

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

Muhammad Tariq¹, Muhammad Tariq², Pervez Akhtar¹, Muhammad Nafees², 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.

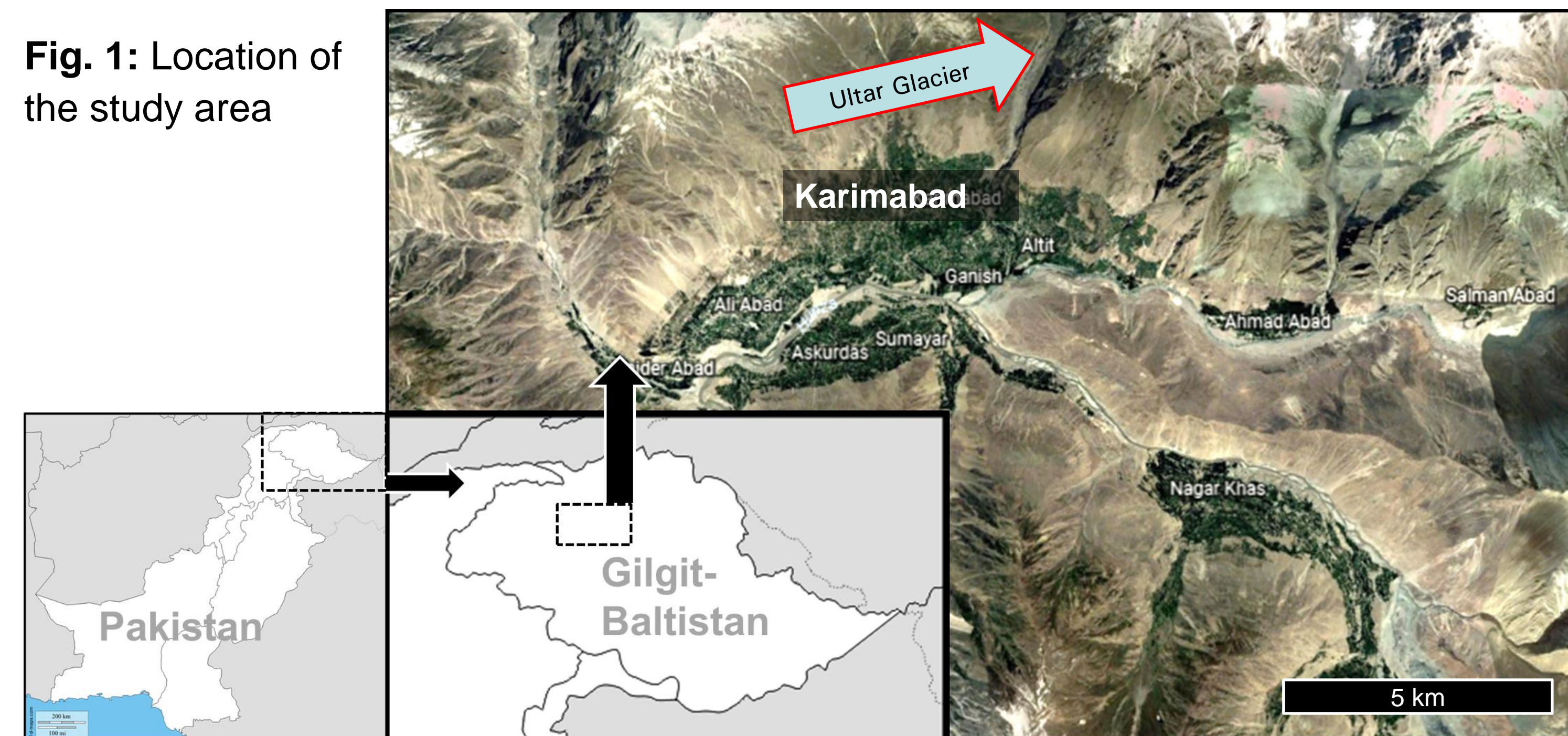
Material and Methods

- 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 introduced.

Fig. 1: Location of the study area



Results

- Farmers in Karimabad depend on irrigation water from the Ulta glacier (Fig. 3).
- Among the four main water channels, the highest discharge rate was $46.73 \text{ m}^3 \text{ sec}^{-1}$.
- 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.



Fig. 2: Traditional sedimentation tank at which channel sediments are discarded and flushed away by river or creek waters.



Fig. 3: Melt water from Ulta Glacier is flowing through the Dalah channel near Karimabad.



Fig. 4: Typical river oases in the Karakoram mountains, with melt water being used for cultivation of cropland, orchards, and grassland.