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Climate Change Impact and Environment Adaptation in Zeravshan River Basin

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Zeravshan is a transboundary river in Central Asia (CA) that has been profoundly affected by mismanagement of the water resources due to the huge diversion for irrigation, poor functioning and maintenance of the drainage networks, as well as high rates of water losses. The river is fully utilized for irrigation use, excessive water use increased water pollution and vast irrigation and pastoral lands in downstream area become salinized. According to official data 12% of the irrigated lands are classified as highly saline and 33% as medium saline, requiring large amounts of water for cleaning soils. These processes may be intensified by climate change under less water availability directly impacting human wellbeing (Toderich et al, 2010).

We investigated impact of climate change on the downstream of the Zeravshan river basin. Through analyzing several future climate projection implications to the water environment and lands in the downstream are discussed. Most of future projections, show a temperature increase of 3-4°C in CA, accompanied by precipitation decrease in summer and increase in winter. Water availability in summer will become the main issue as well as changes in seasonality of the runoff, higher temperatures in winters and hotter and drier summers. The area is highly dependable on summer water discharge. Therefore, the current debates of climate change impacts on socio-ecological systems are oriented towards developing strategies for adaption to the expected adverse impacts and increased water stress.

Marginal waters potential and quantity calculations has been researched to address water availability in Zeravshan river basin under climate change impacts. According to calculations marginal water potential in Zeravshan river is almost equal to 30% of annual river discharge. However, there is little or no information on utilization of low quality waters and salinized lands for alternative agriculture use in CA, even though developing such techniques would be clearly advantageous, as such lands are underused, and these methodologies would not be in any competition with already existing farming practices. Utilization of both marginal waters and lands under a climate change water scarcity scenario can be a potential way of addressing forage availability without requiring fresh waters from river and improving environment.

Research fields to investigate marginal lands and soils potential in creating additional source of nutrition for agro pastures from salt-tolerated plants that can survive extreme conditions has been established. Our findings show how plants interact with water and soil environments to adapt and cope with high concentrations of nutrients and toxicants which occur naturally or as pollutants on such soils. Some plants has been able to remove metals and salts from contaminated environments, making possible land remediation over period of time. Study on remediation strategies and adaptation measures to address future shortage of water in extreme conditions can be an important factor for the agriculture and economic growth ensuring food security in the region.