WWF

SUMMARY

2012

Conservation | Sustainability | Climate Change

# Strategic basin planning

Developed in partnership with the General Institute of Water Resources & Hydropower Planning, Ministry of Water Resources, People's Republic of China

**About this summary**

This document summarises the findings of a collaborative effort between WWF, the General Institute of Water Resources & Hydropower Planning (GIWP), Ministry of Water Resources, People's Republic of China and a number of leading international experts from the UK, South Africa, Australia and the US. The effort was originally conceived to review and disseminate modern approaches to water management in challenging environments, and provide new insights into strategic planning and risk management of water resources.

This paper focuses on basin water allocation planning and is one in a series of three covering (i) strategic basin allocation planning (ii) strategic basin planning, and (iii) strategic flood risk management. A series of books on these three topics, encompassing both a major international review and a summation of world best practice in these fields, will be published in August 2012, in both English and Chinese.

Principal funding for the project has been provided by HSBC through the HSBC Climate Partnership. Additional support for publication has been provided by the Asian Development Bank (ADB) and UNESCO.

**Authors**

**Guy Pegram**
Pegasys Strategy and Development, South Africa

**Tom Le Quesne**
WWF, United Kingdom (corresponding author) tlequesne@wwf.org.uk

**Li Yuanyuan**
General Institute of Water Resources & Hydropower Planning (GIWP), Ministry of Water Resources, People's Republic of China

**Robert Speed**
Okeanos P/L, Australia robert.speed@okeanos.com.au

**Li Jianqiang**
Developed in partnership with the General Institute of Water Resources & Hydropower Planning, Ministry of Water Resources, People's Republic of China

# INTRODUCTION

Water provides the lifeblood of natural systems, societies and economies. People have lived near and on rivers, lakes, wetlands and deltas for many centuries. Rivers provide a multitude of services such as water supply, waste assimilation, fisheries, energy production, flood attenuation, spiritual, cultural and recreational benefits, and the habitat that supports a wide range of ecosystems.

It is precisely because water resources provide so many functions that planning for their use is so complex. The demands on rivers increasingly exceed their natural capabilities resulting in over abstraction, pollution, alien species infestation, floodplain alteration and habitat destruction. These failures are usually the consequence of poor decision-making, inadequate management and inappropriate planning. Effective basin planning is the starting point of sustainable management of river basins.

# A BRIEF HISTORY OF BASIN PLANNING

The practice of basin planning has developed over time in response to the changing demands placed on river systems by societies, and the changing conditions of rivers.

The first attempt to manage the hydrological cycle in a coherent way was undertaken in China about two millennia ago. The concept of the river basin as a unit of management became more widely established in the middle of the 19th Century. It was the massive water resources infrastructure development that took place across the world between 1920 and 1970 that ushered in a phase of 'technical water resources planning'. At the core of these initiatives was the view that river basin planning is primarily a technical activity that can be undertaken by engineers, with the objective of optimising the benefits derived from infrastructure development and operation.

During the 1970s and 1980s it became evident that engineering solutions were no longer adequate to address the multi-faceted problems of management, particularly the trade-offs between competing interests and values. The development of new approaches was influenced by a number of emerging trends in the water and environmental sectors:

- The exhaustion of options for technical, engineering solutions to problems. For example, it was no longer possible in some basins to construct new infrastructure to meet growing demand for water.
- The recognition of the importance of functioning aquatic ecosystems, and the rapid global decline in the health of freshwater ecosystems.
- The increasing costs associated with water supply and waste management.
- A desire for more decentralised management and greater stakeholder engagement.

These trends led to new approaches to water resources management and basin planning. Many countries have since embarked on policy and law reforms, in most cases embracing the suite of approaches typically associated with Integrated Water Resources Management (IWRM), including basin planning. These reforms have highlighted some of the limitations of IWRM. These have included recognition of the importance of planning in the context of limited information and imperfect institutions; the on-going importance of infrastructure; the development of approaches to basin scale environmental management; and decision-making in societies undergoing rapid economic and social change. In this context, more strategic approaches to basin planning are developing, building on the lessons from implementation in recent decades.

**The evolution of China's river basin planning**
While river management has an ancient history in China, in the second half of the twentieth century China's river basin planning has experienced the following three stages:

- From the 1950s to 1960s, the first round of river basin planning was carried out, with a focus on river regulation and management, disaster prevention and treatment. This laid the foundations for the basic layout of major water projects in China's large river basins.
- In the 1980s, the second round of river basin planning emphasised integrated water resources development. Considerations of water resources protection and management were reinforced.
- At the beginning of the 21st century, the third round of river basin planning was conducted based on the core philosophy of harmonious development between man and nature. The emphasis was on maintaining river health and ensuring sustainable development of water resources. More attention was paid to the role of river basin planning in social management.

## STRATEGIC BASIN PLANNING

Under these conditions, basin plans need to recognise and be aligned with broader economic development and planning objectives. In this context, strategic basin planning can be defined as: a coherent multi-disciplinary approach to managing basin water resources and their uses in order to identify and satisfy social, economic and environmental priorities.

The aim of strategic basin planning is not just to meet straightforward, externally set objectives, but to choose between a series of possible water management objectives that will best contribute to a range of competing economic, social and ecological goals. Further, achieving these goals typically involves the participation of a range of government bodies and stakeholders, beyond those directly involved with water management.

The following factors characterise this more strategic approach to basin planning:

- Trade-offs between alternative economic, social and environmental objectives, and between existing and potential future demands.
- Sophisticated approach to recognising environmental requirements for water and the importance of aquatic ecosystem functioning in providing goods and services for social and economic development.
- Understanding basin interactions, including a range of hydrological, ecological, social and economic systems and activities at work within a basin.
- Robust scenario-based analysis to addresses uncertainty in future development and climate, by assessing alternative hydro-economic scenarios.
- Prioritisation, whether in terms of the needs for economic development, social justice or environmental protection.
- The involvement of multi-disciplinary teams.

**Table 1:** Attributes distinguishing technical and strategic basin planning

| | TECHNICAL WATER RESOURCES PLANNING | STRATEGIC BASIN PLANNNING |
|---|---|---|
| **Extent of basin development** | Basins with 'spare' water available for development and not facing significant environmental pressures | Complex or water-stressed basins requiring difficult trade offs between economic, social and ecological objectives |
| **Issues of concern** | Responding to identified water resources pressures | Responding to broader basin stress and socio-economic pressures |
| **Purpose of basin planning** | Reconciliation of water availability or quality with existing development goals: "water for the economy" | Water planning as an integral part of development planning: "water in the economy" |
| **Objective** | Development | Protection and management |
| **Focus of attention** | Water focused: water resources infrastructure systems | Society focused: economic, social and environmental systems supported by the river |
| **Environmental requirements** | Threshold levels, in particular water quality | Maintenance of ecosystem goods and services |
| **Key skills in the planning process** | Water planner led, with a focus on engineering skills | Co-operation between development, water and environment planners |
| **Analysis techniques** | "Technical optimisation"<br>• Water resources infrastructure systems analysis<br>• Economic cost-benefit analysis<br>• Water quality assessment<br>• Future water use projections | "Economic and environmental scenarios"<br>• Integrated water resources systems analysis<br>• Social / economic analysis of water<br>• Strategic environmental assessment<br>• Scenario planning |

**Vision, objectives and actions for the Yellow River**

Planning and management in the Yellow River is guided by a hierarchy of vision, objectives, and actions. The vision for the Yellow River is to maintain a healthy Yellow River and seek long-term safety of the Yellow River, so as to support sustainable social and economic development. This is to be achieved through the following objectives:

- Effective flood management, including establishing a flood control and sediment mitigation system in the lower Yellow River.
- Management of water resources to meet the water demands for social and economic development.
- Improving and ensuring the riparian ecosystem and ensure basic ecological water requirements, to meet water quality objectives.
- Water and soil conservation initiatives, including monitoring.
- Improving river basin institutional and operational mechanisms and co-ordination.

These objectives in turn are supported by a series of strategic actions related to flood and sediment management, water allocation, water efficiency measures, pollution control, and institutional development.

### Content and structure of a basin plan

While the nature of basin plans differs from one situation to another, there are typically a number of similarities between the overall structure of basin plans. Figure 1 presents a very high level structure of a basin plan and its links to the thematic plans that support and align with it.


**Figure 1:** Interface between elements of the basin plan, supporting thematic plans, and implementation plans

### From vision to strategic action

River basin planning typically involves a series of nested statements of intent that together are the means by which basin plans are developed and implemented: these relate to the basin vision and/or goal, more concrete objectives, and specific actions.

Vision statements are often aspirational rather than specific, providing a preliminary indication of political purpose, before difficult decisions over trade-offs and investment need to be made. Basin visions tend to be developed around one or more of the following priorities (see figure 1):

- Environmental state of the water resources in providing goods and services
- Social and economic outcomes related to water use, land use or catchment areas
- Human, property or ecological risks of flooding and other disasters
- Institutional intent for cooperation, collaboration and stewardship

To be implemented, vision statements need to be translated into specific, measurable objectives and actions that are achievable with the available resources and given time frame.

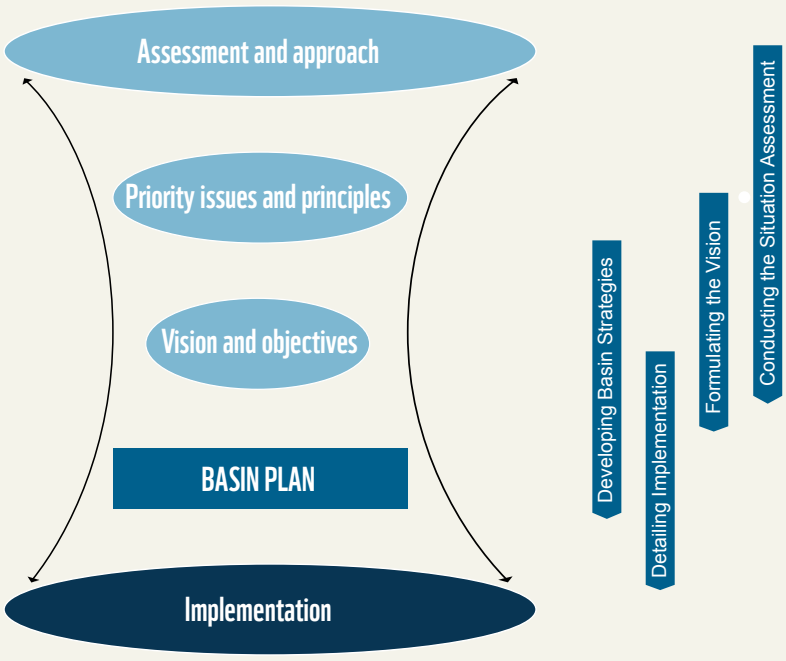
### Stages and milestones in strategic planning

Basin planning typically considers a range of social, economic and environmental issues. However, the range of issues needs to be narrowed down to key priorities to allow for a high-level strategy can be developed. Based on these priorities and this strategy, detailed implementation planning is undertaken. This basin planning process can be represented in four key stages:

- Conducting the Situation Assessment to gain an understanding of the current and future conditions in the basin; identifying and prioritising the key issues.
- Formulating the Vision and Goals to provide the long-term, aspirational desired state for the basin together with goals (preliminary objectives) and principles to achieve this over time.
- Developing the Basin Strategies to specify a coherent suite of strategic objectives and outcomes related to ecosystem protection, water use, disaster risk and institutions, designed to achieve the vision.
- Detailing the Implementation to define actions that give effect to the basin strategies and ultimately achieve the vision and objectives.

This process of narrowing, and then broadening, the scope of the planning exercise is represented by the hour-glass shape in Figure 2. Central to the process is the identification of strategic priorities and trade-offs. These priorities are determined by social preferences about the economy, society and the environment, so these choices are the fulcrum on which the basin planning process rests.

**Figure 2:**
The basin planning process



**Environmental management**

Historically, impacts on river environments have been localised, and responses could similarly be localised. Systemic threats to freshwater systems though require new approaches to basin environmental management. These approaches are characterised by the following:

- Understanding system functioning, assets and services prior to decision-making. This requires an understanding of functions performed by the river and how different activities within the basin – abstractions, flows, wastewater discharge – affect those functions. The starting point of the planning process is thus the river and its services, rather than the pressures on it.
- The incorporation of environmental goals in the basin vision and objectives. Strategic environmental objectives can also shape economic and development options and as such provide the foundations of the basin planning process.
- The emergence of basin ecological objectives. Modern basin planning is increasingly developing ecologically-based objectives. This focus on species and ecosystems represents an evolution from more traditional "environmental" objectives, for example water quality objectives.
- The establishment of different objectives, priorities, and levels of protection for different parts of a basin. This recognises the different characteristics or uses across the basin – with higher levels of protection required in some parts of the basin (e.g. key ecological zones, or sources of drinking water supply), while other areas are more heavily developed.
- Sophisticated standards and plans for a range of environmental processes. This can include rules and plans related to protecting environmental flow regimes, maintaining connectivity at the basin scale, and the management of wetlands and high conservation value species.

**Environmental components of basin visions and mission statements**

Many modern basin plans include environmental aspirations as part of the overall basin vision statement. These overarching environmental visions can then be translated into more specific objectives and actions. The Rhine 2020 Vision (2001) states: "The former network of habitats typical for the Rhine (habitat patch connectivity) and the ecological patency of the Rhine from Lake Constance to the North Sea and the patency of tributaries figuring in the programme on migratory fish are to be restored." The following specific objectives are then specified:

- Water quality must be such that the production of drinking water is possible only using simple near nature treatment procedures
- The water constituents or their interaction must not have any adverse effect on the biocoenosis of plants, animals or micro-organisms
- Fish caught in the Rhine, mussels and crayfish must be fit for human consumption
- It must be possible to bathe in suitable places along the Rhine

### Barriers to implementation

Implementation is the greatest challenge in basin planning – something that is even more difficult in stressed basins – and there is always a great risk that the plan becomes a paper plan that does not change management practice, actions or behaviour in the basin.

There can be technical barriers to implementation as a result of the design of the plan itself. This can occur where he plan is too ambitious or poorly focused, or where it is too complex and lacks alignment between different thematic areas. Equally, problems can equally arise where actions and responsibilities for implementing the plan are not clearly defined. Finally, if the plan is too inflexible to change and not robust to alternative futures, then it will be difficult to implement.

There are also a number of critical contextual issues that may impede implementation. These include:

- **Lack of political commitment and awareness.** Inadequate leadership to drive implementation and allocate resources can mean that other stakeholders may not adopt the necessary changes.
- **Absence of stakeholder legitimacy and cooperation.** This can occur where stakeholders are not supportive of the plans, objectives and actions, and is best addressed by an appropriately constructed stakeholder engagement process linked to the development of the plan.
- **Limited institutional mandate and capacity.** The inability of key institutions to give effect to the strategic actions of the basin plan. This requires a supportive enabling environment (i.e. policy and legislation), as well as institutional strengthening and capacity building.
- **Poor information and communication.** Sound monitoring systems, communications strategies, formal communication and stakeholder engagement mechanisms facilitate improved information sharing to support action.

**Failure of implementation: The Ganga Action Plan**

In response to serious declines in water quality in the River Ganga as result of industrial and sewage pollution, the Government of India launched the Ganga Action Plan (GAP) in 1985. The GAP was a highly ambitious plan to improve water quality through investment in treatment capacity. The Government of India established new institutions to manage and implement the plan, including the Central Ganga Authority in February 1985 under the chairmanship of the Prime Minister, and an executive body under the Department of Environment, to execute the projects under the Authority. Despite this high-level political support, the GAP failed to achieve its objectives. By 2000, only 39% of the intended treatment capacity had been installed, and, even then, many of these plants were either totally or partially inoperative. Between 1993 and 1999 water quality in the river actually deteriorated. Following the failed implementation of the GAP, subsequent efforts have been launched, including the establishment in 2009 of the new National River Ganga Basin Authority, chaired again by the Prime Minister.

*Source: Review of the Ganga Action Plan, Comptroller and Auditor General, Government of India (2000), available at http://www.cag.gov.in/reports/scientific/2000_book2/gangaactionplan.htm*

## GOLDEN RULES OF BASIN PLANNING

Basin planning approaches have developed across the world in response to shifting priorities, different crises and increasing complexity in water resources management. Despite this variety, a number of key issues have emerged as central to the challenge of basin planning.

1. Develop a comprehensive understanding of the entire system.
2. Plan and act, even without full knowledge.
3. Prioritise issues for current attention, and adopt a phased and iterative approach to the achievement of long-term goals.
4. Enable adaptation to changing circumstances.
5. Accept that basin planning is an inherently iterative and chaotic process.
6. Develop relevant and consistent thematic plans.
7. Address issues at the appropriate scale by nesting local plans under the basin plan.
8. Engage stakeholders with a view to strengthening institutional relationships.
9. Focus on implementation of the basin plan throughout.
10. Select the planning approach and methods to suit the basin needs.

# The world's freshwater in numbers

100% RECYCLED

**60%**

of the world's largest river systems are strongly or moderately affected by fragmentation

**80%**

of sewage in developing countries is discharged untreated

**2.5M**

the number of people killed by water disasters since 1970

**20%**

of the world's electricity supply is generated from hydropower

**Why we are here**
To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

wwf.org.uk