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1 Development of a regional model for integrated management of water resources at the basin scale

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Water resources in the European Community, as well as in developing countries, are under increasing pressure from the continuous growing demand for sufficient quantities of good quality water for all purposes. Consequently, in 2003 the European Commission launched the “EU Global Water Initiative”, which proposes to apply the principles of the European Water Framework Directive (WFD) to other continents. The central feature of the WFD is the use of river basins as the basic unit for all planning and management actions. The RIVERTWIN project (www.rivertwin.org) supports the goals of the EU Global Water Initiative (www.euwi.org) by adjusting, testing and implementing the integrated regional model MOSDEW for the strategic planning of water resources management in three river basins in Europe, Central Asia and West Africa.

The regional model MOSDEW will assist planning authorities and decision makers to assess the impacts of economic and technological development, and the effects of global climate and land use changes on the long-term availability and quality of water bodies. The model is based on a geographic information system, which integrates ecological (water availability and quality) and economic aspects (water demand and water use) of water management. Three river basins with catchment areas between

13.000 and 40.000 km^2, and with contrasting ecological, social and economic conditions, were selected. The river basins are located in different climatic regions:

1. Neckar basin – temperate -humid Central Europe
2. Oueme basin – tropical–subhumid West Africa

3. Chirchik basin – continental–semiarid Central Asia

Adoption and use of decision making tools requires the involvement of stakeholders and planning authorities in model development and definition of key indicators as target variables for the model calculations. In an intensive participatory process, the model structure has been adjusted to the stakeholder requirements in the individual basins. In particular the heavily modified water bodies in Central Asia need the adoption of specific submodels that respond to the tasks of complex water distribution networks and to the optimal allocation of scarce water resources.

In parallel to the model development, integrated alternative basin scenarios were compiled with the responsible institutions. The model was used for impact assessment of the scenario options. Scenario runs for the Neckar basin with downscaled climate scenarios from different GCMs suggest that climate change impacts differ between climate scenarios, but there is a general trend of reduced diffuse emissions into the surface and groundwaters in the future 30 years. Projected changing agricultural land use due to the common agricultural policy since 2003 will further support this positive trend.

Although some modelling processes are applicable in all basins, the results have shown that stakeholder involvement in model development is crucial for capturing specific additional modelling necessities in each basin. The participation process and model adjustments are time consuming. However, the stakeholder involvement as project partners in the model development promotes an understanding of interactions between the different sectors that are affected by water management and creates the notion of own property with regard to the project results in the respective basin organisations. Human capacity building in the application of GIS based modelling approaches must be intensified in developing countries in order to make adequate use of decision making tools at the basin scale.