



Tropentag, October 11-13, 2006, Bonn

“Prosperity and Poverty in a Globalised World—  
Challenges for Agricultural Research”

## **Integrated Water Management Options Towards Improving Water Use Efficiency: the Case of a Sub-unit of the Khorezm Irrigation and Drainage System in Uzbekistan**

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### **Abstract**

The performance of many irrigation systems in arid and semi-arid regions is far below expectations, which is indicated by high water input, insufficient yields (as a consequence: low water use efficiency) and severe impacts on the water and soil resources. The required increase of food production in the coming decades needs to be realised to a large degree on irrigated lands under the existing restrictions of water availability (‘more crop per drop’) and given an increased competition. At the same time, it is feared, that water availability is becoming even more problematic due to global change. All this leads to a strong need to improve the water use efficiency while taking the requirements of further water users and environmental aspects into consideration.

The Khorezm irrigation and drainage system in the lower Amu Darya basin is a typical example with a very drastic dimension of the current problems. In the context of the ZEF/UNESCO-Project aiming at the restructuring of land and water use towards a sustainable and economically feasible situation, the current irrigation and leaching strategies on field level and medium-size areas have been analyzed. Approaches to raise water use efficiency must start from the field level and consider concurrently the system operation by e.g. irrigation scheduling models. To reduce the root zone salinisation caused by shallow groundwater, to increase the effectiveness of leaching, and to evaluate the option of conjunctive use, the drainage system (operation and design) was considered to develop an integrated water management approach.

Based on a monitoring programme and model simulations, irrigation efficiencies are estimated (in the range of 30 %) and steps (regarding the full range of operation, maintenance and re-design) towards the improvement of water use efficiency are conceived. Although the concepts are related to a special site, the approach can be seen as a promising contribution regarding the situation of many irrigation and drainage systems in arid and semi-arid regions.

**Keywords:** Drainage, integrated water management, irrigation, Uzbekistan, water use efficiency