

Australia China Environment Development Partnership River Health and Environmental Flows in China

Water quality is one way to monitor the health of a river. But healthy rivers are more than just clean water. Like a finely-tuned orchestra, each element of a river comes together to create a thriving, healthy waterway – from water quality, aquatic life, and physical form to stream flows and streamside (riparian) vegetation.

Environmental flows have been called the maestro of river health, bringing all the elements together in a harmonious whole. However, providing for the flow requirements of a river requires an understanding of how different flows affect, and contribute to, the ecosystem of the river. Likewise, careful river management needs to balance human needs with the needs of the environment.

Project Updates

The Australia China Environment Development Partnership (ACEDP) is a five-year Australian Government AusAID and People's Republic of China (Chinese Ministry of Commerce MOFCOM) initiative. Through ACEDP, Australia offers world-recognised knowledge and expertise to assist China with its immediate water management challenges. The following is a brief update of one of the projects - the River Health and Environmental Flow in China project. More information on the partnership and other projects is available at www.acedp-partnership.org.

- The River Health and Environmental Flow in China Project is a two-year, AUD\$3.4 million project and the largest project under the ACEDP. It aims to trial and adapt international approaches to river health and environmental flows assessments for the China scenario.

The project is focused on the three pilot sites, in the Yellow River, Pearl River and the Liao River Basins. Managed by the Brisbane-based International WaterCentre (IWC), the project involves the Ministry of Water Resources (MWR) and the Ministry of Environmental Protection (MEP) as well as three agencies under MWR and one agency under MEP.

Every river is different, with varying flow regimes that can range from flood to 'no flow'. How do we measure river health and how do we determine which assets to protect? The River Health and Environmental Flow (RH&EF) project team are working with Chinese partner organisations to develop frameworks and methodologies to measure river health and determine environment assets, and to calculate environmental flow requirements.

In the April 2010 issue:

- River health assessments help us understand the problems and threats to sustainable river function, and support the design of targeted management.
 - What is the trade-off between water for the environment and water for other uses? Researchers evaluate approaches to environmental flows assessment and make their recommendations.
 - Project updates.
- The RH&EF Project began on 3 September 2009 in Beijing, with an Inception Meeting attended by more than 40 people from China's Ministry of Water Resources, Ministry of Environmental Protection, Australian Government, the World Wide Fund for Nature, the Asian Development Bank, and various research institutes and universities.

The workshop was attended by Ms Christine Schweizer of the Australian Department of the Environment, Water, Heritage & the Arts, who is a member of the Project Steering Committee. Visits to pilot sites at Yellow, Pearl, and Liao rivers were coupled with a workshop where the project team presented the proposed methodology for the project. Read more project updates on the back page.



Why monitor river health?

Authorities in China recognise the need for a systematic, national approach to river health monitoring. The historical approach of simply measuring water quality does not go far enough to indicate the true ecological state of a river system, which must consider many different aspects. The River Health and Environmental Flow (RH&EF) project team is working towards designing a framework for river assessment that can be applied anywhere in China. The team's recommendations build on an analysis of similar programs in Australia and around the world.

River health has been described as the ability of a river ecosystem to support and maintain a balanced, integrated and adaptive community of organisms that resembles the natural habitat. In practice, river health is measured using various indicators of environmental disturbance from the healthy state, relative to some benchmark or reference condition.

The overall aim of monitoring river health is to provide information on the ecological state and functioning of a river system. This will guide rational river management decisions and actions.

The appropriate agencies are seeking a more rigorous approach to monitoring river health in China that reflects all aspects of a river's ecological condition. Under this approach, a nationally consistent program would underpin the monitoring of river conditions, evaluate the impact of management actions, and assist to prioritise rivers and river catchments for particular management attention.

A river health-monitoring program in China would be one component of a holistic, asset-based framework for evaluating river health, environmental flows and water re-allocation in the country's major river systems, as part of the new river basin master plans. Monitoring should not be restricted to a single set of indicators, and each set

should be chosen to suit local conditions and local objectives. It may be necessary to select a broad range of factors for assessment in pilot studies, and then select those that best respond in the specific river situation.

The main components of a modern river health strategy incorporate:

- Catchment processes
- In-stream physical processes – hydrology and geomorphology
- Water quality and sediment chemistry, including contaminants
- Aquatic and riparian life – flora, fauna and ecosystem processes.

These components are linked through physical, chemical and ecological processes, and a monitoring program may concentrate on one component or a combination. This choice will again depend on the local ecosystem conditions, management issues, and available resources. Clearly, the more comprehensive a program is, the more information it generates about the status of river health, the cause of identified problems, and the management approach to improve river health.

To design a health-monitoring program for rivers in China, the RH&EF project team has started with a generic monitoring framework (shown in Figure 1). The framework details how to set objectives for a program, what and how to measure, and types of benchmark for assessing the relative health of a river.

This framework is being used to develop draft monitoring frameworks for the three pilot rivers. Each pilot program will be based on the local situation and management priorities. As such, the types of river health indicators that will be measured in each basin will be selected with regard to local conditions.

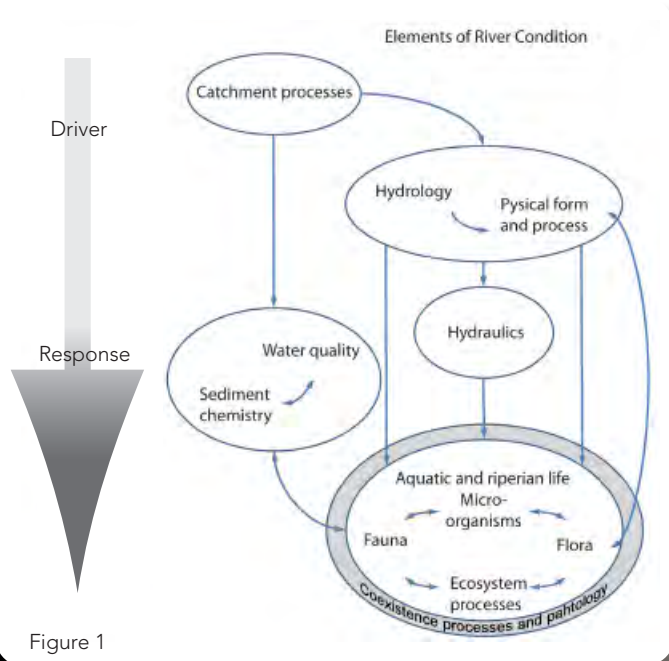


Figure 1

Which environmental assets will we protect?

The River Health and Environmental Flow (RH&EF) project team are building a strong foundation for effective decision-making about how environmental flows should be implemented across China. This includes assessing and defining environmental water needs appropriate to China's situation, how to trade stream flow requirements against the needs of other users, and how to define and identify environmental assets.

Environmental flows are those elements of a flow regime needed to achieve a certain desired state of river health, as determined by government and/or the community. China recognises the importance of environmental flows, and seeks to balance the needs of the environment with other demands on the water resource.

The growing need for energy and fresh water is being addressed through infrastructure projects, such as hydropower developments and interbasin water transfers. These projects directly compete with maintaining appropriate environmental flows.

The revision of the river basin masterplans for China's major river basins is involving the identification of environmental flows in the water allocation arrangements for the river basin. Providing for environmental flows within China's water management framework will involve changes to the way water is allocated and managed at a basin and local scale, to how hydropower systems are operated, and to the planning and development of projects at a basin scale. Each of these elements will need to be informed by an improved scientific understanding of how flows and the river ecology relate.

To effectively evaluate river health, environmental flows and water reallocation, IWC researchers recommend using an asset-based

approach to environmental flows assessment. This approach is outlined in Figure 2, and is designed such that it can be applied to any river and any environmental flows issue.

This framework can accommodate any form of environmental flow assessment, any analytical tools, any size river, any existing constraints, any existing or proposed river uses, and any balance of scientific or social input to the process. Choosing not to use some components of the framework won't prevent a result being obtained, but it may weaken confidence in the result.

A key part of this eight-step process is to identify what assets need to be protected. Environmental assets are important because of the services they provide. For example, water for irrigation may need to be balanced against stream flows that maintain a healthy environment for fish, or minimum flows required to enable navigation.

The hydrological modelling in Step 5 of the framework relies on establishing relationships between flow and ecology. As a first step, IWC researchers recommend developing a regional or national scale classification of natural river flow types. This is because streams or rivers with similar river flow types are likely to share particular ecological features or 'assets'.

Interested parties will ultimately decide on the trade-off between river health and security of supply for non-environmental users of river water. But the trade-off should relate back to the original agreed desired state of river health.

The method of assessing environmental flows will continue to be discussed and developed. But one thing is certain – by allocating water to environmental flows, China is ensuring that the benefits rivers and streams offer can be maintained and enhanced.

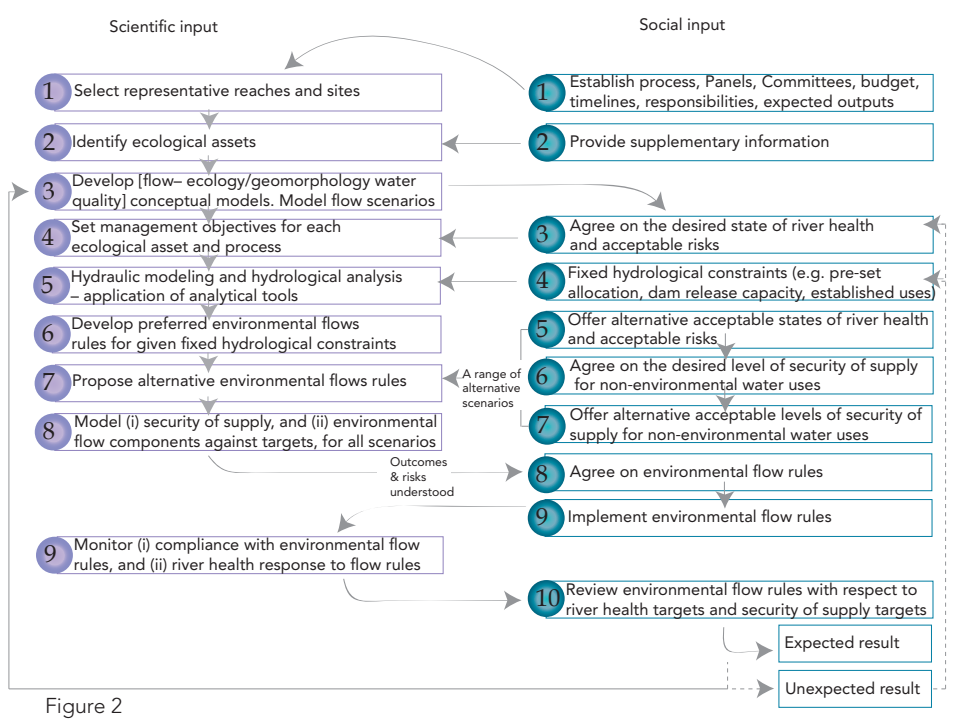


Figure 2

Project updates continued

- Chinese team members of the RH&EF project team, as well as other Chinese government officials from MWR, MEP and their agencies, gathered in Australia on 22 November 2009, to take part in a three week study tour by Chinese water managers and technicians. They were introduced to Australia's approaches to river health and environmental flow assessment and reporting.

The aim of the study tour was to enhance their understanding of key policy and institutional frameworks for planning and managing complex and large river basins. It was also designed to build capability in integrating public participation, social impacts identification and gender equity into river basin policy formulation and implementation.

- In January this year, Australian experts gathered at Pearl River in southern China to begin a six-day pilot site visit and training workshop. The visit involved four days on the Gui River in the Pearl River basin. This was followed by a two-day training workshop, which brought together some 100 officials from water agencies across the basin.

Key dates:

30, 31 March 2010: River health and e-flows training workshop in Zhengzhou

2-10 April 2010: Field assessments in Gui River, Pearl River Basin

18-28 April 2010: Field assessments in the Yellow River Basin

10-16 May 2010: Field assessments in the Liao River Basin

July 2010: River health and e-flows training workshop in Beijing; workshops to review data and develop report cards in Beijing, Zhengzhou and Guangzhou

Participants also attended an indicator and asset identification workshop, where the Pearl River Water Resource Committee put forward clear priorities around the basin and implementation programs. The aim is to develop a draft monitoring program and report card for the pilot site.

- As part of the RH&EF research placement program, up to seven technical staff from China will be visiting Australia's Griffith University and The University of Queensland for six weeks from May to June 2010. These research placements will encourage knowledge sharing and data exchange between Australian and Chinese experts. It also gives technicians high level exposure to a practical working environment.
- Two researchers from the Chinese Research Academy of Environmental Sciences arrived in Brisbane in March. Dr Kong Weijing and Dr Qu Xiaodong will be touring stream catchments and river health monitoring sites in South East Queensland used by the award winning Healthy Waterways Ecosystem Health Monitoring Program and Report Card. They will also be spending time with project team members from Griffith University and the University of Queensland analysing data from their own river health assessment pilot study on the Liao River in northern China.

Contact details:

www.watercentre.org
admin@watercentre.org
+61 7 3123 7766

For further information, please contact the Project Director, Robert Speed
robert.speed@watercentre.org,
+86 13661282792 or +61 421 544 211.

