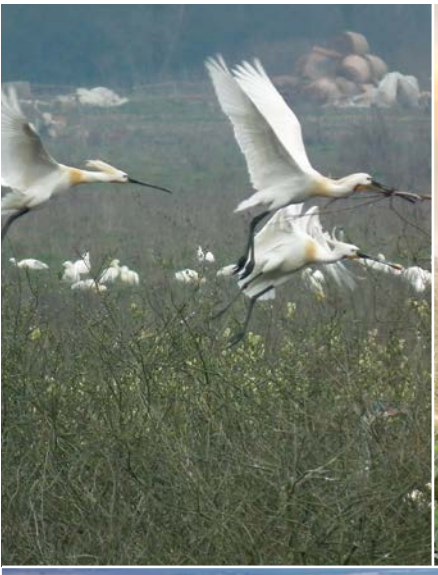
UNECE

Reconciling resource uses in transboundary basins: assessment of the water-food-energy-ecosystems nexus

POLICY BRIEF




UNITED NATIONS

1. THE NEED FOR A TRANSBOUNDARY NEXUS APPROACH

Water, energy and land resources need to be managed jointly. Water, energy, food and ecosystems are strongly interlinked – actions in one sector often impact the others. Yet all too often those sectors operate in isolation. As a result, establishing water, energy, or food security independently and without regard for the impact on other resources may compromise achieving security in the other sectors. In 2011, the International Conference on the Water, Energy and Food Security Nexus – Solutions for the Green Economy in Berlin brought greater attention to these inter-linkages. The conference presented initial evidence on how a nexus approach can enhance water, energy and food security by increasing efficiency, reducing trade-offs, building synergies and improving governance across sectors. Since then several initiatives have sought to identify and address nexus linkages, often in a national context.

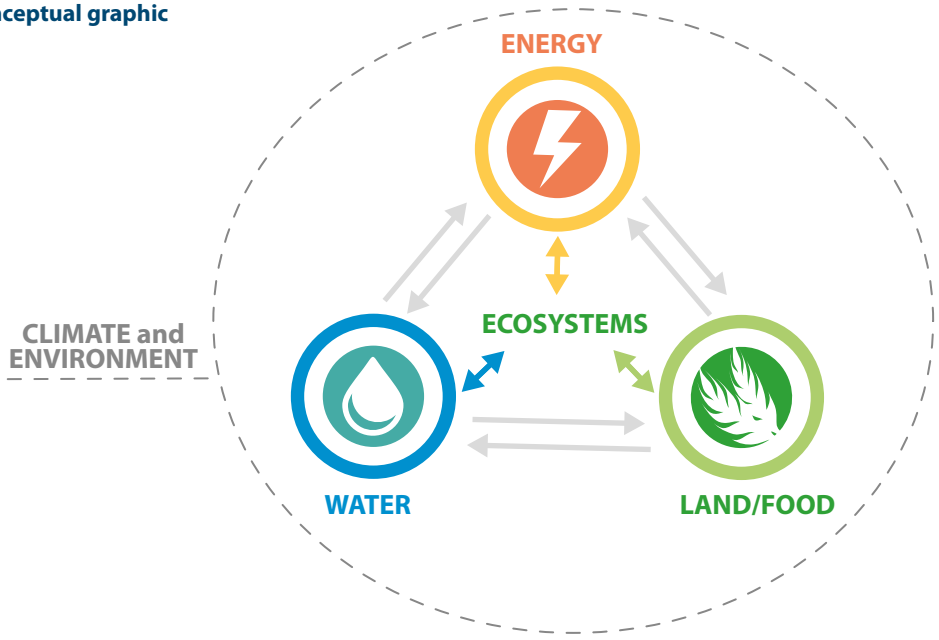
A large share of natural resources falls within transboundary basins. About 40% of the world's population lives in transboundary river and lake basins that account for an estimated 60% of freshwater flow. The management of transboundary basins involves the management of water, energy and land resources, such as agricultural land and forests. But management also involves the economic activities located in the basin and/or dependent on those resources – such as energy production, mining, industrial production, transport or tourism – as well as the social and environmental impact of the management of natural resources.

Managing water, energy, and land resources in a transboundary context poses specific challenges. Coordination between the water, energy, food and environment sectors is challenging even at the national level. But the complexity increases substantially in transboundary river basins where the impact spreads from one country to another and trade-offs and externalities may cause friction between the riparian countries.

BOX 1.
Objectives of a transboundary nexus assessment under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention)

- To foster 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 and needs of common resources
- To assist countries in optimizing their use of resources
- To increase efficiency and ensure greater policy coherence and co-management; and
- To build capacity to assess and address intersectoral impacts.

FIGURE 1
Nexus conceptual graphic



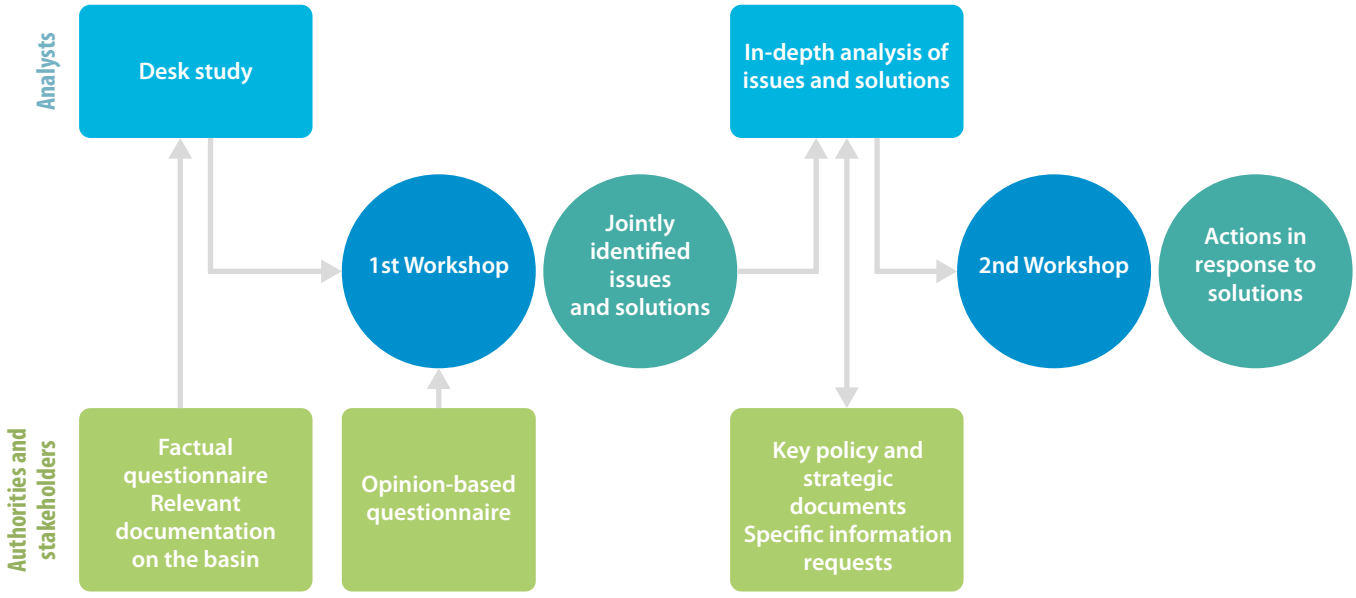
2. CARRYING OUT A TRANSBOUNDARY NEXUS ASSESSMENT

A methodology to assess nexus linkages and solutions adapted to transboundary contexts has been developed in the framework of the Water Convention. The transboundary nexus assessment has been developed under the guidance of the Task Force on the Water-Food-Energy-Ecosystem Nexus, established by the Meeting of the Parties and chaired by Finland. The nexus assessment follows six basic principles: to be participatory; to mobilise available expertise in the basins; to be informed by sound scientific analysis; to contribute to capacity-building; to reflect the broad range of views and expertise involved; and to focus largely on identifying the potential for improvement. The methodology has been developed through a 'learning-by-doing' approach through three phases. Phase A focused on the development of a general methodology, which included agreeing on the terminology, organizational framework, indicators, and preliminary areas of investigation. Phase B focused on testing the general methodology by applying it to three river basins, the Sava, Alazani/Ganykh and Syr Darya. Phase C focused on drawing conclusions and lessons from each of the basin assessments and developing recommendations regarding intersectoral coordination in transboundary basins. Since its publication, the methodology has been applied to other basins, including an aquifer.

A basin-level nexus assessment involves six steps that combine desk studies and participatory workshops.[1] Step 1 focuses on the identification of basin conditions and the socioeconomic context. Step 2 focuses on the identification of key sectors and stakeholders to be included in the assessment. Step 3 focuses on the analysis of key sectors, including through indicators. Step 4 focuses on the identification of intersectoral issues. Step 5 consists of a nexus dialogue about, and the priority of, inter-linkage scenarios to be considered, and a preliminary understanding of the evolution of the inter-linkages under the different scenarios. Step 6 focuses on identifying synergies across sectors and countries. As part of the assessment, a second workshop should be organized to discuss the findings and the possible implementation of the identified solutions. The assessment covers both governance and technical issues through two parallel and complementary efforts that inform each other.

1 Details of each of the steps are outlined in the methodology published in Reconciling resource uses in transboundary basins: assessment of the water-food-energy-ecosystems nexus (2015) https://www.unece.org/index.php?id=41427

FIGURE 2
Information exchange in the nexus assessment of a basin



3.SELECTED FINDINGS OF TRANSBOUNDARY NEXUS ASSESSMENTS – GOVERNANCE, DRIVERS AND LINKAGES

Water, energy and land resources need to be managed jointly. Water, Natural resources are under increasing pressure in the three pilot basins, often from common drivers but with different degrees of significance. The development models in the three basins put different but growing pressure on the basins' resources. The economic importance and characteristics of agriculture varies across the basins, ranging from a major source of pressure on the basins' resources in the Syr Darya River Basin in Central Asia, to a potentially important factor with climate change, as in the Sava Basin in South-Eastern Europe. Energy development will also put increasing pressure on basin resources. In all three basins there is active hydropower development that may affect other water uses or the environment, but the scale is very different. Energy generation potential is generally asymmetric, thus providing opportunities for energy trading and for improving energy security. Additional pressures are derived from settlements, industrial development and, to a lesser extent, tourism. Climate change will generate additional pressures in the three basins, and climate change policies will affect the relative pressure on different resources. Furthermore, greenhouse gas emission mitigation commitments constrain the energy sector development, and may, as in the Sava Basin, provide a driver to extending renewable energy sources.

There are multiple nexus linkages between water, energy and land resources, but they are specific to each basin. The dialogue with stakeholders on inter-sectoral issues was very broad and touched upon many aspects of the nexus in all basins. Generally, the strongest linkages were found between water and energy resources. Land and water linkages have been highlighted in the three basins, but they each present specific features. Energy and land linkages are particularly strong in the Alazani/Ganykh Basin in the South Caucasus where because of issues related to accessing modern energy sources (gas, electricity), deforestation is caused by the use of biomass in rural areas. The resulting aggravated erosion leads to sedimentation which in turn negatively affects infrastructure.

The governance context has a large influence on the cooperative and integrated management of basin resources. There are opportunities for developing the different ways in which sectors participate and interact in decision-making. The need for transboundary management of resources in all three of the basins is fairly recent, having emerged after the break-up of both the Soviet Union and Yugoslavia. At the same time, basin level cooperation and governance varies significantly across the three basins. In the Syr Darya, shortcomings in governance have led to regression in cooperation over water allocation. In the Sava there is a good governance basis for the integrated management of basin resources. Moreover, there is mutual support between governance at the basin level (the International Sava River Basin Commission; the Danube Commissions) and at the supra-basin level (the European Union, the Danube macro-region), and the European Union accession and approximation process provides a common driver and a factor in the integration of policies. In the Alazani/Ganykh Basin, water governance is under development on a bilateral basis. Additional findings from the pilot basins suggest that governance of energy resources is heavily influenced by regional level development of the electricity markets, and that the current governance arrangements do not always support policy coherence.

The basin-specific briefs or the reports from the nexus assessments can be referred to for more information.[2]

2 These documents are available from: https://www.unece.org/env/water/publications/pub.html

4. SOLUTIONS TO ADDRESS TRANSBOUNDARY NEXUS CHALLENGES

The nexus assessment in the three basins identified a broad range of possible solutions. Some solutions are specific to each basin, but there are also some common solutions. The nexus assessment classifies those solutions under five categories: institutions, information, instruments, infrastructure, and international cooperation.

Institutional solutions. While the governance architecture is different in the three basins, they would all benefit from institutional development. It is recommended to build on existing structure and mechanisms to facilitate policy integration, and extend and/or adjust them as appropriate. Many institutional solutions are basin specific, influenced by the current governance set-up. However, effective mechanisms for participation of different interests and for consultation across sectors in general serve to address the nexus.

Information solutions. The implementation of a nexus approach to managing the basins' resources requires better information spanning multiple resources and sectors to improve intersectoral coordination at national level as well as the development of a shared knowledge base for transboundary cooperation. Significant efforts are needed to ensure that the right information is available for policymaking and planning across sectors.

Instruments. There is scope for a more systematic use of policy and economic instruments to address the trade-offs and exploit the synergies offered by a nexus approach. There needs to be proper motivation for both the rational use of resources (water and energy in particular) and environmental protection, with established incentives and an enabling environment. Such changes can be encouraged by economic instruments, especially water and energy pricing, which can also both realize funds and increase the appeal of investment in efficiency. Beyond individual policy instruments such as a Strategic Environmental Assessment (SEA), the nexus assessments call for a coherent mix of instruments.

Infrastructure solutions. The sustainable management of basin resources will require greater investment in infrastructure, both natural and man-made. Some of the infrastructure solutions identified in the nexus assessments are not just about investing more, but about investing better. Investing better is not just about efficiency, but also about creating designs that are environmentally friendly and introducing ways of operating existing infrastructure that better provides for different uses (for example, flow regulation that releases environmental flow and adjusts to flood response). Infrastructure solutions need to be complemented with other types of solutions.

International coordination and cooperation. While many beneficial actions can be taken at the national level, international coordination and cooperation at basin and regional level offers additional opportunities to "manage the nexus". Improving basin-wide monitoring, knowledge-sharing and data verification and exchange are often the first solutions identified. But higher ambition requires, for example, stronger planning processes. Promoting and improving energy trade is highly beneficial, transforming an asymmetry of different energy mixes into a mutually beneficial complementarity. Where institutional arrangements for cooperation cover multiple sectors, there is more potential for realising opportunities across sectors.

5. BENEFITS OF ADOPTING A TRANSBOUNDARY NEXUS APROACH

By adopting a nexus approach for the management of transboundary basin's resources, riparian countries can realise many potential benefits. Many benefits can be generated by an improvement in the management of basin resources, not only through economic activities but also through those which accrue social and environmental benefits. Additional benefit can be generated by the increase in trust between the riparian countries, which can facilitate the realization of regional economic cooperation as well as positive geo-political changes. The relative importance of each type of benefit is basin-specific. The findings suggest that where cooperation is limited, riparian countries are more exposed to external shocks. The economic cost of failing to coordinate can also be significant. For example, when multiple use of an infrastructure cannot be agreed, costly investments need to be made in response, so as to duplicate or extend infrastructure. In other cases, obstacles to trade can lead to production that is not well supported by the resource base and capacities. Adopting a nexus approach to managing the resources of a transboundary basin can improve resource security by building on the complementarity of resource bases. It can also develop resource intensive economic activities where the conditions are most favourable which, through means of trade, can also benefit the other countries sharing the basin.

The benefits of adopting a nexus approach to the management of basin resources are ultimately enjoyed by individual countries. In some cases, the benefits are only enjoyed by the country that takes action. In many cases, however, the actions of one country generate benefits in other countries (the 'transboundary dimension'). When potential individual solutions are evaluated ex-ante, it may be possible to identify, and to some extent assess, which benefits may not justify the cost for one of the parties. However, if a number of potential individual solutions are evaluated ex-ante by each party as a package (that is, considering the aggregated benefits of the package as a whole) it is likely that a greater number of individual potential measures would appear beneficial. The nexus