Sustainable Development Investment Portfolio

Addressing South Asia's water challenges

The Sustainable Development Investment Portfolio (SDIP) is an Australian government initiative aiming to improve water, food and energy security in the major Himalayan river basins of South Asia. It supports climate resilient livelihoods and economic growth, benefitting the poor and vulnerable, particularly women and girls.

As an SDIP partner, CSIRO has been working with counterparts in Pakistan, India, Bangladesh and Nepal to develop adaptive customisable river basin planning and management platforms and tools. These are designed to inform national policies, strategies and regional dialogues on sustainable water management in the major Himalayan river basins; and to build capacity of national partners through jointly applying the tools to solve problems.

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Water challenges of the Himalayan basins

Closing the knowledge gap and capacity building

Pressure on water resources in the large Himalayan basins of South Asia is mounting due to climate change, rapid economic development and burgeoning population. Improving the knowledge base and practices for climate change adaptation in the water sector, consideration of gender equity and women's participation in water related decision-making, and river basin management can benefit South Asian economies to meet water, energy, nutrition and environmental needs of tomorrow.

During SDIP Phase 1 (2013-2016), we initiated the building of river system modelling capacity to quantify water resources, and established a collaborative environment between Australia and South Asia for sharing information. In SDIP Phase 2 (2016-2020), we are cooperating with the governments of Pakistan, Bangladesh and Nepal to use analytical tools and methods for improving understanding of the interactions between water, food and energy and exploring development pathways in the major Himalayan basins.

Achievements: knowledge and practice

Simulation tools support river basin planning in Nepal

The Koshi River flows through some of the poorest parts of China, India and Nepal. While water is abundant, water availability is highly variable and water use is underdeveloped. Understanding water balance is important to water management of the river basin.

Runoff, snow and glacier melt models were built for the headwater catchments of the Koshi Basin in Nepal and China. A collaborative model development approach, under the guidance of the Nepal-Australia Joint Advisory Committee on Water Resource Management, has provided a defensible understanding of water balance for the Koshi Basin and increased Nepal Government capability in river basin planning.

Sustainable water use for food security in Bangladesh

Groundwater dependent agricultural production in the northwest region of Bangladesh is crucial for the country's food security. We worked with researchers and policy makers from Bangladesh and Australia to estimate the sustainable level of groundwater use for irrigation under current and future climate scenarios.

Defining the sustainable level of groundwater use provided understanding for planning and management of water resources and its impact on the socio-economy and livelihoods of farmers, including women, in the northwest region of Bangladesh.

Working towards a water secure Pakistan

Pakistan is heavily reliant on surface water and groundwater resources of the Indus Basin for food and energy security. Yet, the basin is one of the most water stressed and vulnerable to climate change in the world. CSIRO worked with Pakistan government agencies to develop tools for assessing water availability, sharing and delivery. Tools include:

- rainfall-runoff models to assess the volume of water available for use in Pakistan
- seasonal flow forecasting tools used to predict water availability for the ensuing cropping season
- river and irrigation system models supporting long-term and seasonal water allocation decisions
- groundwater assessment models supporting decision-making in sustainable groundwater management
- water quality assessments supporting an understanding of water quality concerns in Ravi and Sutlej rivers
- food security analysis and cropping systems modelling that explore future food and water trends along with the implications of different water availability scenarios on food production.

Well, Topra within the district of Ranchi of Jharkhand, India

Achievements: capacity development

Connecting flow and ecology in Nepal

With local researchers, CSIRO reported on the current state of knowledge of relationships between streamflow and ecology in the Koshi Basin. This work built technical capacity in describing the relationships between ecological assets such as waterbirds, fish, and buffalo and flow attributes such as depth and duration. This is critical knowledge when assessing the ecological impacts of changes in flow associated with future pressures such as climate change. The report forms a foundational document for streamflow ecology in Nepal.

Improved basin modelling capacity in Pakistan

In Pakistan, training workshops brought together male and female professionals from government and universities to work on cropping systems and river basin modelling for integrated water resource management in the Indus Basin. Targeted training of key staff facilitated efficient operations, planning and policy formulation of water management within Pakistan.

The workshops created networks and linkages to enable informal information sharing across agencies. CSIRO also facilitated the training of two female hydrologists in river basin modelling in Australia to build modelling capacity within Pakistan government agencies.

Achievements: creating an enabling environment

High level commitment for basin planning

CSIRO created opportunities for high level knowledge exchange between water management sectors, and between Australia and several South Asian countries that will leave a legacy for Himalayan river basin management beyond the tenure of SDIP.

For example, high-level engagement and sharing of Australian experience and practices in climate change and river basin management with Indian and Nepali government agencies has significantly influenced river basin planning. Evidence suggests that both the countries are implementing basin planning as key strategies for economic development.

Gender

Coordinated efforts to integrate gender into water management

Women and girls are particularly vulnerable to the impacts of water scarcity and related energy and food insecurity. A foundational SDIP document was produced that will lead to the mainstreaming of gender in a standard results-based monitoring and evaluation framework. Staff from the Nepal-based International Centre for Integrated Mountain Development (ICIMOD) and CSIRO, with support from the Australian Department of Foreign Affairs and Trade (DFAT), collaborated over an eighteen-month period to develop the 'Mainstreaming gender in a standard results-based M&E framework', a gender-responsive approach to practice.

Brahmani Baitarni Basin, India

Rural communities in India's Brahmani-Baitarni Basin are impoverished and lack access to a reliable food source. As part of the Memorandum of Understanding on water between the governments of India and Australia, our researchers worked to build capacity and apply new knowledge, improving the understanding of water planning and modelling approaches.

Capacity building in river basin planning: training material and workshops resulted in the Central Water Commission, India, creating a team of river system modellers to support river basin planning.

Acquisition and collation of key datasets from Government of India: increased understanding of data requirements and importance of data collection standards and databases to support basin planning.

Development of a Brahmani Basin model and Basin planning scenarios: presented at International River Symposium, New Delhi in September 2016, the project team has influenced India's thinking on river basin planning, evidenced by the support of the Joint Secretary for Water at the Australian-India Joint Working Group and the framing of India's National Hydrology Program.

Our partners

- Department of Foreign Affairs and Trade (DFAT)
- International Centre of Excellence in Water Resource Management, Australia (ICE WaRM)
- Nepal – International Centre for Integrated Mountain Development (ICIMOD)
- Nepal – Australia Joint Advisory Committee on Water Resources Management
- Pakistan – SDIP Strategic Advisory Group

SDIP Phase 2 (2016-2020) outlook

CSIRO's work in SDIP Phase 2 aims to provide repeatable, quality-assured, evidence-based approaches leading to improved water resource planning and management in the Indus and Koshi basins and northwest Bangladesh.

Priority regional outcomes include:

- increased food security and economic outcomes for populations by identifying key challenges of addressing the water-food-energy nexus
- increased resilience of people and systems to adapt to the impacts of a changing climate such as planning for seasonal fluctuations in rainfall and temperature
- reduced investment risk in infrastructure development and deployment such as hydropower or irrigation by identifying water use needs for energy and agriculture.

Improving the knowledge base

In the Indus and Koshi basins and northwest Bangladesh, CSIRO will continue to collaborate with partners to demonstrate how water use decisions are connected to water, energy and food security. This will be achieved through a holistic view of the water-food-energy nexus in the river basins and the development of scenarios to support trade-offs, policy development and other management options.

Increasingly, there is recognition from both practitioners and researchers of the need for a holistic approach to scenario modelling. This is because water modelling is more than water allocation – it also has socio-economic implications. To achieve this, further research will explore how to have an interdisciplinary approach towards modelling, as well as greater participation and input from different groups of water users, including women and marginalised groups.

Canal water distribution system, Pakistan

Building capacity

Through building significant capacity among key national water decision-making authorities in the region, we aim to support and enable an environment of regional, national and sub-national water based cooperation.

Governments are then equipped with the knowledge and evidence to resolve complex and challenging social and political questions associated with water management. Adoption and implementation of models and frameworks across the region will build capacity and trust in both the biophysical evidence base and the socio-political processes for regional decision-making.

CSIRO aims to extend capacity building with educational institutions that will be training the next generation of experts. In Nepal, CSIRO is working with local universities to support student fieldwork to develop the flow-ecology knowledgebase. In Bangladesh, university students are actively involved in the research programme. In Pakistan, CSIRO continues to work with key partner agencies to enhance their skills in water resource planning and modelling, and data management.

Creating an enabling environment

CSIRO will continue to collaborate with our partners to enhance gender equity and empowerment in water management decision-making. We will share Australian experience and practices in climate change adaptation and river basin management to support change, reform and practice through high-level strategic engagements with governments and civil societies of Pakistan, Bangladesh and Nepal. Our hope is that key partner agencies will develop their own gender research and analysis skills which they can apply in future research on water.

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The CSIRO SDIP project team maintains an up-to-date website for sharing material and news on project activities.
<https://research.csiro.au/sdip>

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