

In continuation of earlier pilot studies, the Institute of Geography of the University of Bern (GIUB) has developed a first spatially explicit, global typology of the significance of mountains for global water resources. A set of global maps in a resolution of about 50 × 50 km² identifies regions where mountain runoff is clearly higher than average lowland runoff. While mountains in temperate climates deliver about twice as much runoff as the lowlands on average, this disproportionality rises above 7 in the arid climate zone. The importance of mountains is particularly pronounced in sub-tropical regions which show a high variability of precipitation, especially if they depend on a single rainy season. The human dimension is included in these analyses by examining relations of mountain water resources to water needs of the adjacent lowlands. From this viewpoint, 44% of mountain areas provide supportive or essential water resources for the lowland dwellers and thus function as 'water towers'. Large mountain systems which are critically important are found in the Rocky Mountains, the Andes, the Middle East, North and South Africa, Central Asia and in the western and eastern Himalayas. Besides that, a number of regional 'water towers' are found on each continent that are equally important for their lowlands. The findings provide an important overview of regions which might be particularly vulnerable to impacts of climate change and population growth. Lowland regions which today depend heavily on mountain water resources might be adversely affected by altered discharge patterns from mountains and increasing water demand for food production.