Water-Food-Energy-Ecosystems Nexus
Reconciling different resource uses in transboundary basins

Why is the Nexus approach needed?
Population growth, economic development, increased energy and food needs all exert increasing pressures on natural resources. Common development needs have to be met in a sustainable manner, without compromising the functioning of ecosystems. However, energy, land management and water resources planning commonly take place in isolation, without adequate consideration of what the planned developments require or assume about other sectors, and what implications – positive or negative – they have. Shortcomings in intersectoral coordination are a major challenge both on the national and regional levels, in developing as well as in developed countries. In a transboundary setting, the trade-offs and externalities may cause friction between the riparian countries and their interests.

The “nexus approach” to managing interlinked resources aims to enhance water, energy and food security by increasing efficiency, reducing trade-offs, building synergies and improving governance across sectors, while protecting the integrity of ecosystems.

At the national level, coordination between the water, energy, food and environmental sectors is fraught with difficulties, but the complexity increases substantially in transboundary basins, where the impacts spread from one country to another. Across the UNECE region and globally, there is great spatial variation both in resource availability (or scarcity) and in the means in place to develop and sustainably manage those resources.

In order to address this challenge, at its sixth session (Rome, 28–30 November 2012), the Meeting of the Parties to the UNECE Water Convention decided that an assessment of the water-food-energy-ecosystems nexus of a representative set of transboundary basins would be carried out as a part of the programme of work under the Convention for 2013–2015. These basin assessments aim to foster transboundary cooperation by identifying intersectoral synergies that could be further utilized, and by determining policy measures that could alleviate tensions related to the multiple needs for common resources. By promoting greater policy coherence and resource efficiency, the assessments also support the transition to a green economy.
A water-energy-food-ecosystems nexus assessment methodology has been developed under the UNECE Water Convention in cooperation with the Royal Institute of Technology (KTH) in Stockholm. The methodology is applicable to diverse transboundary basins and aquifers.

The nexus assessment describes the characteristics of the sectors/resources, the current status of the interdependencies across the sectors of water, energy, food and ecosystems and their governance. Other overarching themes, such as climate change and socioeconomic drivers are also considered. The assessment process consists of the following steps:

1. Identification of basin conditions and socioeconomic context
2. Identification of key sectors and stakeholders to be included in the assessment
3. Analysis of the key sectors
4. Identification of intersectoral issues, reviews and comments by the stakeholders.
5. Nexus dialogue and future developments
6. Identification of opportunities for improvement (across the sectors and countries)

In cooperation with the concerned sectors and relevant stakeholders through a participatory process, the nexus assessment aims to identify:

- **Intersectoral challenges** that call for integrated planning and management and **synergies** that could be further explored and utilized.

- **Policy measures** and actions that could reduce trade-offs between sectors, increase resource efficiency and enhance sustainability.

- **Obstacles to and opportunities for additional benefits** and their equitable sharing that might result from stronger integration across the water, food, energy and environmental sectors

- **Practical solutions** for improving water, food and energy security and ecosystems integrity, and for reconciling the needs of the different sectors.

The process also looks to generate relevant information to support decision-making at different levels. It has been designed to support ownership by the authorities and build their capacity for intersectoral planning. It fosters, meaningful participation by various stakeholders, mutual learning and the exchange of experience between basins.
Nexus Assessments
In the UNECE region

Three assessments have been completed under the 2013-2015 programme of work on a select number of basins in the UNECE region. Some selected findings are in the table below.

<table>
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<tr>
<th>Basin</th>
<th>Level of Cooperation</th>
<th>Main nexus interlinkages and opportunities</th>
<th>Selected solutions from the assessment</th>
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| Alazani/Ganykh River   | Transboundary        | **Interlinkages:** Lack of energy access aggravates deforestation, which increases the exposure to flash floods, erosion and landslides. A poor maintenance of irrigation systems elevates water use and affects fertile soil.  
**Opportunities:** Facilitate access to modern energy sources and energy trade; minimize impacts from new hydropower development; catchment management to control erosion. | - Establishment and strengthening of basin governance  
- Reviewing policies and introducing economic instruments to improve incentive structure and efficiency of resource use  
- Implementing a policy mix to promote switching from fuelwood to modern fuels. |
| Basin                  | cooperation is being formalised now between the two countries and the technical cooperation is rather regular. |                                                                                                             |                                                                                                         |
| Sava River Basin       | Transboundary        | **Interlinkages:** Energy production in the riparian countries heavily depends on water availability in the Sava basin. Targets for renewable energies and climate mitigation push the countries to develop more hydropower but there are environmental concerns for dam construction in environmentally sensitive areas.  
**Opportunities:** Expand hydropower sustainably and integrate other renewable energies. Improve coordination with energy and agriculture sectors to reinforce the scope of river basin management planning. | - Strengthening the participation of energy and agricultural sectors at the transboundary level  
- developing hydropower sustainably with application of guidelines and environmental regulations, promoting multi-functionality  
- Improving national-level inter-sectoral coordination and the development of a shared transboundary knowledge base. |
| Basin                  | cooperation is advanced, covering multiple sectors and the International Sava River Basin offering a platform for cooperation. |                                                                                                             |                                                                                                         |
| Syr Darya River Basin  | Transboundary        | **Interlinkages:** Energy and food insecurity are drivers for conflicting seasonal water uses and make the countries prioritise self sufficiency over cooperation. This aggravates the current situation of sub-optimal use of resources.  
**Opportunities:** 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 (in agriculture in particular). | - Investing in modernisation of built infrastructure to ensure the preservation and protection of the basin’s resources,  
- Reforming water and energy pricing – both to support a more efficient and rational use of resources, and to generate financial resources to pay for water infrastructure upkeep and modernisation. |
| Basin                  | cooperation is currently compromised by lack of trust |                                                                                                             |                                                                                                         |
Areas of action

Examples of nexus based solutions to resource management

In addition to the three basin assessments that have been completed in the UNECE region, countries and joint bodies have requested the Task Force on the Water-Food-Energy-Ecosystems Nexus to carry out a number of other assessments with a more global reach. Current status of these future assessments is listed below:

**Isonzo/Soča River Basin:** Italy and Slovenia have announced their intent to cooperate on the assessment at the XIII Alpine Conference in November 2014. The assessment workshop for the downstream part of the basin was held in May 2015 in Gorizia which has triggered some analytical work.

**North-West Sahara Aquifer System (NWSAS):** The aquifer countries — Algeria, Libya and Tunisia — expressed their interest in the nexus approach at the Steering committee meeting of the Consultation Mechanism on the NWSAS in Algiers in November 2013. Financial support has been requested from SIDA by the Global Water Partnership Mediterranean, and the project is proposed in cooperation with the Sahara and Sahel Observatory (OSS).

**Niger River Basin:** The Niger Basin Authority (NBA) expressed interest in a nexus assessment in the basin to support NBA’s actual strategic and integrated development plans. UNECE’s partners including Wetlands International and FAO, in close coordination with the German Technical Cooperation Agency (GIZ), are exploring possibilities to assist.

For more information:
http://www.unece.org/env/water/nexus.html