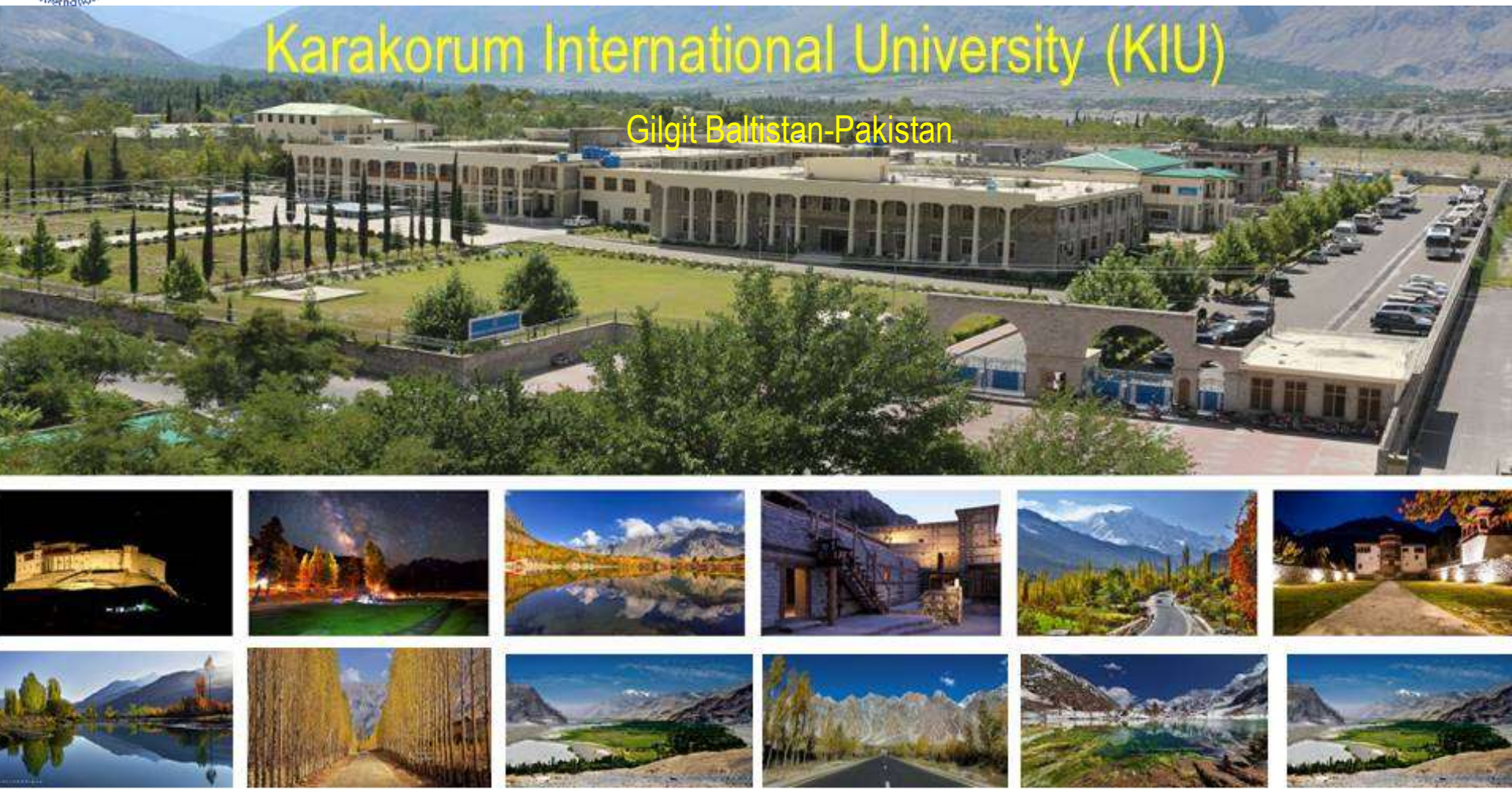
ONLINE CONFERENCE IWRA 2021



Impacts of Climate Change on the Production of Major Crops and Health Security in Gilgit Baltistan Pakistan: Water-Food and Health Nexus.

Engr. Prof. Dr. Attaullah Shah Vice Chacnellor &
Prof. Dr. S.M.Nizami Professor of Forestry

Background

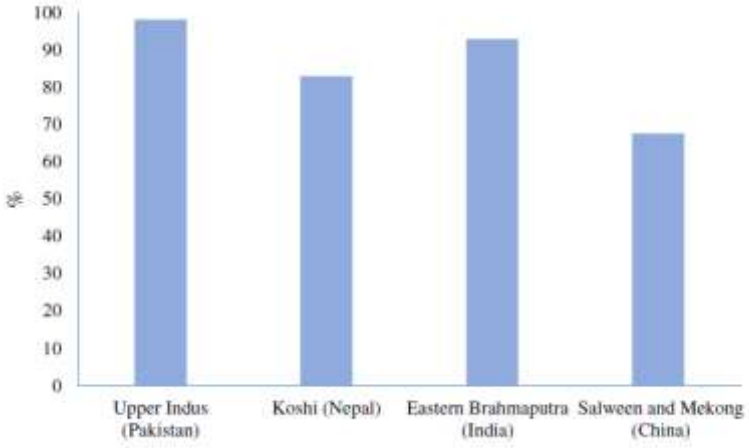
- The three very important Sustainable Development Goals (SDGs) are related to Water, Food and Health (SD6, SDG3 and SDG2), which are essential for the survival of the mankind
- The water security at global and regional level has been threatened with the increase of population, urbanization and climate changes.
- The climate change induced modification in the glacial mass and formation of glacial lakes will lead to water shortage in Hindukush-Karakoram and Himalaya (HKH) region.
- This water shortage will further lead to food and nutrition insecurity in case of low productivity of agricultural produces
- This research was mainly aimed at reviewing the crop production prospects in the KHK region in the wake of the Climate Change and subsequent impact on the availability of water.

Impact of Climate Change on Water and Food Security of the region

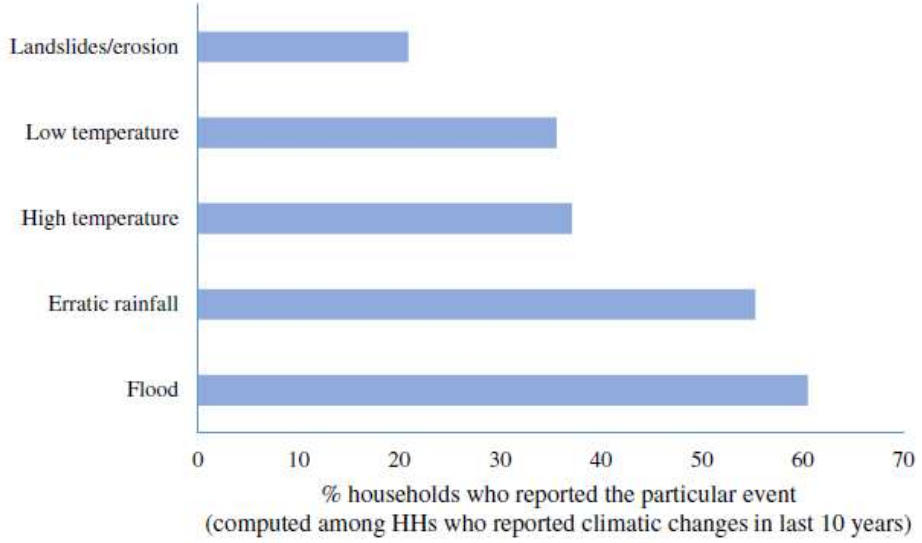
- The latest World Water Development Report of the UN warns about the impacts of Climate Change on the quality, quantity and availability of drinking water for billions of people.
- The transboundary conflicts over water rights are also increasing at regional, national and global levels
- This water shortage will further lead to food and nutrition insecurity in case of low productivity of agricultural produces. This can be the problem for health and wellbeing of people (Rosegrant et al, 2014).
- The availability of clean and ample water is necessary for agricultural productivity, food and nutrition security (FAO,2014; Chivenge et al,2015).
- Historically, the relationship between water and agriculture productivity and the impacts of food and nutrition on human health has been studied extensively but separately (Sachs,2012).
- the critical linkage between Water, Food & Nutrition and Health has been overlooked.
- A paradigm shift including Water-Food & Nutrition and Health Nexus approach is needed to address these issues, which will require interdisciplinary research to address the gaps (Mabhaudhi,2016).

Impacts of Climate Change on Water and Food Security

- Pakistan is considered as one of the top ten highly vulnerable economies to the impacts of climate change (Ahmed et al., 2016).
- The changing weather patterns with climate change at local level in Gilgit Baltistan, has increased the yield of some crops in parts of the region but in most parts, the agricultural productivity has been reduced
- Climate Change has led to shifting duration of growing seasons and reduced yields potentials. This also results into draughts, floods and plant diseases (World Bank, 2013).

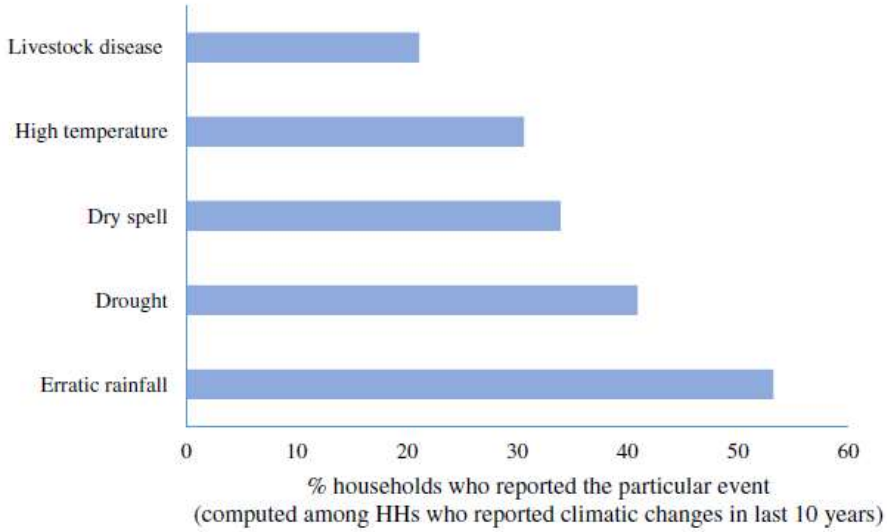


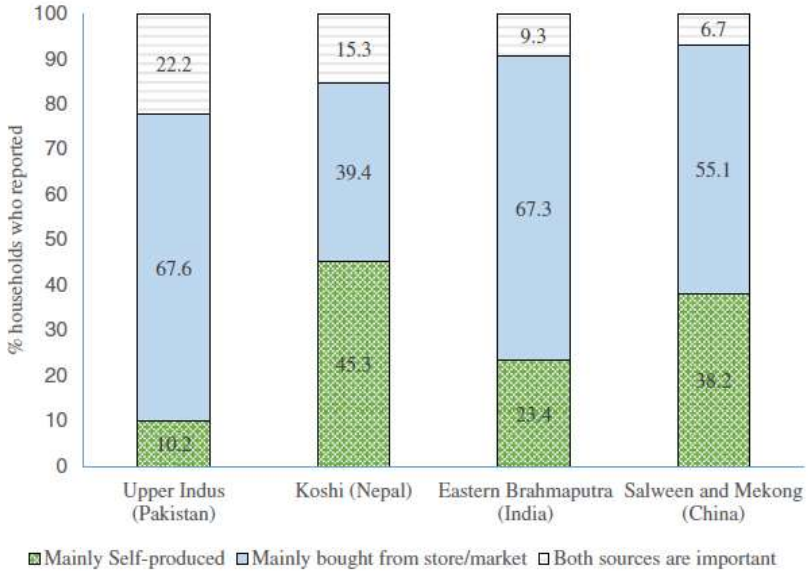
Households (%) who perceived an increase in Climate induced extreme events in the last 10 years (Hussain et al,2016)



Households' perception: Top five climate induced events in the Upper Indus, sub-basin (Pakistan)

Impacts of Climate Change on Water and Food Security-Cont'd





Research Objectives

- To study the production of certain crops including potatoes, wheat and maize due to climatic changes.
- To recommend different adaptations to reduce the food security risks and livelihood protection for upcoming years.
- To address the challenges of climate change and to design appropriate adaptation strategies.
- To gather perceptions of local communities and to find out the ground realities of adaptations towards the climate change.

Research Methodology

- Study Sites; The valleys affected by Climate Changes in Shigar, Hunza and Gilgit region which are more vulnerable to GLOF events.

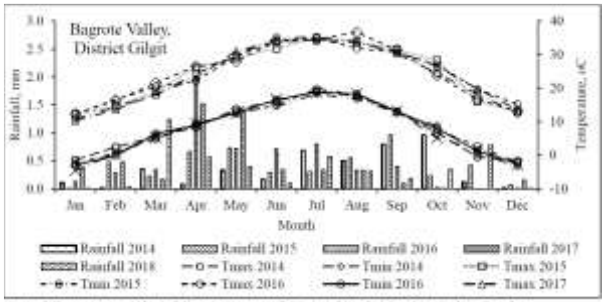


Figure 1 Temperature and rainfall variations round the year from 2014 to 2018 in District Gilgit

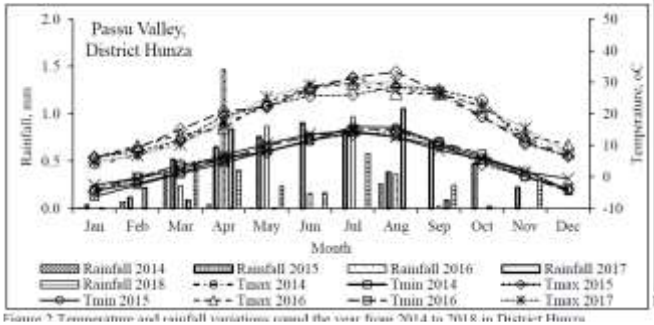


Figure 2 Temperature and rainfall variations round the year from 2014 to 2018 in District Hunza

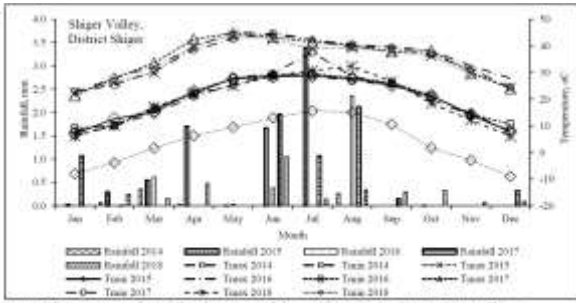


Figure 3 Temperature and rainfall variations round the year from 2014 to 2018 in District Shigar

- Sampling: 3 villages from 3 regions each and 50 randomly selected respondents from each village. (n=450)
- Questionnaire Survey and interview with the people of villages
- The major crops of Maize, Wheat and potatoes were targeted for variation in their yield due to climate changes
- The information related to crop productivity and it's dynamic within last five years.
- Specifically, data pertaining to rate of crop production and area of cultivation were asked from each peasant for the last five years.

Results

- Climate change impact on crop production
  - The results showed that production rates of potatoes, maize and Wheat, in some regions of GB are increasing with increase in temperature. This is more prominent in colder region of Passu and Shigar, where the increase in temp has led to longer period for cultivations and harvesting
  - More cultivation of Potatoes is recommended in these valleys.
  - In Bagrote valley of Gilgit, the increase in temperature has increased the span of hot weather, which has led to reduction in production of potatoes.
  - With increased temperature, the Bagrote valley is more suitable for growing the Wheat
  - There is a decline in yield of Maize in all the three regions,
  - Rise in temperature and heavy rainfall both have negative impact on maize yield that's why people reduced the trend of maize cultivation in GB.
  - Decline of maize yield in Shigar valley is due to degradation of area under cultivation through flooding. This region is most vulnerable to GLOF

Results

- Increase temperature may reduce the rate of photosynthesis, pollen viability, seed abortion and less seed setting which ultimately reduce the grain yield.
- Increase in maximum and minimum temperature cause shorting the duration of flowering and maturity (Ishfaq et al., 2018).
- The food basket of these valleys is shrinking in terms of yields and productivity
- Irregular precipitation patterns, attributed to climate change, have caused severe impacts on livelihoods of millions of vulnerable people in HKH region
- Irregular changes in rainfall patterns may have impacts on water availability and subsequent crop production
- Due to outmigration of larger population, the agricultural productivity has been declined in the region.
- Due to increasing vulnerabilities, the contribution of agriculture in household food consumption and household income has significantly decreased over time.
- The food insecurity has led to health and wellbeing issues and the stunted and wasted growth of the newly born and youth.

Recommendations

- **Climate Responsive agricultural approaches required**
- New Crops which are more resilient to climate change may be explored and planted
- Some of the crops which are affected by changing climates need be abandoned and replaced by others.
- Certain highly water consuming crops need to abandoned also in long term
- To preserve the postures and avoid their further degradation,
- Governments need to establish separate food security policies for mountains because mountains are different from plains in terms of nature, type and magnitude of vulnerabilities.
- Promote cultivation of vegetables in the valleys where the water availability has increased due to melting of glaciers.