1. **Policy solutions:**

SEA extended for interventions that affect water

Modifications to existing policies, new policies

Instruments and procedures

Development funds

**2. Land use and management**

Changing crops etc.

Reforestation

Land use planning

**3. Cooperation agreements**

Institution set up

Trade i.e. oil for water

**4. Technology, operation and infrastructure**

Regulation of river flow

Multi-functional dams

Hydro enabling renewable energy

Investments

**5. Coordination and communication**

Common databases etc

Training, capacity building

Awareness raising, education

**6. Economic instruments**

Market (trading, pricing (if private), water allocation to high value uses)

Non market (abstraction and pollution charges, Payment for Ecosystem Services (PES), water pricing (if state regulated), certificates/eco-labelling, insurance schemes)

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| **#** | **Name and Scope** | **Description** | **Intersectoral value** | **Transboundary value** | | **Source** |
|  | **Type 1** |  |  |  | |  |
| 1 | Catalogue of criteria for hydropower projects  WAT, ECO, ENE, AGR | In Austria, hydropower is an important source of energy, and a further development of the sector is planned. However, there are concerns about the environmental impacts of hydropower plants. To help the government weigh diverse and controversial interests, a catalogue of criteria of sustainability of hydropower projects was developed that includes the criteria concerning energy management, environment, and other questions such as sediment transfer, flood protection, water quality, and others. | The catalogue supports decision making by taking into account the most relevant sectors involved into hydropower production. The catalogue can also be used by those suggesting hydropower projects as a ‘checklist’ of the criteria that should be met for the project to be approved. | In the case of Austria, the catalogue is developed for one country only, but it potentially can be developed for transboundary hydropower projects as well. On the national level, such a tool could support development of sustainable hydropower which will positively affect all countries given the transboundary nature of the rivers. On the transboundary level, such a document could contain jointly elaborated criteria of sustainable hydropower which would ensure their common understanding. | | Fenz R., Koller-Kreimel V. Hydo Power Sustainability Criteria Catalogue  Available at: http://www.gfse.at/fileadmin/files/hydropower/austrian\_ministry\_Fenz-16-05-12.pdf |
| 2 | Guiding Principles on Sustainable Hydropower Development in the Danube Basin  WAT, ENE, ECO | Hydropower plays an important role in the provision of renewable energy and the stabilisation of the electricity grid. However, like other forms of renewable energy also hydropower cannot be considered as sustainable per se due to different negative environmental impacts inter alia on fish populations, sediment transport or adjacent wetlands, thus requiring a balanced approach.  With involvement of relevant administrations, the hydropower sector and NGOs, the ICPDR elaborated Guiding Principles towards striking the right balance between water management objectives, hydropower development interests and environmental protection targets. The key element of the Guiding Principles is a strategic planning approach for new hydropower development, helping decision makers to weigh diverse controversial interests based on different relevant criteria. Practical application has to take place at the national level. | The Guiding Principles aim towards generating better understanding and acceptance by outlining the legal and policy frameworks the different sectors are confronted with. An approach towards increasing the hydropower potential while at the same time meeting the obligations from water management and environmental legislation is presented. Despite resources are required for ensuring stakeholder involvement practical application of the Guiding Principles, benefits are gained for different sectors due to quicker and more transparent decision making, accelerated implementation of legislation and protection of sensitive ecosystems. | The Guiding Principles were elaborated by representatives from Danube countries and different relevant sectors, thus representing a shared understanding and joint approach within the international Danube River Basin. The Guiding Principles are complementary to ongoing efforts on integrated water resources management in a transboundary context due to potential transboundary impacts of hydropower facilities, i.e. to the Danube River Basin Management and Danube Flood Risk Management Plans | | Guiding Principles on Sustainable Hydropower Development in the Danube Basin  Available at: http://www.icpdr.org/main/activities-projects/hydropower |
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|  | **Type 2** |  |  |  | |  |
| 3 | Change of landuse practices WAT, AGR, ECO, ENE | In the Tigris and Euphrates region, the current water use doesn’t allow for covering all the region’s needs. The Stockholm International Water Institute conducted a study on the possible ways to improve water management and concluded that the water can be saved by changing the existing landuse practices which would allow for reallocating the saved water to other needs (varying from sub-basin to sub-basin). | The new landuse practices suggested by the SIWI for the sub-basin areas would allow for up to 30% improvement of the water use efficiency. This would allow to reallocate water to other needs such as domestic water supply and sanitation, energy production, agriculture, ecosystem restoration, and others, depending on the needs of each sub-basin. | The reallocation of the saved water would bring benefits to each country of the region , particularly to the communities living in the sub-basins. Most importantly, this would contribute to the stability in the region as the water will be less of a scarce resource. | | Granit, J. & Joyce, J. (2012), Options for cooperative action in the Euphrates and Tigris Region, Paper 20, Stockholm: SIWI, 2012  Available at: http://tools.waternexussolutions.org/idocument/stream\_document.aspx?objectid=36408 |
| 4 | River restoration – development of sustainable floodplains  WAT, ECO | In the lower Rhine region (Germany and Netherlands) twelve interconnected pilot projects were implemented to address the floods often taking place in the region. The projects were implemented to reduce flooding and encourage the development of sustainable floodplains for multifunctional use, e.g. water retention, agriculture,  nature development and recreation. | Development of floodplains allowed for restoring ecosystems, developing agriculture, improving water quality, and development of recreational potential of the area. | The main transboundary value of the project was decrease of flood risk which was a crucial issue in the region. The joint implementation of the projects also allowed for ownership of the project, transparency and accountability, and positively impacted on cooperation between the countries. | | Sustainable Development of Floodplains  Available at: http://www.sgdsued.rlp.de/icc/Internet/med/e44/e4430d4e-e73f-7231-a633-8762072e13d6,11111111-1111-1111-1111-111111111111.pdf |
|  | **Type 3** |  |  |  | |  |
| 5 | Agreement on water allocation – flexible flows  WAT, ECO | The Tagus, Minho, Duero/Douro, and Guadiana Rivers, shared by Spain and Portugal, are covered by the Albufeira Convention (1998). In 2008, the Convention was amended, to desegregate the annual flow regime  into smaller integration time-steps. This new regime determines a quarterly (Minho, Douro, and  Guadiana), weekly (Douro and Tejo) and daily (Guadiana) discharge flow, depending on the rainfall conditions in each basin. | Such flexible provisions allow for maintaining the environmental flow under any rainfall conditions, as well as allows for ensuring provision of certain amounts of water to the priority water uses in each basin in case of droughts. | Adoption of such flexible conditions was a result of a continuous cooperation and communication between the countries, at the same time, such flexibility contributes to the further cooperation and strengthens mutual trust. | | Sanchez and Roberts, J. 2014. Transboundary Water Governance. Adaptation to Climate Change.  Available at: https://portals.iucn.org/library/efiles/documents/IUCN-EPLP-no.075.pdf |
| 6 | Agreement on water allocation – fixed and flexible flows  WAT, ENE, ECO | The 1949 Niagara River Water Diversion Treaty between Canada and the U.S. employs fixed quantity allocations in combination with percentages of flows. | While in the months with a normal flow regime, 50% of the flow can be withdrawn for hydropower production, the stipulations take into account the possibility of flow variability, and represent a valuable model to follow when considering environmental flows. |  | | A River Diversion: A Niagara River Diversion  Available at:  http://www.niagarafrontier.com/riverdiversion.html |
| 7 | Agreement on water allocation – flexible flows  WAT, ENE, ECO | The Finnish Russian Agreement on the utilization of transboundary watercourses signed in 1964 covers all transboundary rivers.. The ‘Lake Saimaa and River Vuoksi Discharge Rule’ stipulates the natural water level and discharge in normal circumstances. However, when the water level forecast goes beyond the normal zone the discharge may be increased or reduced. The natural discharge resumed when flood or drought threat ceases. Compensation for losses related to energy production by Russia are to be compensated according to the Agreement. The specially created Commission is mandated to consider the issues described in the Agreement with help of relevant experts, as well as supervise the adherence to the provisions of the Agreement by the countries. | The Agreement includes regulations on: water flow and structural measures; floods and water scarcity; timber floating and navigation; pollution and water quality; frontier guard issues (related to water); public health and economic considerations, protection of ecosystems and lands related to the water bodies, protection of areas especially valuable for fishery and with rich aquatic ecosystems, as well as prohibition of excessive fishery in accordance with the national legislation of the countries | According to the agreement, the counties cannot perform any unilateral actions or implement projects that will introduce any changes to the state of the waterbodies in the other country, as well as related ecosystems whatsoever. This also relates to the whole basins of the transboundary water bodies. The countries are obliged to jointly set the water quality standards and prevent any interventions that would cause harm to the waterbody and related ecosystems beyond the set limits. | | Minna Hanski, Reconciling flood protection and energy in the transboundary cooperation on water management between Finland and the Russian Federation  Available at:  <http://www.unece.org/fileadmin/DAM/env/documents/2012/wat/workshops/Latin_American_workshop_in_Buenos_Aires/3.3.Minna_Hanski_FiRuCooperation_En.pdf>  Agreement between the USSR and Finland on transboundary waters  Available at (in Russian): http://rajavesistokomissio.fi/materiaali/finljandija.pdf |
| 8 | Multi-level governance  WAT, ECO | In the part of the Volta River shared by Ghana and Burkina Faso, a demonstration project on water governance was launched consisting of three components: knowledge, awareness raising, and good governance at all levels. Multi-level governance of transboundary waters included local grass roots community pilots, national level committees, and local transboundary committees. On the transboundary level, a Code of Conduct was signed that covered the main principles of water governance. | The Code of Conduct is based on the principles of integrated water resources management, contains guidelines on environmental flows, and good environmental practices. | Such multi-level connections facilitate communication between all stakeholders and help to build capacity and trust across the basin.  The Code of Conduct also includes steps for creation of a multilateral convention for cooperation in the whole basin. | | Rebecca Welling and others, Volta River Basin, Ghana and Burkina Faso. Transboundary water management through multi-level participatory governance and community projects, 2012  Available at:  https://portals.iucn.org/library/efiles/documents/2012-010.pdf |
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|  | **Type 4** |  |  |  | |  |
| 9 | Fish migration aids  WAT, ECO, ENE | In Slovenia, the Blanca Hydropower Plant on the Sava River has an annual average production of 160 GWh. The fish pass on HPP Blanca is the first case of fish pass on Sava river HPPs. It is located on the right part of HPP Blanca dam and constructed in the way of imitation of natural watercourse with hydrological characteristics, morphology, materials and varied habitat. | The fish passes allow for better continuity of the river, ensuring fish pass through all the rivers and not harming the fishery downstream. Environmental considerations are better integrated into hydropower production, making more sustainable. | | | Restore: Case Study: HPP Blanca  Available at:  https://restorerivers.eu/wiki/index.php?title=Case\_study%3AHPP\_Blanca |
| 10 | Use and management of freshwater karst aquifers  WAT, ECO, ENE | The Trebišnjica Multipurpose  Hydrosystem (TMH) in Eastern Herzegovina (border area of Montenergo and Croatia) is a part of the DIKTAS project (Protection and Sustainable Use of the Dinaric Karst Transboundary Aquifer System).The TMH is a complex systems of many tunnels, underground dams, artificial reservoirs and channels. | The karst aquifers can be used for energy production, flood and drought prevention, water supply for agriculture, fish farming, and ecosystems. However, this requires change in the river systems (e.g. the sinking of the rivers needs to be prevented), which leads to changes in all related sectors, therefore, the management should include all relevant sectors and impacts on those. | Joint and sustainable management of freshwater karst aquifers can bring benefits to the countries where it is located, but also to the neighbouring countries (e.g. by providing a cheaper electricity for sale). However, the impacts of such management would also been transboundary, which requires close cooperation to avoid unexpected negative consequences. | | Petar Milanović and Neno Kukurić, Hydro-Power and Groundwater in Karst  Available at:  http://www.un-igrac.org/dynamics/modules/SFIL0100/view.php?fil\_Id=248 |
|  | **Types 4 and 5** |  |  |  | |  |
|  | **Type 5** |  |  |  | |  |
| 11 | Basin Economic Allocation Model (BEAM): An economic model of water  use developed for the Aral Sea Basin | The purpose of the BEAM model is to explore the impact of changes to water allocation and investments in water management infrastructure on the overall welfare of the Aral Sea basin. The BEAM model estimates welfare changes associated with changes to how water is allocated between the five countries in the basin (Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan; water use in Afghanistan is assumed to be fixed). Water is allocated according to economic optimization criteria; in other words, the BEAM model allocates water across time and space so that the economic welfare associated with water use is maximized. | The model addresses the Aral Sea Basin as a whole - that is, the rivers Syr Darya, Amu Darya, Kashkadarya, and Zarafshan, as well as the Aral Sea. The model representation includes water resources, including 14 river sections, 6 terminal lakes, 28 reservoirs and 19 catchment runoff nodes, as well as land resources (ie irrigated croplands). The model covers five sectors: agriculture (crops: wheat, cotton, alfalfa, rice, fruit, vegetables and others), hydropower, nature, households and industry. The focus of the model is on welfare impacts associated with changes to water use in the agriculture and hydropower sectors.  The model aims at addressing the following issues of relevance for economic management of water re-sources:  • Physical efficiency (estimating how investments in irrigation efficiency affect economic welfare).  • Economic efficiency (estimating how changes in how water is allocated affect welfare).  • Equity (who will gain from changes in allocation of water from one sector to another and who will lose?).  The results suggested several options for re-allocation of investments and inputs across sectors for reallocating welfre for all sides. | | | Niels Riegels, Mikkel Kromann, Jesper Karup Pedersen, Palle Lindgaard-Jørgensen, Vadim Sokolov, and Anatoly Sorokin,  Basin Economic Allocation Model (BEAM): An economic model of water  use developed for the Aral Sea Basin  Retrieved from <http://www.gwp.org/Global/ToolBox/Case%20Studies/Asia%20and%20Caucasus/Transboundary.%20BEAM%20-%20Aral%20Sea%20Basin%20Economic%20Allocation%20Model%20%28%23432%29.pdf>  Retrieved on:  17.04.2015 |
| 12 | Transboundary stakeholder dialogues  WAT, ECO | Transboundary stakeholder dialogues in the Drin River established in 2009, brings together ministries, sub-basin commissions and committees, and stakeholders, and have led to a shared vision for sustainable management of the whole basin. The Drin Dialogue was completed after two years, when the five Drin River riparians signed a ‘Memorandum of Understanding for the Management of the Extended Transboundary Drin River Basin’. | The Dialogue aimed at promoting sustainable use of the Drin River taking into account the interdependencies between different human uses (agriculture, hydropower generation, industry, fisheries, tourism, urban settlements, etc.)as well as among uses and ecosystems, in four major inter-connected inland water bodies and a receiving sea | The Regional Dialogue aimed to catalyse action in transboundary water resources management by debating and showcasing the benefits of cooperation. The activities under the Regional Dialogue have been used to enable stakeholders to identify solutions that can be applied in their respective basins. | | Michael Scoullos, Dimitris Faloutsos,and Bo Libert  The Drin Coordinated Action: Towards an Integrated  Transboundary Water Resources Management  Available at:  http://www.gwp.org/Global/ToolBox/Case%20Studies/Mediterranean%20and%20Middle%20East/CS\_459\_Drin%20Basin\_full.pdf |
| 13 | Multiple sector awareness raising | In the Meus River (shared by France, Netherlands, Belgium) a communication project was initiated to raise awareness of all stakeholders and general public on the river and its status. Targeted to the general public of the Meuse basin, the latter proved to be the most effective means of communication, also due to the fact that it was published on the project website and linked to all partners' websites.  - International, regional and local events: meetings with the local community; meetings with small groups of local policy-makers; training workshops; field visits, open to the population; exhibition stands; and online platforms. | The project allowed for better communication between all stakeholders on the national, as well as on the transboundary level. This led for a more coherent and environmental sound decision making, and stronger mutual accountability and trust | | | Martine Lejeune, The AMICE Communication Plan, Version January 2011,  RIOU, AMICE.  Available at:  http://www.amice-project.eu/docs/pa1\_pr4\_1302196426\_AMICE\_COMMUNICATION\_PLAN\_in\_text.pdf  http://www.amice-film.eu/ |
|  | **Type 6** |  |  | | |  |
| 14 | Payment for ecosystem services in a transboundary river  WAT, ECO ENE AGR | In the Vecht river (shared by Germany-Netherlands) an assessment of ecosystem services was held which is the first stage of establishing a PES scheme. This is only the first step of the PES scheme according to the UNECE guidelines, there is no information if the scheme has been implemented. | Identification and assessment of ecosystem services offered by the river allows for establishment of a management scheme that would bring benefits to all uses in the basin. It can also be used to raise awareness on the value of the river and the services it provides. | | Establishment of a payment for ecosystem services scheme in a transboundary context can bring benefits to all stakeholders in all countries involved. However, that would require a strong cooperation to establish such a scheme, and so far there is no evidence that such a scheme exists for a transboundary river. | Suzanne van der Meulen and others, Towards practical implementation  of the ecosystem services (ES)  concept in transboundary water  management  Available at:  http://www.interessen-im-fluss.de/wp-content/uploads/2013/12/vechte\_phase1\_finalreport.pdf |
| 15 | Environmental water account  WAT, ECO, | In the Sacramento-San Joaquin Delta the Environmental water account (EWA) approach is adopted that allows for providing water for fishery protection and recovery and providing assurances against additional water supply losses for urban and agricultural water supplies. The fishery managers agree to operate within a defined water budget. The water budget includes water made available by a regulatory baseline and EWA water. The regulatory baseline includes instream-flow, pumping restrictions, and other requirements based on existing regulations. The EWA itself includes two types of assets: first, EWA managers are granted access to a portion of high flow water when it is available (called "variable assets"); second, they purchase through voluntary market transactions a specified amount of additional water (called "fixed assets"). These assets are used to protect endangered species. |  | | So far there is only evidence of implementation of the approach on the local level. However, if supported institutionally and legally, such an approach can be up-scaled to the regional level, multiplying its benefits. | The Environmental Water Account:  Reducing Conflict Between Fishery Management and Water Supply  Available at:  http://calwater.ca.gov/content/Documents/FactSheet\_EWAWhitePaper\_1-22-03.pdf |
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