



Westfälische Wilhelms-Universität Münster

Interactions of Groundwater, Surface Water and Soil in the Irrigated Agricultural Landscape of Ashirmat Water User Association, Khorezm, Uzbekistan

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Diploma Thesis – Franziska Helbing – *franziskahelbing@gmail.com*

Reviewer: Prof. Dr. T. Buttschardt¹, Dr. A. Malkus¹

¹ Institute of Landscape Ecology, University of Münster, Germany

Abstract

Water user association (WUA) Ashirmat is located in the Khorezm region in south-western Uzbekistan. The region is greatly influenced by agricultural production dominated by cotton, rice and wheat. Due to very low precipitation, the region depends on irrigation water input from the Amu-Darya from which the water is channeled off through huge canals. Within this enormous irrigation system, WUA Ashirmat is located at the very end and thus, is endangered by water shortages and depends on upstream conditions.

The sustainable use of water resources requires wide knowledge about hydrological coherences but also about local conditions of elevation and soil. Thus, this thesis aims at (1) the generation of a high resolution elevation model of the area of interest, (2) the description of linkages between groundwater table and electrical conductivity (EC), (3) the identification of specific patterns of canal water and groundwater level and EC and their potential correlations, (4) the description of differences in soil textures in vertical and horizontal direction and their impact on the soil's permeability and (5) the identification of characteristics which might be useful for the distinction between hydrological sites.

The thesis regards data from the period between May and September 2009, which started with the leaching period. The transformation of the wheat fields to rice fields happened in June and also effected a change in the groundwater conditions. The thesis describes parts of the local water-soil-system of WUA Ashirmat and assumes the kind of irrigation practice depending on the type of land use, to have a high impact on the whole system. During the study period groundwater tables rose and salinity fell, due to leaching activities at the beginning of the monitoring, and to the combination of extensive irrigation and blocked drains during the irrigation period. Beside the type of land use, the thesis assumes meso-scaled elevation conditions as an important factor steering local groundwater conditions.