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The integration of economics in the WEAP Water Evaluation and Planning System

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The Water Evaluation and Planning System (WEAP) contains components that allow the appraisal of water management strategies at basin level with economic values. It has been developed by the Stockholm Environmental Institute (SEI) as a decision support tool for water resources management (www.weap21.org). Currently, it is being applied particularly in regions, which are characterised by water scarcity and increasing demands, such as in the Middle East and North Africa. At many basins, the groundwater extractions exceed the natural recharge resulting in a deterioration of the water qualities and worsening the water shortage. The application of integrated water management strategies (IWRM), including water reuse, artificial ground water recharge, use of brackish water, storage of natural and reclaimed water, demand measures and improved water allocation among competing water uses, becomes increasingly necessary.

The economic components of WEAP allow the calculation of costs for demand notes, transmission links, treatment plants and reservoirs. Moreover, the beneficial impacts of increases in water availability for different demand sites can be evaluated in economic terms. A key role play the price of water and the revenues from supplying the demands. Thus, the economic values added resulting from an improved municipal water supply and from increased electricity generated by hydro-power plants can be estimated. By creating suitable indicators the economic losses of unmet demands and the environmental costs of low river flows can be evaluated as well. WEAP offers the possibility to perform cost-benefit analyses of alternative measures to tackle water problems. For instance, the construction of a reservoir or of a new treatment technology at a demand node to mitigate water shortage can be compared in terms of net present values. The economic net benefits of investments on annual basis can be calculated for different demand nodes. These calculations methods serve to find out the most appropriate IWRM strategy at basin level. Furthermore, various financing options under different loan conditions and pricing policies can be considered.

WEAP was applied successfully to model the hydrological features and water management strategies at many basins and it is being developed further. An example is the co-operation between the Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD) and the German Federal Institute for Geosciences and Natural Resources (BGR) (www.acsad-bgr.org). A further example is the research project ‘Integrated Water Resource Management in the Lower Jordan Rift Valley (SMART)’, funded by the German Ministry of Education and Research (BMBF) (www.iwrm-smart.org).

The session paper aims to explain the functioning of economic components in the Water Evaluation and Planning System of WEAP. Furthermore, it will point out the challenges in integrating more economic components into the water model. A case study at a selected basin in the Lower Jordan Valley will be presented to demonstrate the coupled hydro-economic system of WEAP.