



**Convention on the Protection and Use of Transboundary  
Watercourses and International Lakes**

**Second Joint meeting of the Working Groups on Monitoring and Assessment and on Integrated Water Resources Management**

**Working Group on Integrated Water Resources Management  
Thirteenth meeting\***

**Working Group on Monitoring and Assessment  
Fourteenth meeting\***

Geneva, 28-30 May 2018

Item 10 of the provisional agenda

**The Water-Food-Energy-Ecosystems Nexus in transboundary basins**

**SYNTHESIS DOCUMENT ON ASSESSING THE WATER-FOOD-  
ENERGY-ECOSYSTEMS NEXUS: SUMMARY**

**Submitted by the secretariat in cooperation with Finland as the lead country for programme area 3 “Water-food-energy-ecosystems nexus in transboundary basins”**

**Background and introduction**

1. The sixth session of the Meeting of the Parties decided to include in the Water Convention’s work programme for 2013–2015 an assessment of the water-food-energy-ecosystems nexus in a representative set of transboundary basins. After development of a methodology for participatory assessment of the nexus in transboundary basins, the methodology was piloted and applied in the first basin assessments. In practice this involved an analysis and an intersectoral transboundary dialogue about trade-offs and synergies in managing water and related resources.
2. The seventh session of the Meeting of the Parties decided in 2015 that the methodology developed in 2013–2015 would be promoted for application by partners in other basins worldwide, including by preparing a synthesis brochure. The Parties also decided that the conclusions and recommendations from the basin assessments would be further disseminated.
3. From 2016 to 2018, further basin assessments, including assessment of an aquifer, have been worked on, providing further insights into assessing intersectoral issues. In parallel, the methodology has been refined further, especially regarding the governance aspects and use of the participatory methods. Furthermore, a global stock-taking workshop was organized together with partners in December 2016. These developments made it timely to synthesize and take stock of the work done, even if activities were on-going.
4. The Synthesis Document (ECE/MP.WAT/WG1/2018/INF.7- ECE/MP.WAT/WG2/2018/INF.7) contains lessons focusing on the methodology, the assessment process and taking the process forward. These have been drawn from the collective experiences of Parties to the Water Convention and other States, joint bodies, as well as other stakeholders who participated in the nexus assessments. Consolidating the experience responds also to

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\* Second joint meeting of the two working groups.

the demand for sharing experience on various fora and processes of sectoral or cross-cutting natures at the regional and global levels.

5. The Summary in the present document presents the key conclusions from the Synthesis Document for review by the Working Groups. The Working Groups are invited:
  - a. To discuss application of the nexus assessment experience, its further use in developing work under the Water Convention, implementation of solutions as well as promotion and dissemination.
  - b. To review the Summary and the Synthesis Document, provide any additional comments and entrust the secretariat in cooperation with the lead country to edit into two publications the key content of the Summary and the Synthesis Document, taking into account the comments made and elaborating as necessary;
  - c. To entrust the secretariat to submit a publication synthesizing the methodology and experience in assessing the water-food-energy-ecosystems nexus in transboundary basins, in English for the Meeting of the Parties at its eighth session (Astana, 10-12 October 2018), print and translate it into Arabic, French, Russian and Spanish;
  - d. To entrust the secretariat to submit, publish and print a publication, the Synthesis of solutions to the water-food-energy-ecosystems nexus, in Arabic, English, French, Russian, Spanish in 2019-2020.

## I. Summary

6. The present document summarizes the experience of the activities on the water-food-energy-ecosystems nexus under the Water Convention, carried out from 2013 to 2018. The Synthesis Document (ECE/MP.WAT/WG1/2018/INF.7- ECE/MP.WAT/WG2/2018/INF.7) describes these in greater detail. It has three objectives: i) to complete the documentation of the use of the methodology for assessment of the nexus in transboundary basins, developed under the Water Convention, which so far has been applied in six basin assessments;<sup>1</sup> ii) to promote the application of the methodology; and iii) to foster follow-up action to the Nexus Assessments. Thus, the Synthesis Document brings together the key aspects of the methodology and provides a summary of the past developments.

### A. The value of the nexus

7. **Improving coherence between sectoral policies, but also with environment and climate policies, and ensuring integrated planning are major challenges for many countries.** Recognition of the need to break silos in resource management and to appreciate the interlinkages between various sectors and resources has drawn attention to the potential of nexus approaches. Although integrated resource management approaches are not new, and many have become well established (e.g. the Integrated Water Resources Management), a nexus approach tries to take integration a step further, without attachment to a specific scale. The Water-Energy-Food Nexus Approach, for instance, focuses on greater policy coherence as well as higher resource use efficiency through reducing trade-offs and increasing synergies. Governance plays a key role.
8. **The international community explicitly call for a nexus approach to the implementation of the Sustainable Development Goals (SDGs).** The SDGs formulate several targets on water (SDG 6), food security (SDG 2), sustainable energy (SDG 7) and environmental protection (SDG 15). When analysing them, the interlinkages between these targets become obvious. The aim of achieving all the SDGs simultaneously requires reconciling different interests and taking into account the interdependencies between the SDG targets when devising implementation policies and measures. Strategizing and planning achievement of the 2030 Agenda for Sustainable Development, including in key resource management sectors such as energy and agriculture, hence call for the application of a nexus approach. The challenge is how more sustainable and collaborative development of resources in a specific basin can be strengthened through practical actions.
9. **National efforts to optimize resource use as well as to increase efficiency, policy coherence and co-management benefit from international frameworks with different foci, notably for awareness, experience and good practices.** The nexus approach is increasingly being recognized and applied in the different sectors, from their perspectives, with different scoping and focus. Water has had a prominent role in the nexus concept

<sup>1</sup> The seventh basin where the nexus assessment experience is applied, the Drin, does not follow the full participatory approach outlined in the methodology.

since its rise and thus the nexus is well embedded in the water community. In the energy community, the International Renewable Energy Agency (IRENA) has devoted attention to the nexus from an energy perspective, and the International Energy Agency's World Energy Outlook 2016 describes the water-energy nexus. The necessity of a transition to sustainable energy calls for consideration of cross-cutting issues. While agriculture is perhaps more divided than the energy community, the nexus is also embedded in the agricultural sector. This is demonstrated, for instance, by the work of the UN Food and Agricultural Organisation (FAO), and by the fact that the nexus was one of the topics the Global Forum for Food and Agriculture in Berlin in 2015. Environmental and ecosystems aspects have received limited attention in the nexus debates, although adopting a nexus approach benefits environment protection and, for example, the International Union of Conservation of Nature (IUCN) is actively working on nexus issues.

## **B. The scope of work on the nexus under the Convention:**

10. **Under the Water Convention, the interlinked water, food and land, energy resources and ecosystem services in transboundary basins are in focus, adding a degree of complexity.** Behind the decision of the Parties in 2012 to have the nexus issues looked into was the awareness, underpinned by regional assessment work on transboundary waters, about low policy coherence and a need to reconcile competing water uses. Among the resource security challenges that call for coordinated solutions across sectors and borders are flooding, water scarcity, pollution, sedimentation, unsustainable land use and agricultural practices, impacts of infrastructure, land degradation, inefficient water and/or energy use and their impacts, effects of infrastructure, and degradation of ecosystems and their services. In many cases, the drivers behind pressures and impacts on water resources are outside the sphere of water management, in economic strategies and sectoral policies. Essentially what is at stake is balancing, on the one hand, economic development from shared resources in different countries and, on the other hand, environmental protection.
11. **The objective of the work on the intersectoral links, trade-offs and synergies in the water-food-energy-ecosystems nexus carried out under the Water Convention is to foster transboundary cooperation.** Assisting countries in optimizing resource use and building capacity to assess and address intersectoral impacts are also among the objectives. The work on the nexus includes development and piloting of a methodology for participatory assessment of the nexus in transboundary basins; a series of demand-driven assessments in close cooperation with the Governments of the riparian countries; dissemination of findings and promoting discussion about possible responses; experience sharing and advocacy for cooperation to address intersectoral issues in transboundary basins.
12. **While each Nexus Assessment has been prepared in close cooperation with the national authorities of the riparian countries, the activities on the nexus overall have been overseen by the relevant Governments involved.** Guidance and oversight has been provided by the Task Force on the Water-Food-Energy-Ecosystems Nexus, established by the Meeting of the Parties in 2012. Since then, it has met annually and has gradually experienced an increasing participation of non-water actors. The Task Force provides a forum for the Governments involved in the assessments to shape them, to review them and to discuss the findings. It has also been used by partner organizations, experts, development partners and civil society groups to exchange experience in tackling nexus issues.
15. **The diversity of the transboundary basins covered, e.g. in terms of economic development and abundance or scarcity of resources, indicates that the nexus approach is of wide interest for sustainable development, strengthening or revisiting cooperation and optimizing resource use.** The basins where a nexus assessment has been developed, based upon expressions of interest from riparian countries or joint bodies for cooperation, are the following (an overview is given in the Annex):
  - (a) Alazani/Ganykh (shared by Azerbaijan, Georgia);
  - (b) Sava (shared by Bosnia and Herzegovina, Croatia, Montenegro, Serbia, Slovenia);
  - (c) Syr Darya (shared by Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan);

- (d) Isonzo/Soča (shared by Italy, Slovenia – not completed);
- (e) Drina (shared by Bosnia and Herzegovina, Montenegro, Serbia);
- (f) North-West Sahara Aquifer System (shared by Algeria, Libya, Tunisia – on-going);
- (g) Drin (shared by Albania, the former Yugoslav Republic of Macedonia, Greece, Kosovo<sup>2</sup>, Montenegro – on-going as a desk study).

### C. The Transboundary Basin Nexus Assessment methodology progressively developed under the Water Convention

16. **The Transboundary Basin Nexus Assessment methodology enables stakeholders to identify jointly positive and negative linkages, benefits and trade-offs between sectors with the possibility to account for changes in the future.** Linkages are identified in a qualitative way and in a participatory manner, working with officials and experts from the concerned sectors and countries to jointly identify and map the linkages. This sets the basis for then quantifying the linkages which are of priority and for which data and applicable analytical tools are available. It is carried out in six consecutive steps, which provide for progression from the overall socio-economic context of a basin and its surrounding region to zooming in on the specific intersectoral issues at play. The process leads to jointly determining a broad range of possible solutions.
17. **The development of the methodology was iterative over the past years** (presented schematically in figure 1), involving a great deal of learning by doing. The first version of the methodology was developed from 2013-2015 with key expert input from the Royal Institute of Technology (KTH, Stockholm) and applied in different transboundary basins. Between 2016 and 2018, the methodology was refined further with insights from additional assessments, and with increasingly multi-disciplinary input. Each basin case implied some degree of adaptation and learning. Including the basins assessment processes, close to 300 officials, other key stakeholders and experts have contributed to the nexus assessment undertaking which shaped the methodology.

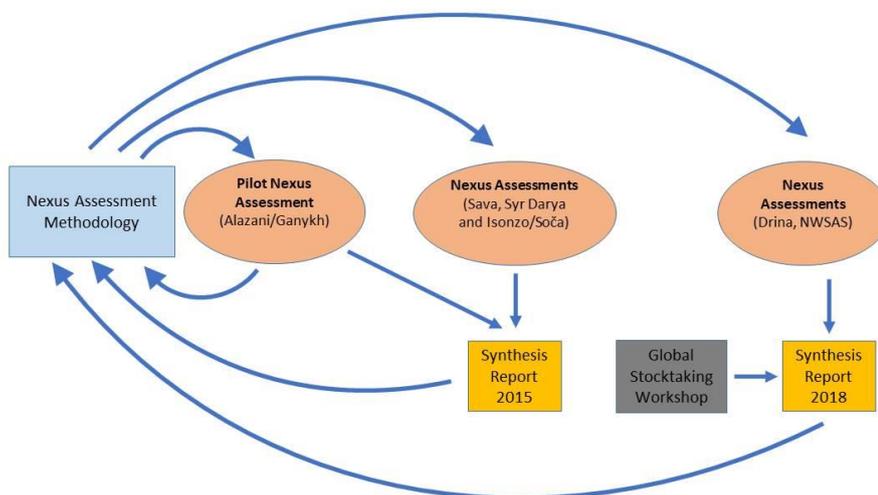


Figure 1: Phases of developing the Transboundary Basin Nexus Assessment methodology.

18. **The methodology was developed as a two-track approach, both of which are fully complementary.** The first track is a technical analysis of resource availability and quality, as well as mechanisms that link their use. The second track is the governance track, which aims to understand how rules and actors determine the management of environmental resources. It is this second track that has methodologically evolved the most from

<sup>2</sup> UN administered territory under the Security Council Resolution 1244 (1999).

2016 to 2018: **With the Revised Governance Methodology, in-depth governance assessments are now better supported**, including consideration of the legal and regulatory basis, organizations and actors, and policies.

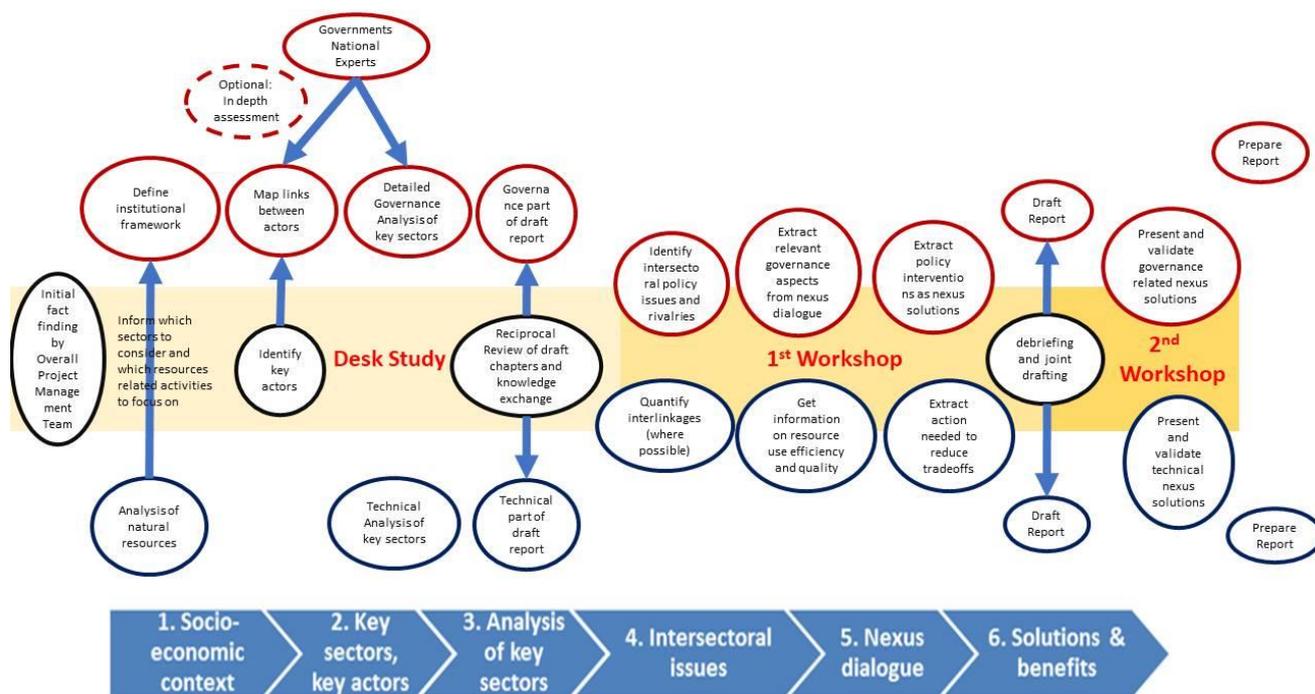


Figure 2: The interaction of the governance and technical “tracks” of works throughout an assessment of the nexus applying the methodology developed under the Water Convention.

19. **Looking at the broad range of benefits that can be generated by cooperating on the implementation of nexus solutions will help to realize the value of cooperation between sectors at the transboundary basins level.** Identification, assessment and communication of the benefits of transboundary cooperation applying the Policy Guidance Note on the Benefits of Transboundary Water Cooperation (2015) developed under the Water Convention proved to be a valuable complement to the Nexus Assessments. This approach, pointing out the benefits of implementing nexus solutions, provides additional incentives to put into action the assessments’ recommendations. A nexus assessment provides space for revealing previously overlooked benefits of possible coordinated actions in the basin, both from national and basin perspectives. It can result in defining common ground for broader cooperation: while each riparian will not gain on all aspects, the sum of the benefits - with multiple sectors and counting both economic benefits and other benefits - is greater than it would otherwise be from just allocating water.
20. **In addition to assessing the nexus in highly diverse river basins, the methodology was also applied to an aquifer, demonstrating flexibility.** A flexible approach to applying the methodology is necessary and meaningful, given the unique circumstances of each transboundary resource. The flexibility allowed for different partnerships to be forged (including with GEF projects) and additional scientific inputs to be integrated (e.g. the work by JRC added to the breadth of the analysis in the Sava River Basin). The methodology has demonstrated its potential to adjust the participatory process to different resource availabilities, evident, for example, in the different number of workshops organized for each transboundary dialogue.
21. **The methodology emphasises participatory methods and consultation of authorities and key stakeholders at crucial moments of the assessment process.** Examples are the stakeholder mapping and analysis to gather an overview of relevant participants, factual questionnaires to gather preliminary information, opinion-based questionnaires to reveal different views, brainstorming exercises to identify nexus issues and a nexus dialogue to develop a shared understanding. In fact, the activity of participation was among the decisive factors for the relevance of the conclusions and for the uptake of the findings.
22. **The methodology can be further improved with more application and through complementary work with partners.** The above-described flexibility provides for refinement of the assessment methodology and for use

of different tools for the analytical work. Partner organizations can therefore add their own tools, processes and networks. The collaboration with the Global Water Partnership (GWP) can be mentioned as an example. In the North West Sahara Aquifer System, GWP contributes to stakeholder mapping practices and, in the Western Balkans, to regional dissemination and linking to national-level assessment of nexus issues.

23. **The Synthesis Document provides practical guidance for assessing the nexus issues.** This is to promote the application of the methodology and the experience, so that others might benefit from it and encourage wider application. Examples and links to salient literature necessary to carry out a Nexus Assessment with the Transboundary Basin Nexus Assessment Methodology are given throughout the Document.

#### **D. Lessons learned about nexus assessments: Considerations and recommendations**

24. **The design of the process is crucial.** Official engagement of countries provides for ownership. When a Nexus Assessment is carried out, broad participation will increase the uptake of the results and solutions in the different sectors. While it was important to involve the key sectors, resource users and interests, the process had to be kept manageable and highly interactive, setting limits to expanding participation, notably in the workshops. Important views of some sectors and countries risk not being fully reflected if their participation in the assessment is lacking or limited.
25. **Communication is an important aspect throughout the assessments.** Before the process, communication motivates involvement. During the process, it forms valuable networks and reinforces mutual understandings of the different interests, and afterwards it is important to communicate the outcomes to add to the impact of other processes. Including the benefits perspective into this communication advances the Nexus Assessments as a whole. It must also be considered that scoping-level Nexus Assessments only lay out possible directions for solutions, and that the dialogues must be continued to move towards implementation of nexus solutions. Assessing the feasibility (technical, financial) and acceptability of priority measures could be logical next steps in that direction. Further guidance on implementation and application of the nexus approach has been called for by some countries.
26. **The right balance has to be struck between giving an overview of the salient intersectoral issues and detailing the priority issues, as well as between the complexity of resource dynamics and the clarity of the messages.** The nexus assessment teams often struggled with navigating between comprehensiveness (i.e. covering all the relevant interlinkages) and at the same time focusing adequately on the priority issues. Many issues would have merited more study, and more investigation could have been channelled into the assessments, ideally alongside more local input and detailing. At the same time, the nexus dialogue benefitted from a certain simplification or development of clear storylines in the face of very complex inter-resource dynamics. Technical and academic initiatives could extend the impact by further study, especially about sensitive issues, without a heavy political charge.
27. **Carrying out Nexus Assessments has synergies with other processes.** Assessments have, for instance, contributed to trigger or to shape subsequent activities in the regions, e.g. by calling for attention to the trade-offs and cooperation needs related to hydropower development in the Western Balkans, and by contributing information about the identified issues during the development of the European Commission-funded Regional Nexus Dialogue in Central Asia. Nexus work under the Convention in general has led to synergies with other partners and activities, some of which remain within the UNECE, such as the cooperation with the Sustainable Energy Division or using the National Policy Dialogues for discussing the findings in inter-ministerial settings.
28. **The nexus approach adds value to basin-based and water- and ecosystems-focused approaches** by building a better understanding of, for instance, the energy sector and agricultural trade dynamics. Some key elements have been accounting for trade in agricultural products and modelling the regional electricity system response to actions like improved energy efficiency and increase of renewable energy (notably non-hydro) in the Syr Darya River Basin. This could then be translated into implications to the hydrological system. In the Drina River Basin, benefits for the energy system from coordinated operation of hydropower plants were debated. Such initial evidence from beyond water management complements IWRM.
29. **The potential of the nexus perspective to add value to GEF merits further attention.** This is suggested by the insights beyond water management and environmental protection as well as by the interaction of the nexus work under the Water Convention with the Global Environment Facility (GEF) funded International Waters

(GEF: IW) projects (notably on the Kura, Drina and Drin Rivers). The “water-food-energy-ecosystem security nexus” is already part of the GEF-6 strategy for IW, and through GEF: IW Learning Exchange and Resource Network (GEF IW:LEARN 4) the nexus work under the Convention supports training and the provision of programmatic support to the GEF International Waters portfolio of projects. Among possible means to complement GEF projects is the use of multi-resource tools for broader and more comprehensive issue diagnoses. Work in the Drin Basin in cooperation with GWP-Med will explore opportunities for the Nexus assessment contributing to identification of a broader spectrum of root causes of transboundary issues deriving from the energy and agriculture sectors, including from beyond the basin geographically. Extended dialogue with economic sectors about scenarios and, eventually, about synergic action leading to environmental benefits would be beneficial.

30. **There is a need for: fit-for-purpose nexus tools, and an orientation for using and soft-linking them to form effective toolkits. Better availability of data is also needed.** The nexus assessments under the Water Convention have tried to provide a space for multidisciplinary analysis to inform a transboundary dialogue. However, there are a number of other approaches and methodologies with different merits, scales or sectors in focus. It is a starting point to get the conceptual picture right as a shared understanding. This report lists some tools for quantitative nexus analysis, with different sectors covered and with different data and resource requirements.
31. **Appropriate institutional frameworks are key not only for carrying out the assessment but also for fostering follow-up actions.** The Water Convention’s framework, with convening power from the water entry point, was reinforced by connecting with regional and sectoral frameworks to improve the dialogue and broaden the outreach. The cooperation with the Group of Experts on Renewable Energy helped to strengthen energy stakeholders’ participation in the Drina River Basin assessment. There is a need for processes and frameworks where analytical tools can be used to inform policy development and policy-making. Regarding the solutions, the potential of basin organizations for intersectoral action was taken into account, recognizing that existing governance structures need to be built upon. The integrated and intersectoral nature of the packages of solutions complicates championing responses and requires partnerships beyond water management. For instance, exploiting the synergy between eco-tourism, sustainable agriculture promoting local products and the development of renewable energy, recommended in the Drina Basin, would require a concerted effort from a range of actors.
32. **Advocacy and promoting uptake of the assessments’ conclusions requires time and effort.** Effective communication about the nexus issues requires tailoring the messages to the audience, with consideration of sectoral and other interests. Therefore, adequate devoted resources for this are necessary and would allow the impact of the nexus work to be amplified. Government officials and experts could play a more active role in disseminating the experience.

#### **E. Moving on from assessment: implementing the nexus solutions**

33. **Five categories have been defined to outline the main types of solutions.** The five I’s of nexus solutions are i) Institutions (essentially governance at large), ii) Information, iii) Instruments, iv) Infrastructure (and investments) and v) International coordination and cooperation. Only some examples of each category are given below. Governance is important for creating a more enabling environment for intersectoral action, but there are also mutually reinforcing synergies between other categories. Institutional solutions include, for example, clarifying and reviewing mandates, and identifying opportunities for multi-sectorality in sector-based policy development. The Information category includes analysing policy implementation issues, improvement of extension services (in agriculture) and improving monitoring. Instruments cover both policy instruments (e.g. the Strategic Environment Assessment) and economic instruments (e.g. water and electricity tariff setting). Infrastructure (and investment) solutions are about planning new and modernizing existing infrastructure, considering resource efficiency and accounting for different user needs in optimizing the use of existing structures. Solutions like trade facilitation and development of markets or joint guidelines are examples of the International coordination and cooperation category, which is cross-cutting in nature.
34. **Among the diverse solutions from the Nexus Assessments, there are some commonalities amongst other, highly specific solutions.** Because of the context-specificity, not all solutions are blueprints for any basin, but

they may serve as a source of inspiration. Challenges related to the impacts of hydropower, which are common to several basins, serve as an example of this diversity of solutions, depending on the stage of hydropower development in the basin and on the specific aspect considered: Firstly, in the present time, , the use of existing reservoir capacity could be adjusted to better support multiple uses by a better coordination of flow regulation. Secondly, in future investment, the distribution of benefits could be improved or impacts reduced by developing the regional electricity grid connections, improving energy efficiency, coordinating with other renewable energy investments and by applying good international practices and instruments. Solutions have been formulated for each individual basin case with its particular characteristics, but there are some general lessons that can be drawn from the past years for strengthening transboundary and cross-sectoral resources management.

35. **Bottlenecks for implementing the nexus solutions also need to be considered.** The transition from an external process (i.e. an assessment project with international facilitation) to an internal, country-led process is challenging. National and sectoral interests are difficult to overcome. Capacities of national administration may be lacking and matters of coordination, or matters that lie in the margins of institutional mandates, are commonly not given priority. More integrated and aggregate level target-setting can help. A lack of adequate data and information for proper analysis to inform policy and decision-making may complicate the processes of demonstrating value and motivating change. Ensuring equally high commitment from all countries and sectors is difficult. Follow-up is demanding and requires sufficient financial resources. Changes in national administration through changes of ministries and turnover of key people can create both possibilities and difficulties.
36. **A progressive application of a nexus approach or partial solutions can pave the way for more ambitious and comprehensive solutions.** Such gradual progress may be necessary, as there are many limitations to the practical application of a nexus approach, requiring new ways of thinking and working, new partnerships and difference incentive structures. The nexus action can start with national efforts, for example, to improve efficiency in the use of water and electricity on shared resources, and gradually build more favourable conditions for actions that require regional or basin-level coordination (as outlined in the Syr Darya Basin). Participation of different interests and the use of existing structures can enhance multi-sectorality: The Drina assessment drew attention to the potential of the International Sava River Basin Commission, firstly, for convening discussions about basin-level impacts of sectoral plans and, secondly, for assessing infrastructure and investment in terms of nexus-related performance. Countries could consider exploring such possibilities on a trial basis to learn what is worth normalising and formalising. More far-reaching applications of the nexus approach can aspire for a full-fledged sustainability assessment of sectoral policies, but effectively implementing the Strategic Environmental Assessment (SEA), with an environmental focus, is already a step in the right direction.

Annex: Basin Assessment summary<sup>3</sup>

	Alazani/Ganykh (2013 – 2015)	Sava (2014 – 2015)	Syr Darya (2014 – 2015)	Isonzo/Soča (2015 – 2016)	Drina (2016 – 2017)	NWSAS
<b>Basin Size</b>	11,700 [km <sup>2</sup> ]	97,700 [km <sup>2</sup> ]	410,000 [km <sup>2</sup> ]	3,400 [km <sup>2</sup> ]	20,320 [km <sup>2</sup> ]	1,000,000 [km <sup>2</sup> ]
<b>River Length</b>	391 [km]	945 [km]	3,019 [km]	140 [km]	346 [km]	---
<b>Countries Sharing</b>	Georgia, Azerbaijan	Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Serbia, (Albania)	Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan	Italy, Slovenia	Bosnia and Herzegovina, Montenegro, Serbia, (Albania)	Tunisia, Algeria, Libya
<b>Climate</b>	Warm temperate climate	Warm temperate climate	Arid/semi-arid climate	Mediterranean influenced, partly humid climate	Warm temperate climate	Arid/hyper-arid climate
<b>Main Nexus Storyline</b>	<ul style="list-style-type: none"> <li>- Lack of access to affordable energy aggravates deforestation, which increases the exposure to flash floods, erosion and landslides.</li> <li>- A poor state and inadequate maintenance of irrigation systems aggravates the impact of flash floods on the loss of fertile soil and damage to settlements.</li> </ul>	<ul style="list-style-type: none"> <li>- Energy production in the countries depends on water availability in the Sava Basin.</li> <li>- Targets for renewables and climate mitigation push countries to develop more hydropower.</li> <li>- There are environmental concerns about dam construction in environmentally sensitive areas.</li> </ul>	<ul style="list-style-type: none"> <li>- Energy and food insecurity are drivers for conflicting seasonal water uses and make countries prioritize self-sufficiency over cooperation.</li> <li>- This aggravates the current situation of sub-optimal use of resources.</li> </ul>	<ul style="list-style-type: none"> <li>- Diverse ecosystem services need protection.</li> <li>- Hydropeaking affects biodiversity and water availability for irrigation. Irrigation is reduced with water efficient technology.</li> <li>- Groundwater abstraction for irrigation needs energy and may cause seawater intrusion.</li> </ul>	<ul style="list-style-type: none"> <li>- Water flow regulation for power generation is sub-optimal and has impacts on flood and drought risks. Application of environmental flows.</li> <li>- Rural development is hampered by low agricultural productivity and a lack of infrastructure.</li> <li>- Water quality is declining because pressures go unchecked (solid waste, wastewaters).</li> </ul>	<ul style="list-style-type: none"> <li>- Heavy and unsustainable exploitation of the aquifer.</li> <li>- Heavy use of irrigation with high losses.</li> <li>- Water and soil salinization from irrigation and inadequate management of drainage.</li> <li>- Water management (pumping from higher depth, treatment etc.) requires sustainable energy solutions.</li> </ul>
<b>Main</b>	- Water-Energy	- Water-Energy	- Water-Land-	- Water-Energy-Ecosystems	- Water-Energy	- Water-Energy

<sup>3</sup> The published reports and policy briefs on the assessments of the water-food-energy-ecosystems nexus are available at: <http://www.unecce.org/env/water/publications/pub.html>

<p><b>Nexus Interlinkages</b></p>	<p>(hydropower) - Land-Energy-Water (biomass use, erosion/sedimentation, environmental flow).</p>	<p>(hydropower) - Land-Water (sediment management).</p>	<p>Ecosystems (irrigation, salinization) - Water-Energy (hydropower) - Land-Water-Ecosystems (unsustainable agriculture, insufficient environmental flow)</p>	<p>(river flow continuity, hydropeaking) - Water-Energy-Food (irrigation) - Water-Energy (groundwater pumping, hydropower, cooling of thermal power plants).</p>	<p>(flood risk, cooling, uncoordinated hydropower operation) - Water-Food (irrigation, flood risk) - Water-Food-Ecosystems (water quality degradation from mainly wastewater &amp; waste)</p>	<p>(groundwater pumping, water use for solar power, desalination) - Water-Ecosystems salinization, desertification) Water-Food (irrigation)</p>
<p><b>Some solutions (examples)</b></p>	<p>Facilitate access to modern energy sources and energy trade; minimize impacts from new hydropower development, including through international guidelines; catchment management to control erosion; clarify mandates concerning repair of irrigation systems</p>	<p>Develop hydropower sustainably and integrate other renewable energies; protect natural infrastructure assets such as floodplains and wetlands; developing a consultation process to review the impacts of national and sectoral development strategies.</p>	<p>Promote restoring and vitalizing energy market, develop the currently minimal trade in agricultural products; improve efficiency in energy generation, transmission and use; improve efficiency in water use (especially in agriculture); reforming water and energy pricing</p>	<p>Link renewable energy generation to existing agriculture infrastructure (small hydropower, solar, biomass); improve river continuity and increase drought resilience; better monitor groundwater use; systematic use of Environmental Impact Assessments, SEA and minimum environmental flows</p>	<p>Coordinate operation of hydropower plants (for flood control, for energy system benefits, environmental flow) and take a basin-wide approach to development of new capacities; exploiting synergy between eco-tourism, sustainable agriculture (local products) and renewable energy</p>	<p>Modernize and improve sustainability of agricultural infrastructure and production, and increase the value and viability of agriculture; improve the reliability of the energy supply and optimize sources; Rationalizing water use</p>