Agriculture and Water Management System in Karimabad, Hunza Valley, Pakistan

Muhammad Tariq¹, Muhammad Tariq², Pervez Akhtar¹, Muhammad Nafees³, Eva Schlecht³, Andreas Buerkert⁴
¹University of Agriculture, Dept. of Livestock Management; Sub-Campus Toba Tek Singh, Pakistan; Email: tariqlm@uaf.edu.pk
²University of Peshawar, Dept. of Environmental Sciences, Pakistan
³University of Kassel, Georg-August-Universität Göttingen, Animal Husbandry in the Tropics and Subtropics, Germany
⁴University of Kassel, Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics, Germany

Introduction
- Efficient irrigation water management is increasingly important given globally enhanced demand for food and feed.
- In the Karakoram region (Fig. 1), increasing variability of precipitation and glacier melt threatens long-term irrigation water availability.
- River water management in upper mountain reaches has regional and national effects on lowland agriculture through erosion (Fig. 2 and 3), flood, and water availability.

Main Objectives
- To explore the current status of water management in the Hunza valley of the Karakoram Mountains in northern Pakistan.
- To investigate the dynamics of human water use with respect to socio-economic and institutional settings.

Material and Methods
- Between autumn 2015 and spring 2016 a pre-tested semi-structure questionnaire was discussed with 110 households in Karimabad (Fig. 1) selected by snowball sampling.
- Primary data was collected on irrigation water management through field surveys, in-depth interviews with key persons and focal group discussions.

Conclusions
- Rapid population growth and intensive cash crop irrigation in water deficient periods are main causes for increasing water scarcity.
- Remediation measures are needed for sustainable agriculture and water management system such as i) Awareness related to natural resource use efficiency is required ii) Construction of new water channels and reservoirs with effective design to avoid water loss. iii) Modern agricultural technologies and irrigation techniques must be introduce.

Results
- Farmers in Karimabad depend on irrigation water from the Ultar glacier (Fig. 3).
- Among the four main water channels, the highest discharge rate was 46.73 m² sec⁻¹.
- Three classes of cultivated land can be distinguished: cropland, orchards, and grassland (Fig. 4).
- Irrigation priority is on cropland, followed by orchards and grassland.
- Per week, a plot receives water for 3 days + 2 nights or 2 days + 3 nights.
- Water distribution is managed so-called Jirgas and Nambardars (selected persons from each tribe).
- Fruit production is the major source of income, but sale of vegetables also plays an important role.
- The traditional double cropping pattern (of subsistence crops) is currently replaced by cash crop cultivation (potatoes).
- Especially the potato cultivation has increased the consumption rate of irrigation water.