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Comparative analysis of climate change impacts in the Yarlung Tsangpo (Upper Brahmaputra) and Upper Danube river basins – the BRAHMATWINN Project.

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Funded by the European Commission under the 6^{th} Framework Program (Priority: Climate Change and Ecosystems), the overall objective of the project is to enhance and improve capacity to carry out harmonized integrated water resources management (IWRM). For headwater river systems of alpine mountain massifs, impacts from likely climate change will be modelled and appropriate mitigation measures developed based on case studies carried out in twinning European and Asian river basins.

A thorough assessment and comparison of the present state in the two river basins allows for the identification of general and specific indicators, which are used as input for building what-if-scenarios. The present state is evaluated through a hierarchical approach in four levels:

- Assessment and analysis of the natural environment (NE) comprising e.g. terrain parameters, runoff, groundwater, glaciers, permafrost, land use, land cover, and eco-hydrological research to derive the interactive dynamics of the system's components.

- Assessment of the system's human dimension (HD) accounting for water related issues of socio-economic vulnerability to environmental stress (water quality, water demand and allocation), gender equity in respect to water allocation and labor division, and considering the political structures and policies pertaining to the basins.

- Analysis of present traditional and conceptual IWRM practices and indigenous knowledge regarding water quantity and quality, user demands, user conflicts, resource

allocation and its potential for adaptation to cope with likely impacts of changing flow regimes.

- The development of future scenarios relies on downscaling predictions from Global Circulation Models (GCM) to a basin scale coupled with a DPSIR approach. The analyses of **d**riving forces, **p**ressures, **s**tate, **i**mpact, and **r**esponse (DPSIR) of system components is focused on the vulnerability to climate change impacts rendered by adherent "what-if?" scenarios.

The key concept of the system assessment for the distributed multi-scale modelling studies, mapping the vulnerability and building future adaptive IWRM scenarios is the regionalization of 'Response Units (RU)'. RU are process based distributed polygon areas in the river basin that are delineated through knowledge based GIS analysis using thematic data layers of the natural environment (NE) and its human dimension respectively. The approach has intensively been tested as Hydrological Response Units (HRU), Erosion Response Units (ERU) and Chemical-hydrological Response Units (CHRU) in numerous applied river basin research projects in Europe and Africa.

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