

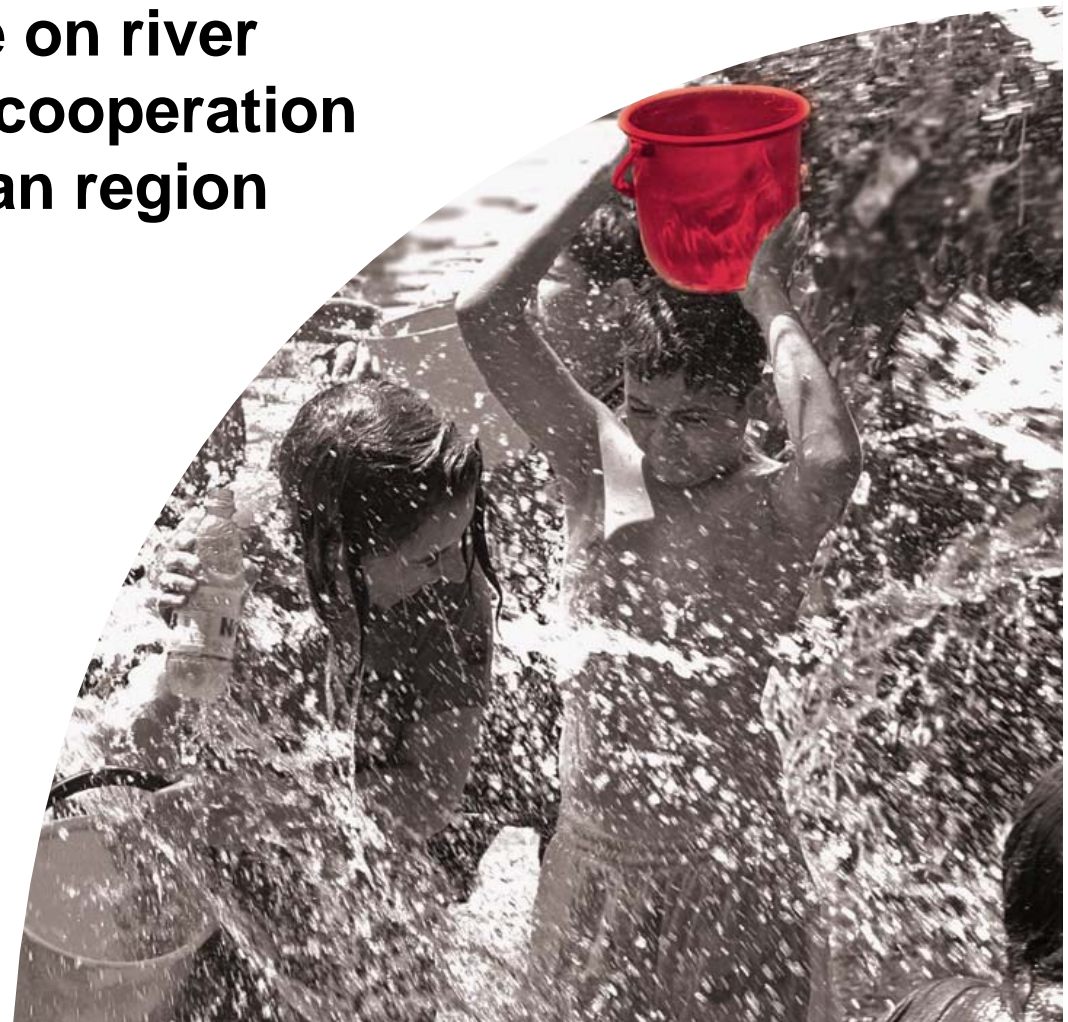
International conference on river basin management and cooperation in the Euro-Mediterranean region

Application of participatory
basin planning guidelines in the
Megright River Basin in Armenia

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River basin planning guidelines in Armenia: multi-step planning process

Steps 1-6 – formulation of a concept plan (delineation and classification of waters, ecological status of waters, the environmental objectives for each water body, the pressure/impact analysis, and the preliminary program of measures, with some prioritization of alternatives).

Step 1 – Completed for the Meghriget basin in summer of 2008:

- Long-term perspective: 10 years
- Broad stakeholder participation and acceptance
- Inclusive of all water uses, including municipal water and wastewater supply, industrial, agriculture

Step 2 – Classification of surface and groundwater bodies

Surface water body classification:

- Each surface and ground water body (aquifer) assigned to a category or type which has its own set of distinct, and ecologically appropriate environmental objectives
- Ecological characteristics – chemical water quality and aquatic life altitude, geology, etc
- Armenia's uses European approach. However, Armenia's Water Code also requires water bodies be 'classified' or described per many criteria.

Ground water body classification:

- Defines location, quality and quantity of (aquifers)
- Forecasts water supply and demand
- Protection of water bodies from contamination.

Classification of sample surface water bodies in Meghriget Basin

Name of drainage	Size (km ²)	Maximum altitude (m)	Minimum altitude (m)	Type of surface water	Actual hydrologic regime*:
Meghriget River (total)	336	3760	513	Several (see below)	perennial
Tashtun tributary	67	3300	1600	1	perennial
Middle Meghriget	178	1600	800	2	perennial
Karchevan	19	2647	535	7	intermittent
Astazurget	35	2150	451	7	intermittent
TOTAL:	—				

*perennial=flows all year; intermittent=flows part of year; ephemeral= flows rarely

Step 3: Assessing water body status and setting environmental objectives

- Measured the quality and quantity of water in a stream, lake or aquifer against water quality standards and minimum flow standards
- Used concept of ‘good ecological status’ for surface waters and ‘good status for ground water’ from the EUWFD meaning balance of between recharge and abstraction (pumping), and prevention of ground water pollution
- Used Canadian Water Quality Index (WQCI) – 9 primary indicators of water quality, and applied to all the data from 2005 to 2008 for Meghriget river, and to 3 different sets of standards for Armenia: drinking water, recreation and fisheries, with fisheries usually being the most stringent.

Class	Quality	Color Class	WQCI value
I	Excellent	Green	95-100
II	Good	Blue	80-94
III	Moderate	Yellow	65-79
IV	Poor	Orange	45-64
V	Very poor	Red	0-44

Step 4: Setting ecological flow and assessing flow status of waters in Meghriget basin

To maintain a healthy aquatic ecosystem, a stream must maintain adequate flows in all seasons of the year. Most aquatic fauna and flora (fish and other species) are adapted to expect a certain characteristic pattern of flows at distinct times of year. Major alterations to these flows, especially the excessive loss of flows during the dry season, are a major stress on aquatic life. To determine if these factors affect the Meghriget River requires good data sources.



Application of environmental objectives to Meghriget basin – pressures/impact analysis and identification of measures

Must be based on an understanding of the type of water body under consideration.

- To identify/describe surface water resource problems It guides the river basin manager in analyzing how distinct land use and development pressures affect surface water resources, and helps to assure that solutions for surface water resource problems actually address the root problems
- From the European Water Framework Directive, and is called Driver-Pressure-State-Impact-Reponse (DPSIR) model, used for pressures and impacts analysis.
- Application of pressure/impacts analysis to surface water in Meghriget basin

Identification of proposed measures

Once the pressures/impacts analysis finished, identification of measures proceeded. Key stakeholders, particularly local government (municipalities, authorities in territorial administration, agriculture, health), private industry, water user groups, and environmental groups worked with the BMO proposed variety of measures for each specific impact, usually using a 'brainstorming' type of approach.

The following are examples of measures suggested for Meghriget river basin, generated by the requisite participatory process:



Step 5

Step 5 of the program involved evaluating those measures to determine which were potentially most effective, most efficient, most environmentally sound, and in sum, highest priority, using economic analysis and participatory evaluation

Each measure refers to a water resource issue being addressed in a particular water body. For each measure there is a proposed responsible lead agency, a short set of activities, and some qualitative criteria for each activity.



Quantitative/qualitative criteria

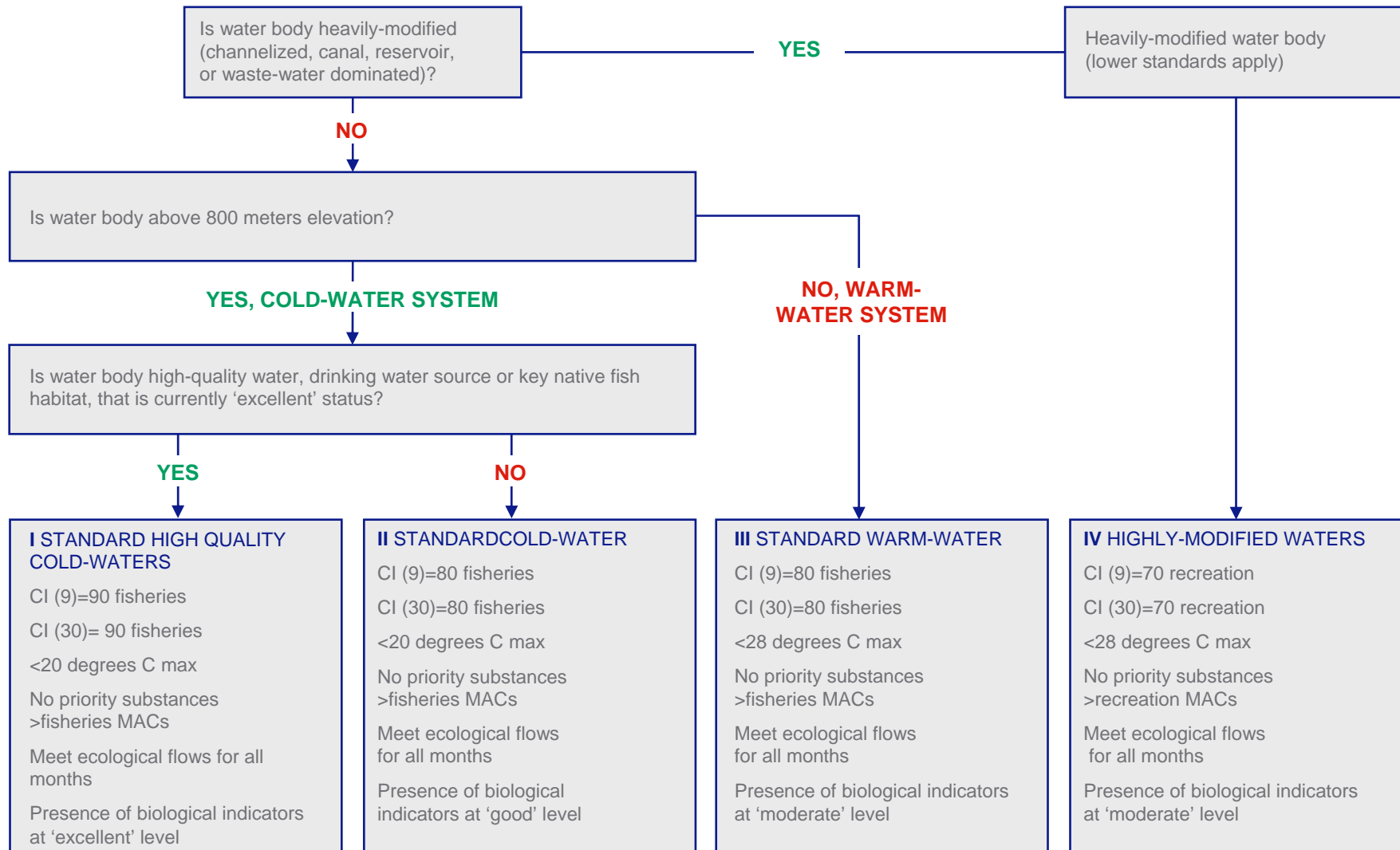
Quantitative/qualitative participatory criteria are:

- Environmental review required?
- Economic benefit?
- Capital cost?



Many measures proved viable, only a few were regarded as complex, e.g. an irrigation storage dam, due to its high capital costs, complex environmental problems of all dams (almost regardless of siting), and problematic cost/benefit ratios of many projects.

Objectives to apply for streams in Armenia



Program of measures for Meghri River Basin – Lower Meghri

Issue:	Proposed measure:	Responsible agency:	Environmental review required:	Economic benefit	Capital cost:
1. Over-abstraction for irrigation	1. Adjust water use permits for Aug-Sept. period using ecological flow guidance.	1. WRMA-BMO	No	++	0
	2. Improve water conveyance structures and reduce withdrawals in Aug-Sept.	2. Water user associations	Yes	+	++
	3. Study irrigation storage options for upper river (Lichq reservoir)	3. Marz authorities	Yes	++	+++
2. Municipal wastewater discharge	1. Study options for simple treatment (sludge settling and simple oxidation pond)	1. Marz authorities	Yes	-	+++
	2. Review options for re-use as irrigation water	2. Marz authorities	Yes	+	+
3. Agriculture-crops and livestock	Review livestock and crop-management practices for runoff risks—especially manure management in spring; design best management practice & educational efforts	Marz agricultural staff with BMO support	No	+	0
4. Solid waste and storm water in Meghri town	1. Develop solid waste management program for Meghri	Municipal authorities	Yes	-	++
	2. Do annual clean-up/ education program	Municipal authorities	No	?	0
	3. Study storm water management options	Marz authorities	Yes	+	+
5. Small-scale industries	1. Review the WU Permits for nutrients/BOD	WRMA-BMO	No	?	?
	2. On-site inspection of vehicle maintenance facilities to assure safe disposal of lubricants (oil/grease)	2. WMRA-BMO	No	?	?
6. Channel constriction/ flood risk	Study flood peaks impact on channels in Meghri town (combine with storm water study)	Marz authorities	Yes	+	++