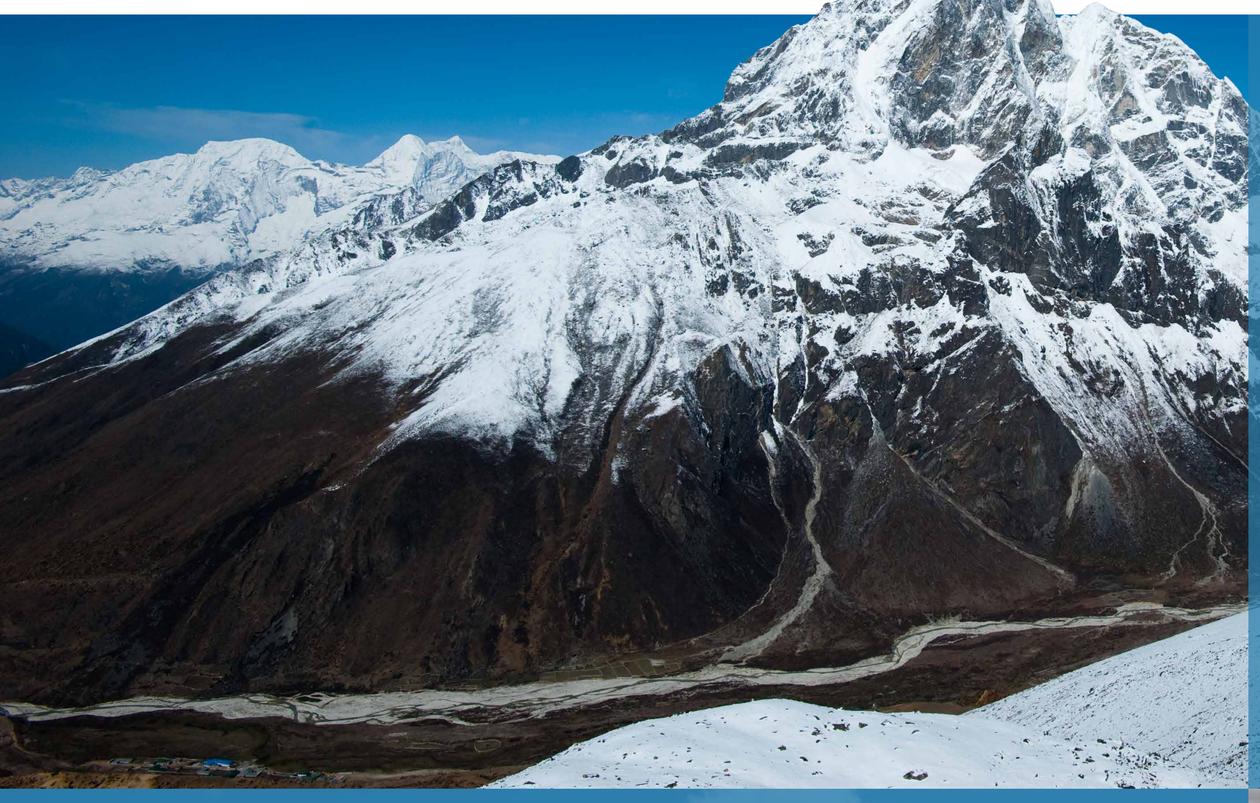
HI-AWARE

RISING TEMPERATURES AND WETTER FUTURES IN SOUTH ASIAN RIVER BASINS

CARIAA
Collaborative Adaptation Research Initiative in Africa and Asia



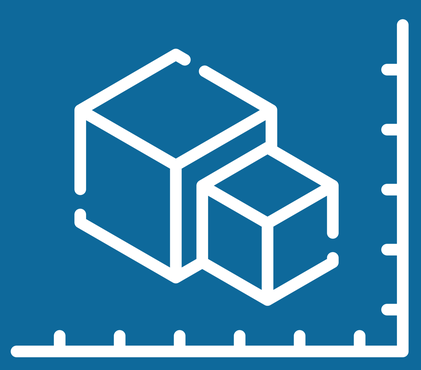
CONTEXT

The Indus, Ganges, and Brahmaputra (IGB) river basins are exceptionally susceptible to rising temperatures. Under a 1.5°C global warming scenario, they would warm up by more than 2°C, on average. A 2°C global warming scenario implies a regional average warming of around 2.7°C. The more likely scenarios specific for the region suggest temperature increases of between 3.5°C and 6°C by 2100. Most projections also indicate wetter conditions in the future.

Downstream areas of the IGB basins are expected to face socio-economic changes - water used for industrial and domestic purposes, currently negligible compared to the volume of water used in agriculture, will form a significant portion of the total water use in the future.

Similarly, food production in IGB is intricately linked to the timely supply of water. A constant supply of water for downstream irrigation results from the unique interplay between seasonal snowmelt in spring and autumn, glacier melt rising during the Asian summer months and into the monsoon season when rainfall starts to contribute, with slowly recharging groundwater resources supplementing shortfalls in supply throughout the year.

APPROACH



FUTURE CLIMATE

an ensemble of reliable climate models, which incorporates all possible futures for the South Asian river basins. These were downscaled to a high resolution, to make them useful for climate change impact modelling. Because high-altitude areas tend to get warmer faster than their surroundings, these models suggest that South Asian river basins will warm up much quicker than other areas.

FUTURE WATER AVAILABILITY

investigated the seasonal pattern of irrigation water demand resulting from the typical practice of multiple cropping in South Asia. We show that the demand for irrigation water differs sharply between seasons and regions; for instance,the relative importance of irrigation supply versus rain decreases sharply from west to east.

FUTURE WATER GAP

a high resolution representative climate dataset developed based on the latest available global climate model output.

detailed modelling framework developed to represent all important processes that influence water availability and demand, i.e. snow and glacier melt, double cropping

RESULTS

1.7°C to 6.3°C Projections of mean air temeprature

–3.1% to +37.4% high level of uncertainty regarding changes in precipitation

All projections show increases in the frequency and duration of warm spells, decreases in cold spells, and increases in the frequency of extremely high precipitation events.

Water demand in downstream areas of the IGB basins will increase strongly during the 21st century

Water used for industrial and domestic purposes, will form a significant portion of the total water use in the future.

Mean annual water availability is likely to increase due to a consistent projection across climate models of increasing precipitation in all three basins.

The increase in water availability will be larger in upstream regions of the three basins. This will increase the dependence of downstream water users on upstream water resources.

There is little space to expand the very intensive cropping system in the IGB. Therefore, increases in the demand for water for irrigation will be less than the increase in demands from other sectors.

Socioeconomic development is the main driver of the water gap in the IGB region in the future.

Consortium members

BCAS · ICIMOD · teri · WAGENINGEN UNIVERSITY & RESEARCH