Socio-Hydrology of the Indus River Basin: An assessment of changing population dynamics and canal discharge efficiency

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Abstract

Over the last few decades, Pakistan has been dealing with plethora of natural disasters like: floods, droughts, cyclones, earthquakes, and landslides. The incidences and implications of floods in Indus River are experienced by the people located at its periphery and adjoining areas. Risk aversion is an innate ability of human being that enables him to anticipate and assess the risk and discover ways to deal with it. One way of dealing with the risk is migrating from high risk areas towards low risk areas. In contrast to this, the people located on the periphery and adjoining areas of Indus River are adamant on living in high hazard risk areas. Furthermore, it is evident from the population structure of the area that people of low hazard risk areas are also migrating towards these high hazard risk areas that would make them prone to hazards. This study tries to identify factors why people are going from hazard free areas to hazard prone areas in relation to socio-hydrological factors of Indus River. In order to carry out the research, the population dataset of Pakistan is obtained from Landscan 2010 and flood extent vector files of 2010, 2011 and 2012 of Indus River are obtained from UN-OCHA website. Through these datasets, district level population is extracted using ArcGIS Spatial analyst clip analysis tool. And finally, the population in the composite flood extent layer of Indus river is estimated using ArcGIS extraction tool and Microsoft Excel. Afterwards, the NDVI of vegetation around the Indus River and Canals is calculated from SPOT Imagery to identify the migration pattern of people. The results demonstrate that there are certain socio-hydrological factors that have become the reason of this active migration and have forced people to continue living in risk zones. The factors identified can furnish the guidance at government level, thereby; appropriate measures can be taken at government level through the providing the alternate of these identified factors in the hazard risk free areas.