessed a substantial decline since the 1990s and currently remains at an average of zero growth. However, notable variations exist among countries, particularly between Central Asia and Europe. While European populations are already experiencing a decline, Central Asia is exhibiting a growth rate of 1.7 percent. It is important to note, though, that this growth rate has also declined since the 1990s (World Bank, 2020).

Figure 1. Population growth in Europe and Central Asia, %



Source: **World Bank**. 2020. Rural population (% of total population) - Europe & Central Asia. In: World Bank Data. <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=Z7>

10. Despite these decreasing levels of population growth, the overall population in Central Asia is growing and expected to increase by one-third to around 100 million by 2050 (Pohl *et al.*, 2017). This is likely to further increase the pressure on land and water resources if water use efficiencies are not improved and agricultural production is not made more sustainable.<sup>3</sup>

#### Lack of gender and minority inclusion

11. Several national agrifood systems in the Europe and Central Asia region are furthermore challenged by the lack of adequate representation and participation of women and minority groups. Although the region has the lowest Gender Inequality Index in the world, at 0.227 (with 0 representing total equality and 1 total

<sup>2</sup> For more on precipitation trends throughout the world, visit <https://climateknowledgeportal.worldbank.org/country-profiles>.

<sup>3</sup> Pressures on surface and groundwater resources in Central Asia are not only driven by population growth but also increasing industrial development and emerging water demands from neighbouring Afghanistan, China and the Russian Federation.

inequality),<sup>4</sup> there remain markable differences among countries. Equality rates in Western Europe and Northern Europe are significantly better than in Eastern Europe, the Caucasus and Central Asia.<sup>5</sup>

12. Overall, Central Asia lags behind European countries. Although substantial improvements in the promotion of women's rights and equal opportunities were made in Central Asia during Soviet times, significant inequalities still exist. In today's agrifood sector, women play an important role in managing water and land resources in the region. However, their participation in water institutions such as water user associations and basin or subbasin management organizations is still inadequate. Also, women's access to land is often limited; in some countries, up to 90 percent of the total agricultural land is owned by men (European Commission on Agriculture, 2019). Even though there are more female-headed households and female farmers than in the past due to social and demographic changes and male labour migration, women are still significantly underrepresented in such institutions. Women's perspectives, knowledge and needs may therefore be overlooked, leading to suboptimal management practices.

13. It is vital to foster gender-balanced representation and inclusion of marginalized groups in Central Asia to facilitate equitable and sustainable water and land management.

14. The European Union and the Caucasus regions have differing dynamics regarding population growth and resource management, with the latter facing significant challenges in achieving gender and minority inclusion in agrifood sectors and resource management organizations. When it comes to gender and minority inclusion, Western and Northern Europe lead in providing equal opportunities. Yet, persistent gaps exist in Eastern Europe and the Caucasus. These areas must strive towards a more balanced representation of women in agrifood sectors and resource management organizations to ensure more effective and equitable practices.

#### Land and water degradation

15. Land and water degradation are another significant concern, impacting food security, economies and quality of life. The extent and severity of water and land degradation vary across countries and subregions of Europe and Central Asia. Climate conditions, land use practices, industrial activities and socioeconomic factors influence the degree of degradation in each area. In Central Asia, estimates of degraded land range from 4–10 percent of cropped land, 27–68 percent of pastureland and 1–8 percent of forested land in each country (Quillerou *et al.*, 2016). Causes vary, but among them are unsustainable agricultural practices such as overgrazing, excessive use of chemical fertilizers and pesticides, improper and unmaintained irrigation techniques and infrastructure, and monoculture farming – all of which contribute to soil erosion, nutrient depletion and the loss of soil fertility.

16. Soil degradation in urbanized countries primarily stems from urban expansion and industrial developments, while the Mediterranean region is primarily threatened by soil erosion.

17. The Caucasus region is grappling with soil degradation primarily due to overgrazing and poor irrigation systems, which along with industrial activities, lead to soil erosion and nutrient depletion.

18. One major cause of water resources degradation in the Europe and Central Asia region is extensive and often unsustainable agricultural production, which has resulted in significant levels of surface and groundwater pollution caused by agricultural runoff. In Europe, 60 percent of rivers, lakes and wetlands are not in a good ecological status (European Environment Agency, 2018). In Central Asia, more than half the land is salinized, making the soil unsuitable for growing crops; this is a major economic concern, in addition to the environmental impacts on land and water bodies (Organization of Economic Cooperation and

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<sup>4</sup> The Gender Inequality Index is a composite measure reflecting inequality in achievement between women and men in three dimensions: reproductive health, empowerment and the labour market. For more information, see <https://hdr.undp.org/data-center/thematic-composite-indices/gender-inequality-index#indices/GII>.

<sup>5</sup> On the one side of the spectrum, countries such as Denmark and Norway have a Gender Inequality Index of 0.013 and 0.016, respectively, while Kyrgyzstan and Azerbaijan have a Gender Inequality Index of 0.370 and 0.294, respectively (2021 data).

Development, 2022). The main driving factors of these developments are improper irrigation methods, including excessive watering and improper drainage systems.

### Lack of intersectoral coordination and resource degradation

19. The coordination among national and regional land and water use practices poses a number of challenges in several subregions of Europe and Central Asia. In particular, water resource planning and management are often split among different agencies, with a lack of coordination between them; this may result in incoherent or even contradicting policies.<sup>6</sup>

20. The European Union’s policies aimed at mitigating nitrate pollution from agriculture sometimes conflict with subsidy structures that promote intensive livestock production, further exacerbating the pollution issues (Forum Ökologisch-Soziale Marktwirtschaft, 2021).

21. In Central Asia, a lack of coordination among the water, agriculture, forestry and energy sectors has prevented an integrated approach to the management of watersheds, producing suboptimal development results. The coordination over water abstraction for balancing the generation of hydroelectricity in upstream countries (with a focus on energy production during winter months) and the irrigation needs of downstream countries (requiring the most water during summer months) has become a growing challenge since independence. Limited transboundary cooperation and intersectoral coordination have caused agricultural losses in downstream countries (Kazakhstan and Uzbekistan) due to a lack of predictable and better-timed water availability. The United Nations Development Programme in 2005 estimated that suboptimal regional water governance reduced agricultural productivity by around USD 1.75 billion per year (United Nations Development Programme, 2005). In addition, indirect environmental and social costs and the indirect costs of desalinization and land degradation could be addressed more effectively through greater bilateral and multilateral coordination (Pohl *et al.*, 2017). The neglect of water requirements by the agricultural sector – such as the provision of environmental flows – and pollution from agricultural fertilization impose a strain on ecosystems and, through desertification and dust storms, on the health systems in all Central Asian countries.

#### *Box 1. Long-term impacts of agricultural development: desertification of the Aral Sea Basin and the impacts of sandstorms*

Until the early 1960s, the Aral Sea ranked as the fourth largest lake worldwide, spanning approximately 68 000 sq. km and supporting a thriving fishing industry. Fed by the Amu Darya and Syr Darya rivers originating from the Pamir and Tian Shan mountains, the lake experienced a significant decline in water flow starting in the early 1960s. The diversion of water for irrigation purposes severely reduced the amount of water reaching the Aral Sea, leading to its drastic shrinkage over several decades. By 2009, the lake had diminished in size by about 90 percent compared to its 1960 extent, accompanied by a significant rise in salinity. As a result, the once-thriving local fishing industry that sustained the livelihoods of local people collapsed. Decreasing water levels and desertification in the Aral Sea weigh on rural livelihoods but also contribute to dust and sandstorms, which are already posing multiple risks to Central Asian countries.<sup>1</sup>

The dust from the dried-up seabed contains toxic substances, including pesticides and industrial pollutants that have since been connected with a vast number of health-related risks, such as increased numbers of cancer and respiratory diseases. More than 90 percent of the populations in Tajikistan,

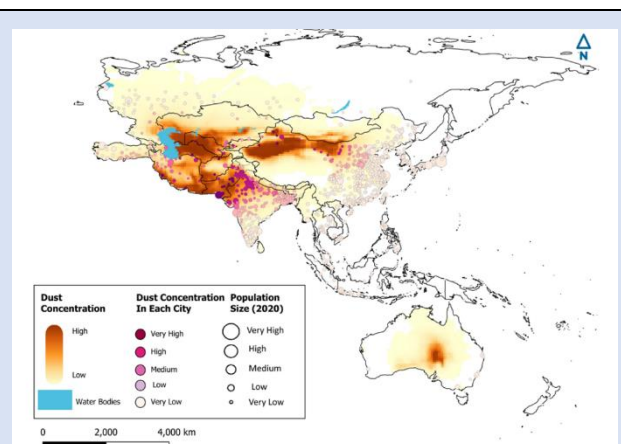


Figure 2: Dust concentration and exposure in cities with more than 300 000 people (ESCAP 2021)

<sup>6</sup> For a more detailed outline on processes and reforms in the Europe and Central Asia region to coordinate and integrate water resources management, refer to the second background paper for the Forty-third Session of the European Commission for Agriculture, titled “The importance of water governance for enhancing water security in Europe and Central Asia.”

Turkmenistan and Uzbekistan are affected by poor air quality due to sand and dust storms, to which the Aralkum desert contributes.

Agricultural production also has taken a hit. SDS generated by the former Aral Seabed has led to off-site effects due to wind erosion exposure, including health impacts and crop production losses averaging USD 11.6 million per year. Landscape restoration interventions in the Aralkum can prevent ecosystem service losses and generate additional benefits of about USD 39 million per year, equivalent to 1.9 percent of the gross domestic product of Karakalpakstan.

Large areas of farmland are affected by dust deposition in Turkmenistan (71 percent of the cropland area) and Uzbekistan (44 percent), reducing yield and posing a significant threat to cotton and other agricultural crops.<sup>2</sup>

Dust and sandstorms also affect glaciers. The deposition of dust on glaciers induces a warming effect and, consequently, increases the melting of the ice. This increases water runoff in the short term, entailing stronger flood risks downstream. In the long term, water runoff will decrease and increase the seasonality of water availability. These developments, in turn, affect water availability for agriculture.

This exemplifies that decisions from land and agricultural development can have far-reaching and long-term impacts on multiple other sectors, such as water, environment and health.

Sources:

**Akramkhanov, A., Strohmeier, S., Yigezu, Y.A., Haddad, M., Smeets, T., Sterk, G., Zucca, C. et al.** 2021. *The value of landscape restoration in Uzbekistan to reduce sand and dust storms from the Aral Seabed*. <http://hdl.handle.net/10986/36461>

**Banks, J.R., Heinold, B. & Schepanski, K.** 2022. Impacts of the desiccation of the Aral Sea on the Central Asian dust life-cycle. *Journal of Geophysical Research: Atmospheres*, 127(21). <https://doi.org/10.1029/2022JD036618>

**Breckle, S.-W., & Geldeyeva, G. V.** 2012. Dynamics of the Aral Sea in geological and historical times. In S.-W. Breckle, W. Wucherer, L. A. Dimeyeva, & N. P. Ogar (Eds.), *Aralkum—A man-made desert: The desiccated floor of the Aral Sea* (Central Asia) (pp. 13–35). Springer.

**ESCAP.** 2021. *Sand and dust storms risk assessment in Asia and the Pacific*. <https://apdim.unescap.org/knowledge-hub/sand-and-dust-storms-risk-assessment-asia-and-pacific>

Notes:

<sup>1</sup> According to Banks, Heinold and Schepanski (2022), it has been estimated that the expanded lakebed of the Aralkum has contributed approximately an additional 7 percent to regional Central Asian dustiness over the past 30 years.

<sup>2</sup> Much of the dust is characterized by a high salt content, which makes the dust toxic to plants.

### III. Integrated land and water resources management: benefits, principles and approaches

22. The previous chapter highlighted the challenges of achieving food security and sustainable resource management in the Europe and Central Asia region. These complexities stem from the intricate interactions between water and land management, often coordinated poorly, resulting in isolated policies. Historically, agriculture, a significant water consumer and polluter, hasn't harmonized with water resource management. Additionally, water managers primarily focused on urban and industrial needs, neglecting agriculture's interplay with land (Tzanakakis, Paranychianakis and Angelakis, 2020).

23. Effective land and water coordination prevents conflicts and encourages sustainable resource management. Misalignments between irrigation expansion and growing industries can cause resource waste and disputes.

24. Coordinated strategies, such as soil and water conservation and regenerative agriculture, foster synergies that enhance environmental resilience. These strategies emphasize on the importance of practices like sustainable forest and land management in mitigating the effects of climate change (FAO, 2022). The degradation of forests, driven by factors such as climate change, underlines the importance of holistic and participatory resource management (Jones *et al.*, 2018). Approaches like sustainable forest management; sustainable land management; and integrated watershed, wetland and water resources management are vital.

25. Forests are pivotal in facilitating resilient food systems, supporting various Sustainable Development Goals (SDGs). However, their economic value is often underestimated, despite their vital services (FAO, 2022).
26. The connection between forest–water relationships and food security showcases the links among ecosystems, agriculture and nutrition, as highlighted by the 2020 *State of Food and Agriculture* report (FAO, 2020).
27. Implementing the mentioned practices can enhance groundwater recharge, improve water quality and reduce treatment costs, with the potential to offset initial land management costs.
28. There are, consequently, a range of benefits to be harnessed through a more coordinated and integrated policymaking, planning and implementation process across sectoral, institutional and professional boundaries. The water sector came up with the **integrated water resources management** approach more than 30 years ago to address this but failed to adequately integrate land and agricultural interests.<sup>7</sup> More recently, the concept of a **water, energy and food nexus** was developed to account for the limited inclusion of energy and food/land components in integrated water resources management (FAO, 2014; Hoff, 2011). The nexus concept highlights the interdependencies of water, energy and food systems and emphasizes that changes in one sector can have significant impacts on the other. The concept therefore acknowledges the need for coordinated strategies and policies that consider trade-offs and that harness potential synergies among water, energy and food resources.
29. **Integrated land and water resources management** accentuates the harmonized management of land and water resources, considering the interconnections between various systems and promoting comprehensive solutions at all levels for effective scalability. These strategies help mitigate land degradation and manage water scarcity effectively (FAO, 2021).
30. In contrast to more conventional water and land management practices, integrated land and water management rests on such principles as the **active involvement of stakeholder groups** comprising all who may impact or be impacted by the outcomes of a decision. Their participation is essential to ensuring that potential interests and impacts across different groups and sectors are considered – using stakeholders’ knowledge to inform and improve the design of an intervention, increase acceptance and mitigate potential conflicts that may arise from an intervention between the water and land sector – and to fostering trust between governments and civil society.
31. Finding the right level for stakeholder participation is vital, ranging from water users’ associations to regional river basin organizations for interstate coordination.
32. Another key principle of integrated land and water management relates to an **enabling policy environment** that allows planning government institutions and agencies to adopt water and land legislation and planning practices that are coordinated, do not contradict each other, reduce land and water degradation and improve food security. This requires clear roles, responsibilities and mandates for actors and intersectoral coordination mechanisms. Coordination among agencies and departments responsible for land and water management can be facilitated through interministerial committees, task forces or procedures outlining coordination or even joint planning processes.
33. Another essential policy aspect of integrated land and water management for sustainable agricultural development is **land and water tenure security**. Only if farmers have secure land and water rights (potentially coupled with other incentive mechanisms) are they willing to make investments in more efficient water use technologies and environmental protection. Without secure land and water rights,

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<sup>7</sup> For more information, see the background paper on the importance of water governance for enhancing water security in Europe and Central Asia.

farmers' focus is likely to shift towards maximizing short-term benefits, often at the expense of water quality and land preservation.

34. Furthermore, integrated land and water management aims to **safeguard and enhance the resilience of ecosystems**, recognizing their crucial role in supporting sustainable land and water management. It promotes practices that maintain biodiversity, protect natural habitats, restore degraded areas and conserve ecosystem services, ensuring the long-term health and functioning of ecosystems. Policymakers have numerous steering instruments to support such approaches. In the context of agriculture, for example, pricing and subsidies of inputs like land, water, seeds and agrochemicals play a crucial role. It is well-documented that under-pricing natural resources and providing subsidies for agricultural inputs can result in the overexploitation of resources and environmental degradation. Therefore, carefully designed policies related to subsidies, pricing and other factors must be formulated in a way that ensures fair and dependable resource access, efficient resource utilization and ecosystem protection.

35. Integrated land and water management aligns with the FAO's "four betters" framework, fostering sustainable production and environmental protection while ensuring equitable resource access and conservation (FAO, 2021) by promoting sustainable production, environmental protection, nutritional security and livelihood improvement.

#### IV. Case studies of integrated land and water resources management

##### 1) Addressing land-based water pollution through transboundary cooperation in the Danube River and Black Sea

36. The case of the Danube River and Black Sea exemplifies how integrated land and water management can be a key to successfully addressing water pollution. The Black Sea is one of the most degraded seas in the world, having undergone drastic environmental changes since the 1960s, mainly caused by high nutrient loads that reached their peak in the 1980s and early 1990s (Kovacs and Zavadsky, 2021). One of the key sources contributing to eutrophication, bad environmental quality and biodiversity loss is the discharge of organic substances and nutrients by land-based agricultural practices and sewage within the Danube River Basin. Because the river is one of the main water sources for the Black Sea, water quality in the Danube River's 19 riparian countries directly affects not only the Danube itself but also the Black Sea's environmental status.

37. Germany and Austria, upstream of the Danube, started implementing pollution control measures at the national level during the 1990s, when the first binding European Union legislation – the Urban Wastewater Treatment Directive (1991) and the Nitrates Directive (1991) – came into force (Kovacs and Zavadsky, 2021). Their legally binding pollution control provisions were further reinforced by the Water Framework Directive (2000). In subsequent years, seven additional Danube countries acceded to the European Union and thus became subject to the same directives. These countries have taken significant measures to comply with European Union regulations to lower basin-wide nutrient emissions. These measures have included substantial investments in wastewater treatment plants with nutrient removal technology, the introduction of best available techniques at industrial facilities, the introduction of phosphate-free detergents, and the implementation of improved agricultural practices.

38. Under the guidance of the European Union, a support mechanism to facilitate funding for these activities was established in 2001: the Danube Black Sea Task Force (Butter, 2012). The task force involved the International Commission for the Protection of the Danube River, the Black Sea Commission, the European Union, international financing institutions, European Union Member Nations and donors. Its main objective was to develop financing mechanisms for investment projects focused on pollution reduction and ecosystem rehabilitation in the broader Black Sea region. While the International Commission for the Protection of the Danube River and the Black Sea Commission provided scientific information, other actors provided loan funding, primarily for wastewater sector improvements. The Danube Black Sea Task Force

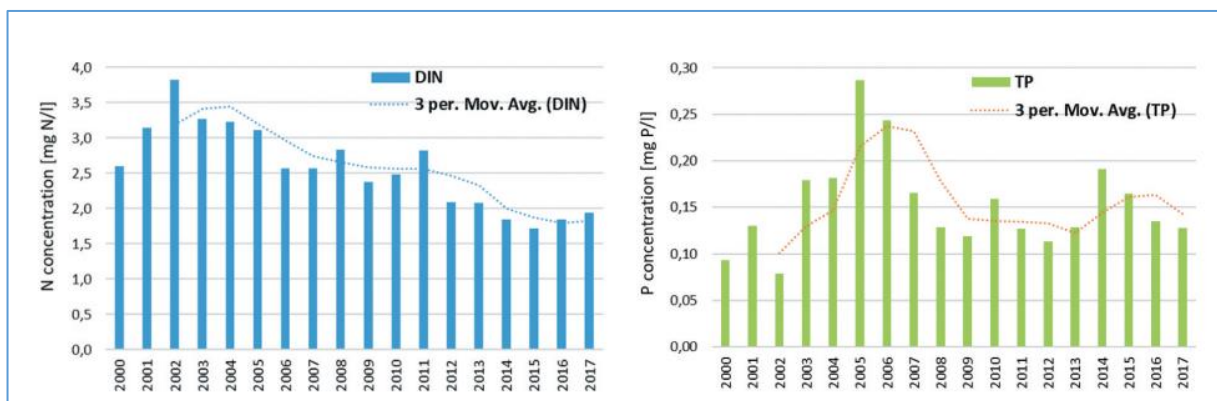


ceased its operations in 2011 due to improved project preparation capacities in European Union Member Nations and the emergence of other European Union support instruments.

39. Recent European Union policies are enhancing pollution control requirements for Danube countries, guided by the European Green Deal, the Zero Pollution Action Plan, the Farm to Fork Strategy and the new Common Agricultural Policy (2023–2027). These aim for zero harmful pollution to water sources by 2050.

40. Transboundary cooperation, facilitated by the International Commission for the Protection of the Danube River and the Black Sea Commission, contributes to integrated resource management. The commission's coordination and monitoring roles, as highlighted in Kovacs and Zavadsky (2021), play a pivotal role in evaluating the basin's water quality.<sup>8</sup>

Figure 3. Annual dissolved inorganic nitrogen and total phosphorus concentrations in the Danube at Reni Station.



Source: **Kovacs, A. & Zavadsky, I.** 2021. Success and sustainability of nutrient pollution reduction in the Danube River Basin: recovery and future protection of the Black Sea Northwest shelf. *Water International*, 46(2): 176–194. <https://doi.org/10.1080/02508060.2021.1891703>

Note: DIN refers to dissolved inorganic nitrogen. TP refers to total phosphorus.

41. The coordinated management has reduced nitrogen and phosphorus pollution by about 25 percent compared to the late 1980s. Despite this, current pollution levels surpass the environmental goals targeting the 1960s standards (Kovacs and Zavadsky, 2021).

## 2) Improving transboundary water cooperation in Central Asia

42. In Central Asia, despite ongoing transboundary cooperation concerning water resource allocation, the lack of a systematic, coordinated approach hampers the optimization of opportunities.

43. The region, once under Soviet rule, relies heavily on the Amu Darya and Syr Darya rivers for agriculture, utilizing about 90 percent of abstracted water. Soviet-era arrangements facilitated water storage in Kyrgyzstan and Tajikistan to aid summer irrigation in downstream countries, coupled with energy trade-offs.

<sup>8</sup> The Transnational Monitoring Network can be accessed by all registered users at <http://www.icpdr.org/wq-db/>. All Transnational Monitoring Network yearbooks can be accessed on the International Commission for the Protection of the Danube River's website at <http://icpdr.org/main/publications/tmn-yearbooks>.

44. After gaining independence, Central Asian countries established several institutions, including the Interstate Commission for Water Coordination and the International Fund for Saving the Aral Sea, to govern the use and protection of interstate water resources and promote sustainable development.<sup>9</sup>

45. These institutions, though criticized for their limited scope, have succeeded in preventing destructive fragmentation, fostering peace, and maintaining a platform for negotiation, especially during the critical phase of nation-building. Their efforts also partly address environmental issues (Pohl *et al.*, 2017).

46. In addition, countries in Central Asia have in recent years also taken steps towards including Afghanistan in the regional water cooperation architecture (Kamil, I. (2021). Including Afghanistan may be unavoidable considering ongoing water development plans, such as those of the Qosh Tepa Canal, that will affect the water balance in the Amu Darya River (as well as salination issues due to lack of canal waterproofing) and hence affect downstream countries. However, this has certainly become more difficult since the radical Islamist Taliban has taken over power in the country.

47. Despite the undisputable success, cooperation over shared water resources in the region remains below its potential and has been increasingly criticized for the lack of systematic integration of land and energy issues. Water management on the transboundary level, to date, remains limited to water allocation for agricultural purposes (an inheritance of the Soviet system, which one-sidedly focused on large-scale agricultural irrigation with little consideration of water development for other purposes or environmental concerns). However, this one-sided focus on providing a sufficient amount of water for irrigation (in downstream countries) does not sufficiently reflect the national interests of upstream countries or a changing economic structure in which the economic significance of agriculture is decreasing (Pohl *et al.*, 2017; Ziganshina and Sehring, 2023). Furthermore, the limited and mainly water-allocation-focused cooperation undermines the ability of governments to harvest the full potential of economic, social and environmental benefits that closer cooperation and a more integrated land and water management entail (for an example, compare Box 1). Pohl *et al.* (2017) estimate that the costs of insufficient cooperation across the water, land and energy sectors add up to more than USD 4.5 billion per year.

48. Past attempts to broaden the scope of cooperation, including the 1998 Syr Darya Framework Agreement and expansions of the Interstate Commission for Water Coordination's mandate, have not been successful, resulting in Kyrgyzstan suspending its participation in the International Fund for Saving the Aral Sea in 2016.<sup>10</sup>

49. The above case studies outline that considerations for integrated land and water management encompass several crucial aspects. One key consideration is the need for coordinated policies and regulations across sectors and countries. This entails aligning land and water management frameworks, breaking down silos, and fostering collaboration among relevant stakeholders. Additionally, the establishment of appropriate financial incentive structures is essential to encouraging sustainable practices. This may involve providing support, such as capacity development support to develop financing mechanisms, providing subsidies and grants for adopting water-efficient technologies, promoting sustainable land use and incentivizing conservation measures. By addressing these policy considerations, integrated land and water management can effectively promote holistic approaches that enhance resource efficiency, environmental sustainability and socioeconomic well-being.

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<sup>9</sup> There are also several bilateral agreements between Central Asian governments, including the 1996 agreement between Turkmenistan and Uzbekistan on equal water distribution of the Amu Darya and the agreement between Turkmenistan and Iran on the construction and operation of the Doosti Reservoir Dam on the Hari River.

<sup>10</sup> The reasons for this failure are multiple, including the low capacity of national water sectors to implement agreed-upon rules, limited coherence across national departments, and a genuine lack of trust among governments (which is partly the result of the non-implementation of previous agreements).

## V. Conclusions and recommendations

50. Integrated land and water management planning is a crucial step for countries and communities in Europe and Central Asia to address the interrelated challenges of climate change, population growth and natural resource degradation that all contribute to food insecurity. Increasing land and water productivity is crucial for achieving food security, sustainable production and SDG targets. A package of workable solutions is now available to enhance food production and tackle the main threats from land degradation, increasing water scarcity and declining water quality. But these will succeed only when there is a conducive enabling environment, strong political will, sound policies, inclusive governance and full participatory planning processes across all sectors and landscapes (FAO, 2021). Many actions at varying levels (from local to regional) can be taken to better solidify the connection between water management and land use and contribute to more sustainable food security:

51. **Establish and support intersectoral coordination mechanisms.** In many cases, governance and planning structures that support vertical and horizontal coordination between water and land sectors are missing, resulting in sector-based policies and regulatory mechanisms and divergent sectoral institutional frameworks that hinder an integrated intersectoral approach. Efforts to establish intersectoral coordination should start from an analysis of existing mechanisms, such as intersectoral working groups, or coordination mechanisms that have been established in support of intersectoral initiatives, such as sustainable development plans, climate resilience strategies and others. Such coordination mechanisms, even if not yet comprehensive in scope, can provide an opportunity to introduce a land-water nexus perspective and institutionalize coordination without adding to the often already complex and fragmented institutional landscapes.

52. **Improve national policy frameworks.** Refine national policy frameworks to incorporate water elements in land-use planning and promote sector collaboration, with financial incentives for local community involvement and gender and minority inclusion.

53. **Support intersectoral (water-land) coordination and planning at the regional level.** While a regional institutional framework for water coordination in Central Asia exists (Interstate Commission for Water Coordination, International Fund for Saving the Aral Sea and bilateral institutions), it is primarily focused on coordinating water issues, such as water abstraction rates. However, to better manage trade-offs, foster synergies and improve coherence among the water, agriculture/land and energy sectors, it would be necessary to promote a more integrated water and land management and planning approach. This could be realized in a stepwise approach, starting with including aspects that are of specific interest and priority to all parties of a specific regional institution. Tools could include respective sectoral representation (within the existing institutional water landscape) in regional organizations, the formation of specific working groups, or the determination of national focal points for agriculture/land and energy. Here, an exchange between the experiences of European Union Member Nations and Central Asian countries could be valuable, though the evolution and policy context between the two regions is quite different.

54. **Take measures to increase land and water productivity.** Increasing land and water productivity is crucial for achieving food security, sustainable production and SDG targets. Promote measures to increase land and water productivity, fostering a conducive environment with strong political will and sound policies is a key step in bolstering sustainable growth.

55. **Develop and support capacities to finance integrated land and water management activities.** Developing capacities to finance integrated land and water management activities is vital. These involve assessing and documenting project benefits through systematic cost-benefit analyses to facilitate multisector investment and developing business models that encourage public-private partnerships for financing sustainable land and water management projects.

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