



RETA 6470:

**Managing water in Asia's river basins:
Charting progress and facilitating investment
(Financed by the Japan Special Fund)**

Inception report

March 2009

Asian Development Bank

Updates

- 0 1st draft for internal circulation
 - 0a Over-all copy-editing; Appendix D expanded (but still incomplete)
 - 0b Polishing of Appendix F.3
 - 0c Many upgradings in response to guidance received: Summary, Chapter 1, 3.4, 4.3, Appendices C, E2, E3, E4, F1, G, H
Parts of Appendix F3 shifted to Working Paper 6 (roadmaps)
 - 0d - 0g Some minor changes; American spelling of CRBOM
 - 0h Roadmap terminology modified
 - 0i Minor changes
- 1 Same as 0i, final

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Acronyms and abbreviations

APWF:	Asia-Pacific Water Forum
CNMC:	Cambodia National Mekong Committee
CRBOM:	Center for River Basin Organizations and Management
DONRE:	(Province) Department of Natural Resources and Environment
EEPSEA:	Economy and Environment Program for Southeast Asia
GWP:	Global Water Partnership
IUCN:	World Conservation Union
IWMI:	International Water Management Institute
IWRM:	Integrated water resources management
JICA:	Japan International Cooperation Agency
JWA:	Japan Water Agency
MDG:	Millennium development goal/goals
NARBO:	Network of Asian River Basin Organizations
RAS:	Roadmap advisory service
RBO:	River basin organization
RETA:	Regional technical assistance
SEA:	Strategic social and environmental assessment
TA:	Technical assistance
TKPSDA:	Tim Koordinasi Pengelolaan Sumber Daya Air ['water council', Indonesia]

Summary

RETA 6470, *'Managing Water in Asia's River Basins: Charting Progress and Facilitating Investment'* is implemented by ADB and forms a part of the work programme of the Network of Asian River Basin Organizations (NARBO), in response to a request from NARBO to ADB at NARBO's 2nd General Meeting.

A close dialogue will be maintained with various partners, expectedly including various river basin organizations and involved agencies; Asia-Pacific Water Forum (APWF) and Japan Water Forum; as well as parallel development initiatives by ADB, JICA, and others. Particular synergies will be pursued with the new *'Center for River Basin Organizations and Management (CRBOM)'*, established by Ministry of Public Works, Indonesia, as a member of the network of regional knowledge hubs within the APWF framework.

Over a period of two years, the project will compile a regional overview of IWRM in river basins, assist Asian river basin organizations with preparing action-oriented river basin investment roadmaps, and provide or facilitate related capacity-building. Activities include country assessments, performance improvement of river basin organizations, and roadmap advisory services for water-related development initiatives.

Pilot implementation will take place in five basins. They are located in northeast Cambodia (the 4-Ps area of Prek Preah, Prek Krieng, Prek Kampi, and Prek Te); India (the Baitarani Basin in Orissa); Indonesia (Bengawan Solo Basin in Central Java); the Philippines (to be identified), and Viet Nam (the Vu Gia-Thu Bon Basin near Da Nang).

The present inception report describes the context, scope and implementation of the project, together with outlines of proposed modalities for roadmap advisory services, country performance assessment, and river basin organization benchmarking.

An important part of its objective is to serve as a reference during consultations about scope, approach, interfaces and collaboration opportunities.

1 Introduction

Asia's river basins are rich and diverse. They offer a variety of livelihoods, abundant natural resources, unique habitats, and, in many cases, an attractive scope for development. Each basin has its own individual context in terms of resources and development agenda. Policies, legislation and management frameworks vary from one place to another, and over time, following a cycle of reform and consolidation.

Basin-level water management is a powerful tool for holistic and forward-looking development planning with clear priorities and in response to new challenges and new opportunities (including new knowledge and new technology). Throughout Asia, in recent years, many positive lessons have been learnt that are well suited for sharing with others.

RETA 6470, '*Managing water in Asia's river basins: Charting progress and facilitating investment*' will contribute to good river basin management practices with a focus on action-oriented, IWRM-based development planning. The aim will be achieved by a set of pilot initiatives, to be implemented in collaboration with representatives from the Asian community of river basin managers, practitioners and scientists, as well as others involved in resource-based development planning.

The present inception report is intended as a reference for dialogue about scope, approach, interfaces, and opportunities for collaboration with related development initiatives, in support of efficient progress towards a useful outcome.

2 Implementation context

Implementation takes place on an ever-changing background of related development initiatives. The usefulness of the results is supported by a dynamic interaction, interfacing and knowledge-sharing.

Background¹

Adopted in 2001, of the Asian Development Bank (ADB) *Water for All Policy* fosters integrated water resources management (IWRM), as well as improvements in water service delivery. Across the region, ADB clients have adopted IWRM, and an increasing number of water loans are now prepared for river basins. In 2005-2006, one third of approved water technical assistance (TA) activities and one quarter of approved water loans were for river basin investments. In many cases, the preparations included the establishment or strengthening of a river basin organization (RBO) to facilitate IWRM.

In March 2006, at the 4th World Water Forum in Mexico City, Mexico, ADB announced its *Water Financing Program for 2006-2010* to double water investments and achieve targeted outcomes through rural, urban, and basin water investments. One target is to help introduce IWRM in 25 river basins.

Network of Asian River Basin Organizations (NARBO)

(from <http://www.adb.org/Water/narbo/>)

... was initiated in 2003 with support from ADB, ADB Institute, and the Japan Water Agency
 ... promotes and supports IWRM-based good governance at the river basin level by knowledge-sharing and capacity-building

In 2005, NARBO initiated an RBO performance benchmarking with a peer review process

RETA 6470 is implemented as an integral part of NARBO's work programme

In 2006, NARBO's 2nd General Meeting requested that ADB: (i) lead the introduction of RBO performance benchmarking and peer review; (ii) support capacity development in RBOs; (iii) chart the progress of IWRM in river basins in the region; and (iv) facilitate further investments in river basin projects to introduce IWRM, involving RBOs as facilitators. The present RETA 6470 is implemented in support of these aims, within the wider perspective of ADB's Water Financing Program.

¹ Most of this section is quoted from ADB (Jun 08)

ADB's Water Financing Program

(from <http://www.adb.org/Water/WFP/default.asp>)

In response to international calls for increased financing for water, ADB launched its *Water Financing Program* to double investments in the sector between 2006 and 2010. Setting a precedent among multilateral development banks, the programme committed to devoting 25% of ADB's investment portfolio to water projects and set out to deliver the following specific outcomes:

- 200 million people with sustainable access to safe drinking water and improved sanitation
- 100 million people with reduced risks to flood
- 40 million people with more productive and efficient irrigation and drainage services
- 25 river basins introduced to integrated water resources management (IWRM)
- Improved water governance through national water reforms and capacity development

As another recent initiative, NARBO's support to the RBOs has been extended with peer reviews and performance benchmarking. Presently, ten RBOs have joined the process, with four RBOs having completed their peer review by 2007.²

Related activities

Several related activities have been completed in the recent past, or are taking place in parallel, or are in a state of preparation.

ADB is undertaking comprehensive regional and national water-related development initiatives, in direct or indirect support of its Water Financing Program. Examples are listed in Appendix D.

APWF has recently formed a network of regional knowledge-hubs, which, between them, provide a powerful coverage of key IWRM-related disciplines and perspectives. The establishment by Indonesia of a regional knowledge hub, *Center for River Basin Organizations and Management (CRBOM)*, was announced at the 1st Asia-Pacific Water Summit in Japan in December 2007. The present project will be implemented in a close interaction with CRBOM.

The APWF network of regional knowledge hubs

(from <http://www.apwf-knowledgehubs.net/>)

The network was launched in June 08. By early 2009, it has the following participants:

Urban water management: The PUB Water Hub (of Public Utilities Board), Singapore

Disaster risk reduction and flood management: International Centre for Water Hazard and Risk Management (ICHARM), Japan

Water and climate change adaptation in Southeast Asia: National Hydraulic Research Institute of Malaysia (NAHRIM)

River basin organizations and management: Center for River Basin Organizations and Management (CRBOM), Indonesia

Water quality management in river basins: Korea Water Resources Corporation (K-water)

Decision support systems for river basin management (hydroinformatics): Centre for Hydroinformatics in River Basins (CHIRB), China

Water governance: Institute of Water Policy (IWP), Lee Kuan Yew School of Public Policy, National University of Singapore

Irrigation service reform: International Water Management Institute (IWMI), Sri Lanka

IWRM in Central Asia: Central Asia IWRM Resource Centre, Uzbekistan

IWRM in the Pacific: Pacific IWRM Resource Centre, Fiji Islands

Erosion and sedimentation in river basins: International Research and Training Centre on Erosion and Sedimentation (IRTCES), China

Healthy rivers and aquatic ecosystems: International Water Centre (IWC), Australia

²

Performance benchmarking and peer reviews have been completed in the Citarum River Basin (Indonesia), Mahaweli River Basin (Sri Lanka), Laguna de Bay Lake Basin (Philippines), and Red River (Viet Nam)

The 10 key operating principles for APWF knowledge hubs

- 1 Vision and leadership for achieving results in the hub's priority topic
- 2 A focus on meeting client needs with relevant and feasible solutions
- 3 An inclusive attitude to knowledge networking with clients and partners
- 4 An (international) team of experienced specialists working at the hub
- 5 A stimulating research environment at the hub, including internships
- 6 Generation, identification, and dissemination of state-of-the-art knowledge
- 7 Regular comparative analysis of progress in countries across the region
- 8 Excellent products and services for knowledge and capacity development
- 9 Adequate human and financial resources to develop the hub's excellence
- 10 An entrepreneurial approach to developing a sustainable business model.

IWRM knowledge base development and capacity-building

International and regional knowledge base development and capacity-building are undertaken on an institutional basis by for example

- Asia-Pacific Water Forum, initiated in 2006
- CapNet, with regional CapNets for South and Southeast Asia, as well as in many countries
- Global Water Partnership (GWP), founded in 1996, with regional partnerships in South and Southeast Asia (as well as elsewhere), and numerous national bodies
- Indonesia Water Partnership (arranges a regional river basin workshop in June 2009)
- International Network of Basin Organizations (INBO), established in 1994
- International Water Management Institute (IWMI), founded in 1984
- Japan Water Agency
- Network of Asian River Basin organizations (NARBO), initiated in 2003
- UNESCO Water and World Water Assessment Programme, founded in 2000, and the UNESCO-IHE Institute for Water Education

National knowledge base development and capacity-building are undertaken by various organizations, projects and programmes in each country.

3 RETA 6470 components and activities

3.1 Overview

RETA 6470 has four components:

- A A Project Development Facility, aiming at promotion of IWRM-based development initiatives at the river basin level;
- B an RBO knowledge service;
- C country performance assessments; and
- D RBO performance improvement (by support to capacity development).

Pilot implementation will take place in river basins located in Cambodia (the 4-Ps area of Prek Preah, Prek Krieng, Prek Kampi, and Prek Te), India (the Baitarani), Indonesia (Bengawan Solo), the Philippines (to be identified), and Viet Nam (Vu Gia-Thu Bon).

Figure 1: Location of pilot basins



A close dialogue will be maintained with partners, expectedly including various river basin organizations and involved agencies; IWMI and IUCN; and NARBO and APWF, including Japan Water Forum, as well as parallel development initiatives by ADB, JICA, and others. Particular synergies will be pursued with the new Center for River Basin Organizations and Management (CRBOM), established by Ministry of Public Works, Indonesia, as a regional knowledge hub under the APWF framework.

3.2 Components and activities

This section is based on ADB's Board Paper, (ADB Jun 08), with minor adjustments only

A Project development facility

A roadmap advisory service (RAS) will be developed to help RBOs in preparing roadmaps for long-term integrated river basin investment programs. It will be tested and consolidated in the pilot basins.

The following activities are envisaged:

- A.1 Prepare draft RAS guidelines to define objectives, process, requirements and outputs (by the RETA, during its inception phase) (please refer to Appendix F);

- A.2 for each pilot basin, prepare or update a river basin profile, using the RAS guidelines. This activity will be conducted by each RBO in collaboration with stakeholders, largely by their own resources;
- A.3 for each pilot basin, conduct a river basin profile assessment to identify IWRM investment needs. This and the following two activities will involve a small RAS team of international and national specialists and NARBO peer experts;
- A.4 for each pilot basin, conduct a 1st basin stakeholder workshop to discuss the assessment's findings;
- A.5 for each pilot basin, develop a roadmap outline for a long-term integrated river basin investment program;
- A.6 for each pilot basin, prepare a draft roadmap (by each RBO);
- A.7 for each pilot basin, conduct a 2nd basin stakeholder workshop to review the draft; and
- A.8 for each pilot basin, finalize the roadmap (by each RBO).

The outcome will serve as a basis for future project preparatory TA aiming at implementation of one or several investment projects, and possibly involving initial social and environmental examination (IEE) and/or strategic social and environmental assessment (SEA).

B RBO knowledge service

Up-to-date information and knowledge will be compiled and provided to better equip RBOs in addressing changing river basin management needs for IWRM. The following activities are envisaged:

- B.1 Compile documents, guidelines and case studies from partners as well as by in-house capacity, with emphasis on electronic documents;
- B.2 establish an www.crbom.org website; and
- B.3 disseminate knowledge products via the website and in other ways (in connection with training, by direct networking, etc).

This component will link closely with parallel providers of knowledge about IWRM and RBOs, including the APWF network of regional knowledge hubs.

Examples of subjects

- Urbanization
- Decentralization
- Stakeholder collaboration
- Water rights and allocation
- Adaptation to climate change
- Integrating environmental management in infrastructure and water services development

C Country performance assessments

Systematic country performance assessments will be conducted to chart the progress of introducing IWRM against operational indicators and to gather experience and lessons learnt from basin projects implemented to date. These assessments will involve national water sector apex bodies, key water agencies, RBOs, and other stakeholders, and will result in specific recommendations for investment programs to address the changing needs in IWRM.

- C.1 Prepare draft assessments, possibly using guidelines as indicated in Appendix G;
- C.2 consult stakeholders about preliminary findings and adjust accordingly; and
- C.3 publish the results, highlighting the region's overall performance, challenges, lessons learnt, and opportunities for basin water investments.

D RBO performance improvement

Capacity development activities will be organized to improve RBO performance through diagnostic assessments, training programs, workshops, and seminars. These are expected to include:

- D.1 Training workshops for RBOs and stakeholders on preparing investment roadmaps with the RAS;
- D.2 peer reviewer certification training for senior RBO staff to conduct NARBO's performance benchmarking service;
- D.3 performance benchmarking on a pilot basis, possible drawing on the indicative outline attached as Appendix H;
- D.4 leadership training for RBO champions in implementing IWRM and organizational changes; and
- D.5 seminars on adapting to the changing needs in IWRM and on improving water governance.

3.3 Summary of outputs

The following outputs are expected to be produced under each component in 2009 and 2010:

General

- Inception report and inception workshop: 1st quarter 2009
- Mid-term report: 4th quarter 2009
- Completion report and completion workshop: 4th quarter 2010

A Project Development Facility

- Draft RAS guideline: 1st quarter 2009
- 5 river basin profiles: 3rd quarter 2009
- 5 river basin profile assessments to identify IWRM investment needs: 4th quarter 2009
- 5x2 basin stakeholder workshops: 1st quarter 2010
- 5 roadmaps: 2nd quarter 2010

B RBO knowledge service

- An electronic archive with courseware and reference documents: 2nd quarter 2009
- An www.crbom.org website, consolidated with useful documents: 2nd quarter 2009

C Country performance assessments

- 5+ draft country performance assessments: 1st quarter 2010
- Stakeholder workshop: 2nd quarter 2010
- River basin publication: 3rd quarter 2010

D RBO performance improvement

- 5 training workshops for RBOs and stakeholders on preparing investment roadmaps with the RAS (expectedly back-to-back with the 1st series of basin stakeholder workshops under Component A): 4th quarter 2009
- Peer reviewer certification training: 3rd quarter 2009
- 5 performance benchmarking reviews: 2nd quarter 2010
- Leadership training seminar: 3rd quarter 2010
- 1-2 water governance seminars: 4th quarter 2010

3.4 Reporting

The reporting will include

- Basic project reporting:
 - o The present inception report;
 - o quarterly progress reporting;
 - o a mid-term-report; and
 - o a completion report.
- A series of workshop reports
- A stand-alone publication about river basins in Asia, produced under activity C.3
- A series of thematic working papers, expectedly describing
 - o each pilot basin, in two different perspectives: Its development needs and opportunities (in support of roadmap preparation) and its institutional framework (in support of the RBO performance review) (possibly taking Appendix E and its references as a starting point);
 - o proposed routines for roadmap preparation, country performance assessment, and RBO benchmarking (possibly taking Appendices F, G and H and their references as starting points); and
 - o other subjects.

Working papers, planned or in preparation

- 1 Bengawan Solo Basin - development needs and opportunities (jointly with Tim Koordinasi Pengelolaan Sumber Daya Air, TKPSDA)
 - 2 Vu Gia-Thu Bon Basin - development needs and opportunities (jointly with DONRE, Quang Nam Province)
 - 3 The 4-Ps Area, Cambodia - development needs and opportunities (jointly with Cambodia National Mekong Committee)
 - 4 (Not yet initiated, about the Baitarani Basin)
 - 5 (Not yet initiated, about a basin in The Philippines)
 - 6 Roadmaps for IWRM-based river basin development (jointly with CRBOM) (cf. Appendix F)
 - 7 Assessment of national IWRM implementation (jointly with CRBOM) (cf. Appendix G)
 - 8 Assessment of river basin organizations (jointly with CRBOM) (cf. Appendix H)
- ... Various other monographic papers, to be produced by the participating RBOs, as well as by CRBOM. These papers will present a range of aspects of river basin management, describing benefits and lessons learnt, with a view to innovative approaches of broad interest.

Relevant parts of the documentation will be compiled into an '*electronic library*' together with various ADB publications and other papers and reports.

4 Implementation

4.1 Implementation partners

General

Collaboration has been initiated with

- Network of Asian River Basin Organizations (NARBO) and Japan Water Forum, in connection with peer reviews and benchmarking of river basin organizations, and related training and capacity-building
- Asia-Pacific Water Forum (APWF), in connection with the formation of Center for River Basin Organizations and Management (CRBOM) as a member of the APWF network of regional knowledge hubs;
- Ministry of Public Works, Indonesia, as the mother organization of CRBOM and the host of RETA 6470
- JICA, in connection with its capacity development project in Indonesia (and, expectedly, in other connections as well)

Also, collaboration has been initiated with the river basin organizations (or other bodies) that are involved in the pilot basins:

- Cambodia Water Partnership (CamboWP) and Cambodia National Mekong Committee (CNMC)
- (India)
- Bengawan Solo RBO (Balai Besar Wilayah Sungai Bengawan Solo) and the branch office of Jasa Tirta Public Corporation I (Perum Jasa Tirta , PJT I)
- (Viet Nam)

Collaboration is anticipated with

- International Water Management Institute (IWMI), which may possibly assist with for example peer reviewer certification training for RBO performance benchmarking
- IUCN, which may possibly collaborate in training workshops and seminars
- ADB Institute, which may possibly collaborate in training workshops and seminars

Others with a background or interest in IWRM-based basin-level management and development planning are most welcome to collaborate in one way or another, for example by exchange of documentation, mutual participation in meetings and workshops, active participation in the various activities, or simply by providing suggestions and guidance.

TA advisory group

Senior experts from development partner organizations will be invited to advise key stages of TA implementation (especially during inception and initial provision of roadmap advisory services), and to review workshop proceedings and other outputs. The TA advisory group may include experts from the NARBO secretariat and knowledge partners, such as the Japan Water Agency, Japan International Cooperation Agency (JICA), IWMI, IUCN, APWF, and the Japan Water Forum (APWF's secretariat). The organizational arrangements will be finalized during the inception phase.

Relations with CRBOM

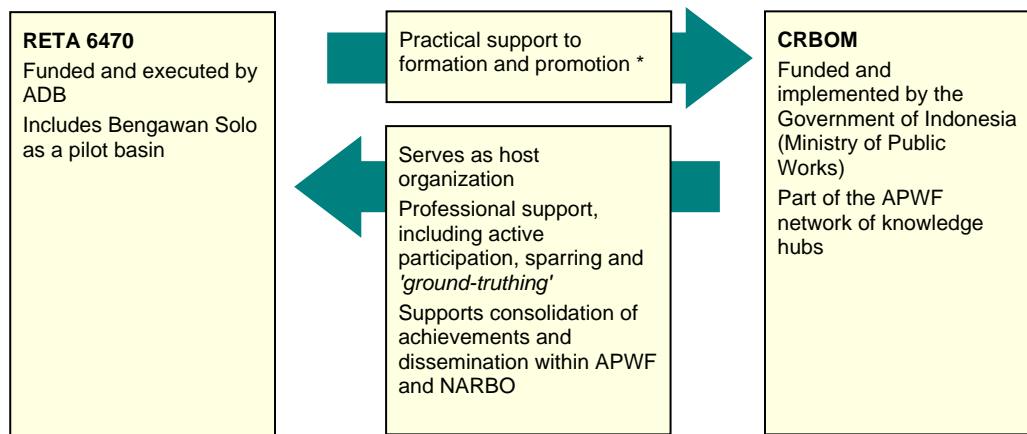
CRBOM, with its closely related agenda, will serve as host organization for RETA 6470. A close collaboration will be maintained, including the RBO benchmarking and roadmap advisory services, and various training and capacity-building efforts.

Center for River Basin Organizations and Management (CRBOM)

Center for River Basin Organizations and Management (CRBOM) was announced at the 2008 Singapore Water Week as a member of the Asia-Pacific Water Forum (APWF) network of regional knowledge hubs. While the other knowledge hubs are existing and well consolidated operations, CRBOM is established as a new center to join the network.

The Center is hosted by Ministry of Public Works via its River Research Institute (Balai Sungai). Building on the comprehensive expertise available with national agencies and river basin organizations (RBOs), the Center will compile, produce and share expertise within IWRM-based, development-oriented river basin management. By its own capacity, or jointly with partners, the Center will undertake research and development, produce documentation, and provide advisory services and education

Figure 2: Synergies between RETA 6470 and CRBOM



* The support may for example include assistance with a small business plan, a training catalogue, and various courseware

The relations between CRBOM and the new '*Dissemination Unit for Water Resources Management and Technology*' (DUWRMT) (presently being established with support from JICA) are not yet defined, but the two bodies will be located side by side in Ministry of Public Works' compound in Solo, so there will be a clear scope for day-to-day liaison.

4.2 Staffing

The following staffing is envisaged:

- A senior IWRM specialist (24 person-months) serving as adviser and stationed at CRBOM;
- a knowledge management specialist (6 person-months) for the publication and dissemination activities:
- a TA coordinator (6 person-months) at ADB headquarters to monitor and coordinate the implementation of TA activities with ADB's Water Community of Practice and regional departments; and
- 10 project specialists (2 person-months each, with expertise in either water resources, environment, or governance, as needed) to support the RAS in the pilot basins

Guidance, supervision and backstopping will be provided by ADB staff.

References

Additional references are listed in Appendices E, F, G and H.

- ADB (Jan 09): Aide Memoire. Inception mission to Indonesia for RETA 6470, managing water in Asia's river basins: Charting progress and facilitating investments
- ADB (Nov 08): Promoting climate change impact & adaptation in Asia and the Pacific. TA 6420 REG Performance Report
- ADB (Jun 08): Managing water in Asia's river basins: Charting progress and facilitating investment (financed by the Japan Special Fund) (Project 41063). Regional Technical Assistance Report
- Arriens, Wouter Lincklaen (Feb 08): Measuring the performance of RBOs and river basins. Opening remarks at the 3rd NARBO General Meeting
- Jønch-Clausen, Torkil (Jan 04): Integrated water resources management (IWRM) and water efficiency plans by 2005 - why, what and how? Global Water Partnership
- Kei Saiki (Jan 08): A Design of IWRM basin performance benchmarking program. ADB and University of Tokyo
- Yusuf, Arief Anshory and Herminia A Francisco (Jan 09): Climate change vulnerability mapping for Southeast Asia. Economy and Environment Program for Southeast Asia (EEPSEA)
- Zhou Yaozhou (Sep 08): Promoting environmental flow management in Asian rivers: Policy, cases, and lessons. Slide presentation at 11th River Symposium, Brisbane

Websites

- ADB Water for All: www.adb.org/Water/
- Capacity Building for Integrated Water Resources Management (CapNet): www.cap-net.org
- GWP: www.gwpforum.org
- International Network of Basin Organizations (INBO): www.inbo-news.org
- Intergovernmental Panel on Climate Change (IPCC): www.ipcc.ch
- International Water Management Institute (IWMI): www.iwmi.cgiar.org
- Network of Asian River Basin Organizations (NARBO): www.narbo.jp
- UNESCO Water and UNESCO World Water Assessment Programme: www.unesco.org/water/
- Waterencyclopedia: www.waterencyclopedia.com
- Wikipedia: www.wikipedia.com
- World Water Council (WWC): www.worldwatercouncil.org
- ... and many more!

Appendix A: RETA 6470 at-a-glance

This appendix is an extract from ADB (Jun 08)

The TA aims to encourage further basin water investments under the Water Financing Program and demonstrate good IWRM practices in river basins across the region.

Pilot activities will be conducted in river basins located in Cambodia (the 4-Ps area of Prek Preah, Prek Krieng, Prek Kampi, and Prek Te), India (the Baitarani), Indonesia (Bengawan Solo), the Philippines (to be identified), and Viet Nam (Vu Gia-Thu Bon).

The TA is financed on a grant basis by the Japan Special Fund, funded by the Government of Japan. It is executed by ADB over a period of 24 months.

The TA will be hosted by a new organization being established in Indonesia under Ministry of Public Works: Center for River Basin Organizations and Management (CRBOM). The center is part of Asia-Pacific Water Forum (APWF) network of regional knowledge hubs.

The TA has four components:

A *A Project Development Facility*

Roadmaps for long-term integrated river basin investment programs will be prepared for each pilot basin. A roadmap advisory service (RAS) will be developed to assist the RBOs with this work.

A small RAS team of international and national specialists and NARBO peer experts will be mobilized for the purpose.

B *RBO knowledge service*

Up-to-date information and knowledge will be compiled and shared to better equip RBOs in addressing the changing river basin management needs for IWRM, including urbanization, decentralization, stakeholder collaboration, water rights and allocation, adaptation to climate change, and integrating environmental management in infrastructure and water services development.

Online access and dissemination of knowledge products and services will be provided via CRBOM.

C *Country performance assessments*

Systematic country performance assessments will be conducted to chart the progress of introducing IWRM against operational indicators and to gather experience and lessons learnt.

The results will be disseminated in a publication that will highlight the region's overall performance, challenges, lessons learnt, and opportunities for basin water investments.

D *RBO performance improvement*

Capacity development activities will be organized to improve RBO performance, expectedly including:

- (i) training workshops for RBOs and stakeholders on preparing investment roadmaps with the RAS,
- (ii) peer reviewer certification training for senior RBO staff to conduct NARBO's performance benchmarking service,
- (iii) leadership training for RBO champions in implementing IWRM and organizational changes, and
- (iv) seminars on adapting to the changing needs in IWRM and on improving water governance.

Appendix B: RETA 6470 design and monitoring framework

(Appendix 1 in ADB's approved Board Paper, June 2008)

<i>Design summary</i>	<i>Performance targets and/or indicators</i>	<i>Data sources and/or reporting mechanisms</i>	<i>Assumptions and risks</i>
Impact			
Quality of water resources management is improved and progress of IWRM implementation in the Asia and Pacific region is accelerated	<p>Implementation of IWRM in the region significantly improved</p> <p>Basin water targets under ADB's Water Financing Program (WFP) achieved</p> <p>Water-related MDG targets achieved in the region by 2015</p>	<p>APWF and ADB water reports on region's progress</p> <p>WFP reports</p> <p>UNESCAP-ADB progress reports on MDGs</p>	<p>Assumptions</p> <ul style="list-style-type: none"> • Stronger enabling environment for IWRM including updated legislation • Political will and commitment of governments and RBOs to implement IWRM <p>Risk</p> <ul style="list-style-type: none"> • Low priority for basin water investments for IWRM
Outcome			
<p>Basin water investments under WFP encouraged</p> <p>Demonstrated good practices in introducing IWRM in river basins</p> <p>Enhanced RBO knowledge in new basin challenges</p> <p>Improved RBO performance</p>	<p>Number of basin water projects identified in WFP</p> <p>Good practices for IWRM demonstrated in WFP</p> <p>RBOs train staff and basin stakeholders</p> <p>Higher performance ratings of RBOs</p>	<p>WFP reports</p> <p>Basin plans and WFP reports</p> <p>Knowledge products, RBO reports, and web sites</p> <p>NARBO performance benchmarking service</p>	<p>Assumptions</p> <ul style="list-style-type: none"> • Technical and institutional capacities for IWRM • Financing for IWRM investments are available <p>Risks</p> <ul style="list-style-type: none"> • Lack of technical and institutional capacities for IWRM • Lack of coordination resulting in fragmented investments
Outputs			
<ol style="list-style-type: none"> 1. Roadmaps for basin investments 2. Establishment of the RAS 3. Online access and dissemination of IWRM publications and services 4. Country performance assessments for IWRM 5. Dialogues on country and basin assessments 6. Publication on regional overview of IWRM progress 7. Knowledge products on priority topics and case studies 8. Capacities of RBOs on IWRM developed 	<p>Investment roadmaps prepared by five RBOs</p> <p>The RAS developed and piloted in five river basins</p> <p>Higher demand for products, online and offline</p> <p>At least five assessments completed</p> <p>Five successful dialogues with stakeholders held</p> <p>Publication widely disseminated</p> <p>Publications widely disseminated</p> <p>Five RBOs with improved capacities on IWRM; dialogues, training, workshops, and seminars successfully held</p>	<p>RBO reports, RBO web sites, progress reports</p> <p>RBO reports, RBO web sites, progress reports</p> <p>RBO reports, RBO web sites, ADB and NARBO web sites, progress reports</p> <p>Progress reports, publications, ADB and NARBO web sites</p> <p>Dialogue reports</p> <p>Progress reports, web sites</p> <p>RBO reports, RBO web sites, progress reports, publications, ADB and NARBO web sites</p> <p>RBO reports, event proceedings prepared by consultants</p>	<p>Assumptions</p> <ul style="list-style-type: none"> • RBOs strengthen hardware, software, and human resources based on improved knowledge • RBOs commit to pilot the RAS <p>Risks</p> <ul style="list-style-type: none"> • Lack of available staff to participate in training • Stakeholders are unable to participate in consultations and training

Activities with milestones	Inputs
<i>Component 1: Project development facility</i>	
1.1 Develop the RAS guidelines (third quarter 2008)	ADB:
1.2 RBOs prepare or update river basin profile (fourth quarter 2008)	• 2 million USD
1.3 The RAS conducts river basin assessments, and identifies IWRM investment needs (second quarter 2009)	Government:
1.4 Conduct basin stakeholder workshops (fourth quarter 2009)	• Participation in workshops, training seminars, dialogues
1.5 Finalize the investment roadmaps (first quarter 2010)	RBOs:
<i>Component 2: RBO knowledge service</i>	
2.1 Develop knowledge products on new basin challenges (fourth quarter 2009)	• Participation in workshops, training seminars, dialogues
2.2 Develop online IWRM knowledge services (third quarter 2009)	IWMI:
2.3 Publish assessment of IWRM elements and roadmap (first quarter 2010)	• Expected to conduct peer reviewer certification training for RBOs on performance benchmarking service
2.4 Publish case studies on innovative approaches emerging from assessments (second quarter 2010)	
2.5 Improve online access and dissemination of publications (third quarter 2009)	
<i>Component 3: Country performance assessments</i>	
3.1 Conduct country performance assessments on introducing IWRM in river basins (first quarter 2009)	IUCN:
3.2 Analyze and publish results of the country action plan and regional overview (third quarter 2009)	• Expected to collaborate in training workshops and seminars
3.3 Disseminate and pursue actions at the regional level (first quarter 2010)	NARBO and APWF including Japan Water Forum:
<i>Component 4: RBO performance improvement</i>	
4.1 Conduct training seminars to build capacities on new challenges in river basin management, changing needs in IWRM, and improving water governance (third quarter 2009)	• Provide advice in training programs and workshops and through the advisory group
4.2 Conduct RBO peer reviewer certification training (fourth quarter 2008)	
4.3 Conduct dialogues on country performance assessments (second quarter 2009)	
4.4 Conduct leadership training for RBO management on championing organizational change for improved RBO performance and how RBO can best facilitate the introduction or strengthening of IWRM (third quarter 2009)	

Appendix C: Activities during the inception phase

- 10 Dec 08: ADB's Notice to Proceed to the Senior Adviser to commence services by 20 Dec 08
- 22-24 Dec 08: Inception mission by ADB to Indonesia. Consultations in Jakarta with MPW leaders and senior staff, the NARBO Chair, and the team conducting the JICA RBO Capacity Development Project; and in Solo City with management and staff from River Research Institute (Balai Sungai), Balai Besar Wilayah Sungai Bengawan Solo, and the branch office of PJT1. Proceedings are summarized in an aid memoire by ADB (Jan 09)
- 8-9 Jan 09: Participation in 3rd Steering Committee Meeting in Bangkok for review of the *'IWRM Guideline at the River Basin Level'*, in preparation under the UNESCO World Water Assessment Program (WWAP) with financial and technical support from Japan Water Agency
- 13 Jan 09: Arrival of Senior Adviser to Solo City
- 30 Jan 09: Inception report, 1st draft for internal circulation
- 18-25 Feb 09: Participation in 5th NARBO Training, *'Keys for success in IWRM'*, Hoi An, Viet Nam
- 24 Feb 09: Consultation meeting with DONRE, Quang Nam Province
- 27 Feb 09: Decree about the formation of CRBOM, signed by Secretary-General Ir. Agus Wijanarko on behalf of the Minister of Public Works
- 27 Feb 09: Consultation meeting with CNMC, Cambodia
- 16 Mar 09: Participation in workshop about the 4-Ps area, held by CNMC
- 24 Mar 09: Liaison meeting with TA 7016, *'Capacity building for water resources management in a decentralized environment'*, and JICA's *'Dissemination Unit for Water Resources Management and Technology (DUWRMT)'*
- 3 Apr 09: CRBOM-CKNet consultation meeting
- 14 Apr 09: TKPSDA (Bengawan Solo Basin Council) meeting
- 16-17 Apr 09: Participation in workshop on *'Indicators for RBO performance benchmarking'*, Surabaya
- 27 Apr 09: Completion workshop of RETA 6351, *'Process Development for Preparing and Implementing IWRM Plans'*
- 28-30 Apr 09: CRBOM launch and RETA 6570 inception workshop
- 1 May 09: Bengawan Solo stakeholder meeting, with the Bengawan Solo Water Council

Appendix D: Related activities

Some recently completed, ongoing or planned activities, which are related to the present RETA

D.1 ADB projects

Table D.1: Examples of related ADB projects (national and regional)

No.	Title	Status
TA 7217 PRC	Preparing national guidelines for eco-compensation in river basins and a framework for soil pollution management	Approved (Jan 09)
TA 7016-INO	Capacity building in water resources in a decentralized environment	In progress since Dec 08, executed by Directorate General of Water Resources
TA 6420-REG	Promoting climate change impact & adaptation in Asia and the Pacific	In progress since Sep 08, executed by ADB
TA 4903-VIE	Water sector review project	Completed in late 2008; please refer to http://www.vnwatersectorreview.com/
TA 4381-INO	Integrated Citarum water resources management program, Phase 3	A component of a comprehensive TA programme, in progress since early 05, executed by Directorate General of Water Resources
RETA 6325	Promoting effective water policies and practices (Phase 5)	Approved (Oct 08), executed by ADB, in continuation of previous TAs (since 2002)
RETA 6123	Promoting effective water management policies and practices (Phase 3)	
AOTA LAO 37579	Sustainable natural resources management and productivity enhancement project	Approved (Oct 08)
AOTA INO 37049	Institutional strengthening for IWRM in the 6 Cs River Basin Territory	Approved (Dec 08)
AOTA PRC 42025	Strategy for drought management project	In preparation (Oct 08)
PPTA MON 41234	Integrated irrigated agriculture and water management project	In preparation (Oct 08)

D.2 Other development projects and initiatives

ADB-JWA collaboration on increasing water security through IWRM in Asia

Presently in a state of formulation.

Capacity Development Project for RBOs in Practical Water Resources Management and Technology in Indonesia (JICA, Indonesia)

This project aims at strengthening of practical water resources management at the river basin level, including hydrology (monitoring and modelling), river engineering, water quality, dams and reservoirs, and flood management. It started in July 08 and has a duration of 3 years. Host organization is Ministry of Public Works with particular liaison with DGWR, RCWR, and PJT.

A new 'Dissemination Unit for Water Resources Management and Technology' (DUWRMT) is being established in Solo as a part of the project.

CapNet training

Various training sessions and short courses conducted continuously, often in collaboration with partners

CKNet-INA (Collaborative Knowledge Network Indonesia)

Established in 2002, this network covers ten universities in Bandung, Jakarta, Makassar, Malang, Padang, Semarang, Surabaya, and Yogyakarta.

Working with AquaJaring, CapNet and UNESCO-IHE, the network undertakes water-related capacity-building, including irrigation management, IWRM and river basin organizations.

Mekong River Commission (MRC)

Mekong River Commission (MRC) is a regional organization formed by Cambodia, Laos, Thailand and Viet Nam. Its history goes back to the Committee for Co-ordination of Investigations of the Lower Mekong Basin (established in 1957). Its mandate is laid down in the Mekong Agreement from 1995. Its work is supported by National Mekong Committees in each member country. The Mekong Agreement includes principles for intra-basin and inter-basin water-sharing.

MRC is supporting water-related development towards '*an economically prosperous, socially just and environmentally sound Mekong river basin*'.

In support of this vision, a number of programmes are implemented, including the IWRM-based Basin Development Plan (BDP). The planning addresses water resources development and water-related development within irrigated agriculture; fisheries; hydropower; navigation; flood management; water supply; watershed management; and tourism. The member countries, represented by their National Mekong Committees, have a strong implementing role, and more than 200 national agencies are participating in the planning. The process includes public participation fora with representatives from national and de-central authorities, mass organizations, research institutions, local user groups, NGOs, and international organizations.

NARBO IWRM training

This series of training sessions is intended for mid-level RBO managers and other practitioners. It is implemented with support from International Water Centre, Brisbane. Apart from the training itself, the programme encourages informal professional networking among the participants.

The 5th training session (in Hoi An, Viet Nam, Feb 09) applied the Vu Gia-Thu Bon Basin as a case study.

Orissa Integrated Irrigated Agriculture and Water Management Investment Program (OIIAWMIP) (Orissa State Government, Supported by ADB)

This programme includes water-related development in the Baitarani Basin.

ADB's Country Strategy and Programme Update 2006–2008 includes a loan for the OIIAWMIP. A supporting TA programme provides support to DOWR in the further project processing of the OIIAWMIP and institutional strengthening of the DOWR and related institutions. One output of this assistance has been an institutional assessment that among other things reviewed the policy and legislative framework, the institutional framework including the organizational structure of DOWR and the institutional capacity, and the water management instruments.

The World Bank

A '*BAPPENAS-World Bank IWRM training for the decision makers*' is scheduled for early April 2009. (BAPPENAS is the central national planning agency).

Appendix E: Pilot basin profiles

*This appendix is intended as an introduction only.
It has been cut-and-pasted from various readily available sources, as indicated in each case*

(By country, by order of alphabet)

E.1 The 4-Ps Basin, Cambodia

Quoted from CamboWP and CNMC (draft, Dec 08)

Geography

The 4-P area is located on the eastern (or left) bank of the Mekong. It forms a triangle delineated by the Mekong towards west, by the Sre Pok Basin towards northeast, and by the Prek Chhloung Basin towards south.

The Mekong mainstream itself is not regarded as a part of the area, because this section of the mainstream has its own particular development agenda .

The area covers some 12,472 km² (which is 7 percent of Cambodia's entire area) and has a population of some 143,290 persons (or 1 percent of the national population).

Only around one percent of the area is cultivated (excluding plantations and orchards), with a quarter of the cultivated areas served by irrigation infrastructure. The major parts are covered by forests, in various states of degradation, and forest plantation.

Many people in the area are vulnerable to floods and drought, as they are heavily dependent upon agriculture, often conducted on a subsistence basis. The average rice yield ranges from 1.4 to 1.9 tons per ha.

Safe water - whether by piped network, from orderly wells, or bought from vendors - is accessible to 40% of the population in Kratie Province and only 25% in Mondulkiri Province. The majority of remote areas have no such access, and this situation affects people's health and life expectancy. Mondulkiri Province has the highest infant mortality rate in Cambodia (with 125-170 deaths per 1,000 live births).

The study area covers a major part of the 222,500 ha Phnom Prich Wildlife Sanctuary and a minor part of the 250,000 ha Lomphat Wildlife Sanctuary.

A distinction can be made between two zones (that are not sharply divided):

- Along the Mekong mainstream (and including the town of Kratie), the population density is high, and the economy is better developed and more diversified as compared with the inland parts of the basin. Typical livelihoods are lowland farming (cultivation and livestock), capture fisheries, various manufacturing and small-scale industries, trading, and some employment in the service sector, including tourism.
- The inland (and major) parts of the study area are originally forest areas with a relatively sparse population, some spotty cultivation, and various forest-related subsistence livelihoods. There is still some shifting cultivation in this area. The land use is in a state of rapid transition, with large areas being reclaimed for forest plantation, often requiring re-settlement of the population, with a related loss of traditional livelihoods and apparently few and inadequate alternative livelihood options.



Subsistence cultivation in the 4-Ps area



Policies and administration

The basin covers parts of Kratie province (3 districts) and Mondulkiri province (5 districts). The provincial town of Kratie is located within the basin.

The national development planning process is a hierarchy of de-central and national planning, partly by sector, and partly integrated. The levels are (i) the national level; interacting with (ii) the province level; and (iii) the commune level.

National and ministerial Public Investment Programmes (PIPs) are prepared annually as rolling plans covering a 3-years period. Commune Development Plans are in a state of early consolidation. Some water user groups exist in the area.

National water management and water-related development is undertaken by Ministry of Water Resources, together with numerous other ministries, such as Ministry of Agriculture, Forestry and Fisheries; Ministry of Industry and Mines; Ministry of Public Works and Transport; and Ministry of Rural Development.

The provincial governments of Kratie and Mondulkiri have a coordinating role with regard to the provincial departments of sector ministries and other institutions with water-related responsibilities. Coordination bodies are functional for this purpose in each province.

Recently, a 4-Ps Basin Coordination Committee for Development (BCCD) has been designated as a coordinating committee for water-related development, management and protection of the 4-Ps Basins.

Development agenda

Examples of development needs and opportunities are listed below in random order:

- Access to safe water and electricity
- Support to sustainable livelihood development in general and rural livelihoods in particular, for example by development of agricultural extension services; agro-industry processing and handicrafts; and tourism
- Improved land use and land management
- Increased groundwater exploitation for rural water supply

- Irrigation system rehabilitation and development, and expansion of small-scale and medium-scale water storage capacity
- Flood and drought preparedness, warning systems and disaster relief
- Poor soils improvement/management
- Diversification of farming and development of markets
- Increased micro-hydropower infrastructure
- Management plans for protected areas and national parks and critical upper watersheds
- Promotion and consolidation of agricultural development communities and water user communities
- Export-oriented agro-industry
- Human resources development

Border trade reforms, whether bilateral or regional, can offer new opportunities for economic growth in the area.

Adjacent to the 4-Ps Basin, the Mekong mainstream development needs and opportunities include for example (i) the urgent need of bank protection in front of the provincial town of Kratie; (ii) the potential for tourism (featuring the Mekong dolphin and other rare species); and (iii) the scope for hydropower development (presently being studied at feasibility level)

References

ADB (Oct 08): Country operations business plan 2008-2010, Cambodia

ADB (Aug 07): Country strategy and program 2005-09, mid-term review, Cambodia

ADB (Jan 05): Country strategy and program 2005-09, Cambodia

CamboWP and CNMC (in preparation, not yet received): Report from stakeholder consultations in December 2008

CamboWP and CNMC (draft, Dec 08): The 4-P area - The Prek Preah, Prek Krieng, Prek Kampi and Prek Te river basins. Piloting river basin approach to IWRM in Eastern Cambodia. A Pilot and Demonstration Activity under ADB's RETA 6325: Promoting effective water policies and practices (Phase 5)

CamboWP and CNMC (Jun 07): The 4-P area - The Prek Preah, Prek Krieng, Prek Kampi and Prek Te river basins. An IWRM-based pilot study of water-related development opportunities. Cambodia Water Partnership and Cambodia National Mekong Committee

MAFF and MOWRAM (Feb 07): Joint Strategy for Agriculture and Water 2006-2010, prepared by Ministry of Agriculture, Forestry and Fisheries and Ministry of Water Resources and Meteorology

MOE (Apr 05): State of the Environment Report 2004, prepared by Ministry of Environment

MOP (Nov 03): Cambodia Millennium Development Goals report 2003, prepared by Ministry of Planning

MRC (Dec 05): '*Strategic directions for IWRM in the Lower Mekong Basin*', prepared by Mekong River Commission under its Basin Development Plan

NSDP (Nov 05): National Strategic Development Plan 2006-2010 (draft English translation)

E.2 Baitarani, India



Geography

Orissa is facing increasing water challenges to which the state must adapt. The state is well endowed with water in general, but there is a strong seasonality (almost 80% of the rain falling in the 3 monsoon months), and the future per capita availability is affected by population growth, increased demands resulting from economic development, and increased water consumption in upstream states leading to decreasing inflows to Orissa (presently accounting for some 30% of the total water availability). These factors combine to an estimated reduction of per capita water availability by 30 % by 2050. At the same time some parts of the basin suffer from poor water quality due to inadequate treatment of municipal and industrial effluents, leading to environmental degradation.³

The Baitarani River is one of six major rivers of Orissa. Venerated in popular epics and legends, the river is a source of water for agricultural irrigation, but most of the potentially arable land in the area is not under cultivation. The coastal plain of Orissa has the name of '*Hexadeltaic region*' or the '*Gift of Six Rivers*'. These deltas divide the coastal plain into three regions from north to south. The Baitarani, the Mahanadi and the Brahmani rivers form the Middle Coastal Plain, with evidence of past '*back bays*' and present lakes.⁴

The Baitarani originates from the Guptaganga hills in Gonasika of Keonjhar district (in Orissa) at an elevation of 900 m above sea level. Its uppermost part, about 80 km in length, flows in a northerly direction; then it changes its path and flows eastward. An upstream reach of the river forms the border between Orissa and Jharkhand.

The river enters a plain at Anandpur and creates a deltaic zone at Akhuapada. It drains into the Bay of Bengal after joining of the Brahmani at Dhamra near Chandabali. The river has 65 tributaries, of which 35 join from the left side and 30 join from the right side.

A major portion of the basin lies within the state of Orissa, while a small patch of the upper reach lies in Jharkhand state. The upper Baitarani Basin on the western slopes of the Eastern Ghats, comprising the Panposh-Keonjhar-Pallahara plateau, is one of the two plateaus forming '*The Central Plateaus*' - one of Orissa's five major morphological regions.

Dams and barrages on the Baitarani and its major tributary, the Salandi, irrigate 61,920 ha. The proposed Bhimkund and upper Baitarani multi-purpose projects envisage many more dams across this river and its tributaries to provide irrigation to more than 100,000 ha.

Flooding occurs regularly, and many inhabitants live in constant fear of loss of life and property. Even a two-day rain in July in 2005 caused the river to overflow its banks, affecting 140,000 people in 220 villages of Jajpur and Bhadrak districts. In at least two places the embankments were breached and marooning occurred, inflicting massive losses of life and property. Apart from the long pending construction of a dam at Bhimkund

³ ADB and Orissa State Government (Jun 08)

⁴ This and the remainder of the section quoted from Wikipedia (Jan 09):

and proposed other measures like river bed excavation and construction of embankments etc. in the deltaic region, there remain unaddressed land use issues in the upstream parts.

Baitarani Basin, with its rich mineral and agricultural resources and with availability of cheap labour, offers an ideal ground for establishment and operation of various industries. On the other hand, development activities in the industrial, agricultural and mining sectors have caused deterioration of the water quality.

Policies and administration⁵

According to the Constitution, water falls under the exclusive jurisdiction of the states. In this context, the Union Ministry of Water Resources developed the National Water Policy in 1987 and revised it in 2002. The Policy identifies a range of challenges related to the more traditional aspects of water management, such as escalating costs of delivering water and restoration and maintenance of infrastructure. The policy also emphasizes new challenges that include environmental flows, water quality, increasing demands, social equity, and participatory management.

State legislation includes

- The Orissa Irrigation Act (1959); and
- the Orissa Pani Panchayat Act (2002) (about farmers' involvement in management and maintenance of irrigation systems).
- Land management is covered by several state acts, including the Orissa Land Reform Act (1960) (amended in 1992)

State policies include

- a) Orissa Agricultural Policy (1996)
- b) State Reservoir Fishery Policy, Orissa (2003)
- c) Orissa Resettlement and Rehabilitation Policy (1994 & 2006)
- d) National Forest Policy (1988)

National institutions include

- Ministry of Water Resources; and its engineering organization
- Central Water Commission.

State institutions include

- Orissa State Planning Board;
- Orissa State Water Resources Board; and
- Orissa State Water Resources Department (DoWR)

The Government of Orissa first prepared its State Water Policy in 1994. In response to the revised National Water Policy in 2002, the State Water Policy was revised in 2004 and 2007. It covers the following areas with due consideration of ecological balance and sustainability:

- Participatory irrigation management;
- disaster management policy;
- food security;
- industrial water reservation;
- drought management;
- water quality monitoring and management; and
- environmental flows.

An Orissa State Water Plan was prepared in 2004, based on 11 individual river basin plans.

⁵ ADB (Nov 08)

Development agenda⁶

Development needs and opportunities have been identified as follows:

- Laws and institutions: Orientation towards multi-sector water resources planning; knowledge base and research capacity; responsibility of local government; capacity of water user groups; and participatory water planning
- Environment: Upper watersheds; water quality and water quality monitoring; wetlands; and aquatic ecosystems
- Basic human needs: Basic water supply and sanitation conditions in cities, towns, and rural areas
- Food security: Adaptation to growing population; realization of potential offered by existing irrigation infrastructure; surface-water irrigation projects; groundwater irrigation; and soil and water conservation
- Economic development: Farm incomes; off-farm employment; poverty reduction; small-scale irrigation
- Disaster management: Floods, cyclones, drought
- Hydraulic Infrastructure: Water allocation and transfer, inter-seasonal storage

References

ADB (Dec 08): Country operations business plan, India 2009

ADB (Sep 07): Country operations business plan, India 2008-2010

ADB (Oct 05): Country strategy and programme update, India (2006-08)

ADB and Orissa State Government (Jun 08): Orissa Integrated Irrigated Agriculture and Water Management Investment Program (OIIAWMIP). Technical Assistance for Integrated Water Resources Management (IWRM) in Orissa. Preliminary draft final report

ADB (Nov 08): Summary information on Baitarani River Basin

⁶ Quoted from ADB (Nov 08); the list is incomplete

E.3 Bengawan Solo, Indonesia

Section extracted from ADB (Nov 08), DGWR (Mar 01), DPU (Feb 02) and NARBO (Feb 07)



Geography

The Bengawan Solo (or Solo River) is the longest river in Java (600 km). It originates from the Sewu mountain range near the south coast and runs towards north and east through the Central and East Java Provinces, discharging into the Java Sea just north of Surabaya. On its way to the sea, it passes through Solo City (or Surakarta) with its population of about half a million people. Its catchment area is 16,100 km², or 12 percent of Java's area. The basin has an area of 16,100 km² and is densely populated (as is Java in general), with a population of around 15 mio. people (2009). The basin is divided into three sub-basins: The Upper Solo Basin; the Madiun Basin (a major tributary); and the Lower Solo Basin.⁷ There are three volcanic mountains within or along the basin boundary: Mount Merapi (2,914 m)⁸, Mount Merbabu (3,145 m) and Mount Lawu (3,265 m). They form a section of the 'Pacific Ring of Fire'.

Two million years ago, the basin was inhabited by *Pithecanthropus erectus* or *Homo erectus soloensis*, as indicated by fossils found on the banks of Bengawan Solo and its close vicinity.⁹ Irrigated paddy cultivation was introduced around 2,700 years ago. More recently, between the 8th and the 10th century, as well as later on, Solo was the centre of successive powerful kingdoms that ruled parts of today's Indonesia.

The land and water resources in the basin have been developed from old times. In the 19th and the early 20th centuries, with the Dutch administration, efforts were made to develop its water resources by constructing small irrigation dams, irrigation intake weirs and irrigation facilities. Most of the existing irrigation systems in the basin was conceived during this period. Around 1880, the river mouth was diverted towards north, away from the Surabaya Strait, in order to prevent accretion in the strait of the huge volumes of sediment conveyed by the river.

The land use is distributed between paddy fields (35 percent of the area); other farmland (17 percent); forest (24 percent); and other uses (24 percent). Some 70 percent of the paddy fields are irrigated. There are 44 dams with a total active storage of 0.66 billion m³. They are small, except for the Wonogiri Dam (1983) with an effective storage volume of 0.44 billion m³.

The average rainfall is some 2,100 mm/year, with a distinct seasonality.

⁷ A distinction is made between the Bengawan Solo Territory (Satuan Wilayah Sungai, SWS) and the Bengawan Solo drainage basin itself. The Bengawan Solo Territory has an area of some 20,100 km². It comprises the Solo Basin, the Grindulu Basin and the Lamong Basin, as well as the Northern Java River Basin that discharges directly into the Java Sea, and the Southern Java River Basin that flows into the Indonesian Ocean

⁸ Meaning 'Mountain of Fire', the most active volcano of Indonesia. It is one of 16 'Decade Volcanoes' identified by the International Association of Volcanology as being worthy of particular study in light of their history of large, destructive eruptions and proximity to populated areas (*Wikipedia*)

⁹ The 'Sangiran Early Man Site' 18 km north of Solo was listed as a UNESCO World Heritage Site in 1996, citing the location as 'as one of the key sites for the understanding of human evolution that admirably illustrates the development of *Homo sapiens sapiens* from the Lower Pleistocene to the present through the outstanding fossil and artefactual material that it has produced (<http://whc.unesco.org/en/list/593>)

About 8 percent of the basin is flood-prone, and major floods (caused by extreme direct rainfall) occur regularly. The severest ones on record were 1966 (142,000 ha inundated), 1968 (120,000 ha), and late 2007 (120,000 ha). Also, drought is frequent, affecting both the rainfed and the irrigated areas.

Parts of the basin are exposed to erosion, due to improper land use and degradation of the vegetation cover, causing damage to the infrastructure and siltation in the reservoirs, notably the Wonogiri Reservoir, as well as adding to the flood risk.

The Wonogiri Dam



Policies and administration

A water law was passed in 2004, promoting basin-level IWRM. The law builds on principles of participation and transparency.

In 2007, 30 RBOs were established under the central government, and another 50 ones under provincial governments.

In addition to the RBOs, which are funded mainly from the national budget, there are two public corporations (Jasa Tirta I and II Public Corporations, or PJTI and PJTII), the costs of which are mainly recovered from the water users.

The Solo Basin covers 9 regencies/ municipalities in Central Java Province and 11 regencies/ municipalities in East Java Province.

Water-related institutions include:

- National level: Ministry of Public Works (Pekerjaan Umum, PU)
- Provincial level: Department of Public Works (Departemen Pekerjaan Umum, DPU)
- River basin level: The River Basin Development Agency (Balai Besar Wilayah Sungai Bengawan Solo, BBWS)
- Sub-basin level: Balai PSDA (one for each of the three sub-basins)
- Local level: Dinas PU Pengairan Kabupaten
- Jasa Tirta I Public Corporation (Perum Jasa Tirta I, PJTI)

Jasa Tirta Public Corporations (Perum Jasa Tirta, PJT)

There are two such corporations: PJTI and PJTII. They operate and maintain water infrastructure in the Brantas, Bengawan Solo and Citarum River Basins (PJTI covering the Bengawan Solo Basin).

The organizations are public corporations, expected to combine healthy corporation principles and accountable public services, operating in a dialogue with the public and private sectors and the water users. They undertake

- Water allocation and drought management, as agreed with the Provincial Water Resources Management Committee (Panitia Tata Pengaturan Air, PTPA);
- flood control, flood forecasting and flood warning;
- watershed management;
- recommendations on water licensing (to the PTPA);
- water quality monitoring;
- provision of technical recommendations for wastewater disposal;
- general maintenance and minor rehabilitation of infrastructure;
- sediment removal in reservoirs and channels;
- monitoring and control of sand mining; and
- land use planning (especially around reservoirs and river corridors); related technical recommendations on licensing of river corridor utilization; and related monitoring.

PJTI applies quality management according to ISO 9001 for the Brantas Basin, as well as accreditation of its laboratories by international standards.

The River Basin Development Agency (Balai Besar Wilayah Sungai Bengawan Solo, BBWS)

According to a decree of Ministry of Public Works (2006), a BBWS should perform the following functions, unless covered by a PJT:

- Basin-level water resources management planning;
- planning and management of protected headwater areas;
- basin-level water resources management, covering water conservation, resource development, water efficiency, and damage control;
- technical recommendation and provision of permits for water allocation and water uses;
- operation and maintenance of water-related infrastructure;
- hydrological monitoring;
- provision of water resources data and information;
- facilitation of coordinated water resources management; and
- related community empowerment

The Bengawan Solo Water Council (TKPSDA)

The '*Bengawan Solo Water Council*' is an unofficial short translation of '*Tim Koordinasi Pengelolaan Sumber Daya Air*' (TKPSDA), or the '*Water Resources Management Coordination Team*'.

TKPSDA was established in early 2008. Until now, it is one of only two such bodies in Indonesia (the other one covering the adjacent Brantas River Basin).

TKPSDA comprises 64 agencies, organizations and bodies that are in some way involved in water resources management in the basin, at the national, province, or de-central level. Half of these - 32 - are governmental, and the other half non-governmental.

The chair of the council rotates between the two provinces that share the basin (Central Java and East Java). A small secretariat is located at BBWS, Solo.

Two programmes are in preparation: One addresses water-sharing in the upper Solo Basin; another is a basinwide water resources management master plan.

There is also an Experimental Rivers Station in Solo, a unit under the Research Centre for Water Resources under the PU Agency for Research and Development.

The National Friendship Movement on Water Safety Guard (Gerakan Nasional Kemitraan Penyelamatan Air, GNKPA) was established in 2005 as a national water conservation movement. GNKPA operates at the central, provincial and district level and involves government and non government organizations and other stakeholders.

Starting in 1969, development of the Bengawan Solo Basin was undertaken under the Bengawan Solo Basin Development Project (Proyek Bengawan Solo, PBS), aiming at flood control and drainage, watershed management and water resources development. In the 1990s, the Project was converted into PIPWSBS (Proyek Induk Pengembangan Wilayah Sungai Bengawan Solo) and made fully responsible for the implementation and operation of all water resources development projects within the basin.

The 2001 Comprehensive Development and Management Plan (CDMP)

The CDMP preparation included

Phase I: Review of the existing plans and studies, and basic studies

Phase II: Formulation of Water Resources Development and Management Master Plan

Several public consultations were held during the work.

Key issues:

- 1 Inadequate water allocation
- 2 Increasing water demand, in terms of quantity and quality (safe water)
- 3 Increasing water-sharing conflicts
- 4 Environmental degradation
- 5 Topographical and geographical constraints

CDMP components:

- 1 Water resources development
 - Domestic and industrial water supply plan (with 4 supporting projects)
 - Irrigation development and rehabilitation plan (with 10 supporting projects)
- 2 Watershed management
 - Watershed conservation and management plan (with 3 supporting projects)
- 3 Water quality management
 - Water quality management plan (with 2 supporting projects)
- 4 Flood control management
 - Flood Control Management Plan (with 9 supporting projects)
- 5 Institutional framework of water resources management
 - Strengthening and improvement plan for institutional framework of water resources management (with 1 supporting project)

In 2007, PIPWSBS was transformed into the River Basin Development Agency (Balai Besar Wilayah Sungai Bengawan Solo, BBWS) through a decree from Ministry of Public Works. Most of the former responsibilities remain within this agency but additional tasks, such as conducting hydrological monitoring and surface water quality monitoring were added..

An overall development master plan for the Bengawan Solo Basin was formulated in 1974 with support from Japan. It covers water resources development for irrigation, flood control, and hydropower generation. Several of the projects have been realized, including the Wonogiri Multipurpose Dam, and infrastructure for irrigation and flood control.

Between 1974 and 1999, the social and economic conditions changed significantly, as did the river morphology. In response, a Comprehensive Development and Management Plan (CDMP) for Bengawan Solo River Basin was prepared in 2001 under the Lower Solo River Improvement Project (1999-2001). It covers the entire Bengawan Solo Territory (in line with contemporary river basin planning practices).

Development agenda

The following goals for basinwide development have been suggested:

- 1 Enhanced economic growth in the Bengawan Solo Basin, achieved via
 - 1.1 Enhanced RBO capacity; and
 - 1.2 Enhanced water security.

Supporting feasibility studies are suggested on

- water quality management;
- watershed conservation; and
- water supplies.

The CDMP recommends 36 dams and two weirs as priority projects to supply 1.8 billion m³/year of water in order to meet the demand in 2025 (under a 5-years drought).

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E.4 Vu Gia-Thu Bon, Viet Nam ¹⁰

Entire section extracted from Nghia (06), except where otherwise indicated

Geography

Vu Gia-Thu Bon is one of the 10 largest basins in Viet Nam and has been the basis for wealthy communities. The basin was the location of Tra Kieu, capital of the Champa Kingdom, the cham port of Hoi An and, today, notably, Da Nang harbour.

The Vu Gia-Thu Bon system originates on the eastern side of the Truong Son mountain range. Its upper part is short and steep with a narrow riverbed, steep banks and many cascades. The system meanders once or twice. In the middle and downstream reaches, the riverbed is rather wide and shallow. In the downstream reach, the banks become low, allowing overflow into fields and villages during the flood season.

The system is formed by two main rivers: The Vu Gia and the Thu Bon. The Vu Gia has many tributaries. The Thu Bon originates at the borders of the three provinces of Quang Nam, Kon Tum and Quang Ngai at an elevation of more than 2,000 m. It enters the sea through the Dai estuary near Da Nang. The total catchment area of the entire system is 10,350 km².

Towards the downstream area, there is an exchange of flow between the two rivers. The Quang Hue River diverts part of water from the Vu Gia into the Thu Bon, and further downstream, Vinh Dien River returns part of the water back from the Thu Bon to the Vu Gia. In the downstream stretch, the river network is rather dense. Apart from the flow exchanges, the mainstreams are also supplied with additional water from other branches.



The monsoon season lasts for four months, from September through December. The dry season is from January through August. In May and June there is a secondary rainfall peak, which is more pronounced towards the north-western part of the area and causes a Tieu Man flood period in the Bung River Basin. The total annual rainfall is between 2,000 mm and 4,000 mm, with the monsoon rainfall accounting for 65-80 percent. Still, the water resources are under pressure, in terms of quantity and quality. Groundwater is sparse.

The basin has a diversified economy of agriculture, forestry and fishery, industry, handicraft and services. However, the economic starting point is very low. This, in addition to a poor infrastructure, forces the local economy to depend on agriculture. Industry is underdeveloped, commodity production and exchange is limited, and trade and services are developing at a low rate of growth.

There is a high incidence of poverty in the upper basin with its majority of ethnic minorities.

The cultivated area is some 83,000 ha (8 percent of the basin area) (2000), including 63,000 ha for annual crops, 15,000 ha for miscellaneous gardens and 5,000 for perennial crops. Most cultivation is rainfed, especially in the upper basin, and crop yields are low due to single cropping in unstable areas. Some areas have deteriorated due to slash-and-burn cultivation.

Aquaculture has developed comprehensively in all fresh, brackish and saline water bodies, supported by new production models and improved technology, especially for black tiger shrimp breeding in brackish waters. Aquaculture occupies 495 ha (2000), producing an average annual yield of 1.05 metric tons per ha. The basin has a coastline of about 60 km and two estuaries, the Han and Cua Dai Rivers, with rich and diverse fishery

¹⁰ Pronounced 'vu za thu bon'

potentials. Along the coast, brackish and saline surface waters are abundant, offering favourable conditions for aquacultural development.

Several industrial zones have been approved for foreign investment; but still, industries are mainly based in Da Nang City. Local industries produce key products of local specialties, which are highly competitive, while core and rural industries do not exist or are not yet consolidated.

The topographic conditions (with 75 per cent of the area shaped by hills and mountains) are advantageous for water resources development projects as well as small- and medium-scale hydropower cascades. At present, the area has 65 reservoirs and 250 weirs. These storage structures irrigate 30,000 ha of rice and 10,000 ha of subsidiary crops and cash-crop trees. It is planned to construct another 60 reservoirs and weirs in order to increase stable irrigation from 69 per cent to 75 per cent by 2010. Also, according to the industrial plan, Quang Nam Province can develop eight large cascades and 30 small and medium-scale cascades on different rivers (mostly in the Vu Gia Basin).

Policies and administration

The basin covers major parts of Quang Nam Province and Da Nang, and a small part of Kon Tum Province.

National policy aims to develop the Quang Nam - Da Nang region as an economic hub of the central area of the country, with a diversified and balanced economic structure. Hereby, the gap between incomes of different classes in the society and between regions should be narrowed. Special consideration is needed to people living in remote and upland areas in order to help reduce and alleviate poverty.

The agricultural development is directed towards a fundamental shift from monoculture to comprehensive agricultural production that focuses on commercial trees, food crops and livestock expansion in accordance with the specific conditions prevailing in the various parts. Agricultural development will emphasize intensive and specialized farming, to meet the demand of the industrial, tourism and export sectors as well as ensuring food security to the local population.

A master plan for Da Nang City and Quang Nam Province aims to make the province a prosperous industrial centre. Emphasis is put on the development of industries that create added value and are export-oriented, producing goods for consumption and export, such as construction materials, products based on agriculture, forests and fisheries, machinery, and electronics. The major part of this development will take part along the coast.

The management of rivers, streams and related basins is assigned to the local authorities based on administrative boundaries.

The Department of Agriculture and Rural Development (DARD) carries out state management of hydraulic works planning for water resources exploitation for production and domestic use and flood control in provincial basins. Since 2003, groundwater management and planning has been assigned to Department of Natural Resource and Environment (DONRE). State management of hydropower works planning in the river basin remains the responsibility of the Provincial Industry Department.

At the province level, two key bodies are involved in water resources management: DARD and DONRE. Following the Water Resources Law (2003), the water resources management function in general belongs to DONRE, with DARD undertaking certain state management functions.

In mountainous and rural districts, the Land and Economic Department undertakes the management functions for agriculture, rural development, natural resources and the environment, while DARD and DONRE are involved in the town and delta districts.

Water-related development is coordinated by two bodies:

- A *Vu Gia-Thu Bon River Basin Organization* (RBO) was formed in 2004 as a consulting agency. Its members are representatives from central and local governments and departments. They are involved on a part-time basis only. The RBO has no executive power, but it may influence the decisions of the Government and the Provincial People's Committees (PPCs) through its recommendations.¹¹

¹¹ Nghia (06)

- A *Committee for the Management and Control of Integrated Water Resources (CMCIWR)* of the Vu Gia Basin was established in 2007 by the Quang Nam Provincial Peoples Committee¹².

Tasks of the Vu Gia-Thu Bon River Basin Organization (RBO)

(From Nghia 06)

The RBO serves as an advisory body. Its tasks are

- (a) to plan for sustainable regional socio-economic development in the basin;
- (b) To establish a database on the demand and supply of water resources in the whole basin;
- (c) To maintain participation of the community;
- (d) To maintain a close relationship with the National Water Resources Council; and
- (e) To solve or recommend solutions to water-related disputes.

Hereby, the RBO is expected

- (a) to serve as a forum where local government and departments can discuss IWRM issues;
- (b) to enhance stakeholders' capacity in IWRM;
- (c) to provide inter-provincial IWRM coordination; and
- (d) to create a conducive environment for investment in socio-economic development

National Decree No. 120 about river basin management was passed in December 2008. It will create a new coordination body for the entire basin, under the authority of the central government. Guidelines for its implementation are in preparation. It is expected that the tasks of the two existing coordination bodies will in some way be carried forward to the new one.

Development agenda

The river basin has a rich potential for continued economic development. It has abundant natural resources, including land, water, forests and fisheries.

There is a rich hydropower potential, and four large-scale hydropower plants are planned: (a) Vuong; (b) Song Tranh 2; (c) Dak Mi 4; and (d) Song Con 2. In total, 10 large and 43 medium/small hydropower schemes have been identified.

Also, there is an attractive scope for tourism development.

Erosion and sedimentation cause losses of cultivable land and property as well as changes in river flows and increased flood risk. The erosion is partly generated by occasional flash floods.

With regard to domestic water supplies, a major part of the population, both in rural and urban areas, do not have access to clean water. In rural areas, about 74 per cent of the population use water from rivers, streams or from unhygienic sources. In areas around Da Nang and Hoi An, only 60-70 per cent of the population have access to piped water. The water can be contaminated by saline water.

With regard to flood control, most reservoirs are built on tributaries and have small storage capacities, as their main purpose is irrigation; thus, they are not effective in flood control. Annual losses caused by floods and inundation amount to between Dong 220 billion and Dong 758 billion. Drought and salinity intrusion are frequent. Existing hydraulic structures are mainly pumping stations and weirs, except for the Phu Ninh reservoir with its relatively large capacity. Other reservoirs have limited capacity so they cannot supplement irrigation water in the dry season. That is why drought and salinity intrusion frequently cause serious losses and affect human life in many ways.

In response, a comprehensive flood protection project (covering Quang Nam Province) will be implemented with support from JICA, covering structural as well as non-structural measures.¹³

Irrigation structures have not yet met production requirements. Their efficiency is low, non-irrigated areas are still large, and drought occurrence is relatively frequent, affecting the production. Reasons for the low efficiency include:

¹² ADB (Jun 07)

¹³ Starting in March 2009 with a scheduled duration of 3 years

- (a) Out-of-date irrigation techniques (mainly flood irrigation), and regulators and distribution structures that are inefficient or manually operated;
- (b) incomplete schemes, where headworks and main canals have been completed while the on-farm canals and on-canal structures are incomplete. Some structures occasionally cause localized inundation;
- (c) degraded structures. Most hydraulic structures in the basin are small and medium-scale, having been constructed 10-20 years ago. Many headworks have deteriorated and irrigation canals are silted up, resulting in erosion and sedimentation each flood season. Therefore, they cannot meet the design flows;
- (d) management issues such as irrational water allocation and management, which cause wastage of water, and poor operation, maintenance and management that results in deterioration or untimely repairs; and
- (e) water sources. Water supplies are sometimes insufficient for structures in the Ly Ly and West Que Son sub-basins. On the plains, water sources usually suffer from saline intrusion, so pumping stations on the Vinh Dien and Ba Ren rivers have to stop working. Some other pumping stations are unable to perform at full capacity due to low water levels.

A scope is seen for institutional strengthening towards improved basinwide coordination, as a basis for IWRM-based action planning of water-related development.¹⁴

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¹⁴ ADB (Jun 07)

Appendix F: Draft framework for river basin roadmaps

This draft guideline covers IWRM-based basin investment roadmaps. It comes with two examples - a simple one and a comprehensive one.

F.1 Scope and approach

What?

A roadmap is a concise, holistic, sequenced action plan.

Why?

An action-oriented, IWRM-based river basin investment roadmap is a powerful tool for social, economic and environmental progress. It can provide a clear and agreed sense of direction, illustrate the relations between various development initiatives, and assure that gaps and overlaps are sorted out. Also, the roadmap provides guidance on implementation.

How?

The following steps may be considered, as relevant from case to case:

- Get an overview of existing documentation. Conduct a screening of study reports and other documents. Prepare a synthesis of management modalities, including the national socio-economic planning framework, and the role of the RBO (if any)
- Get an overview of information sources and stakeholders (with a particular view to identification of development opportunities and supportive development initiatives). Consider how to liaise with stakeholders
- Prepare a small activity list - a '*roadmap for the roadmap*' - indicating what to do and who does what
- Identify, in consultation with informants and stakeholders, a vision for the basin, and a preliminary set of operational development goals in support of achieving the vision (cf. examples provided below). This will form a preliminary framework for the roadmap, the purpose being to provide a reference and a focus for the continued work
- Conduct a stakeholder consultation workshop on development priorities and scoping, facilitated in order to add '*open-mindedness*' to the scoping process (looking ahead as much as over the shoulder)
- Adjust the draft framework and prepare a draft roadmap with specific development initiatives (structural as well as non-structural). Indicate implementing bodies - '*who does what?*'. Please refer to the examples provided below
- Conduct a stakeholder consultation workshop for review of the draft, in support of its validity, adequacy, and implementation prospects. Conduct and adjust accordingly
- Check the roadmap for project cycle technicalities. Add these activities to the roadmap as required
- Prepare and circulate a final version
- Revise it when there is a need to do so

Who?

The roadmap can conveniently be prepared by the RBO (if one exists), or otherwise by a dedicated coordination body with a relevant government mandate. (If there is no RBO, creating one may be considered as an element of the roadmap).

A close dialogue must be maintained with institutional and individual stakeholders, possibly including the private sector.

Implementation of the roadmap can be facilitated by the RBO, but many of its specific elements will be implemented by sector agencies, de-central administrative bodies, and others - who should therefore be involved in the planning.

Guiding principles

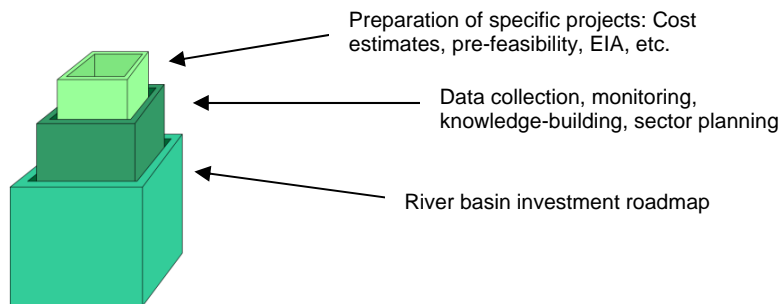
... as relevant from case to case:

- An IWRM perspective is applied, emphasizing a holistic, cross-sector, balanced, and sustainable water allocation in accordance with national development policies and priorities
- The roadmap may cover short-term and medium-term development initiatives in support of a long-term perspective. Its recommendations should be action-oriented and practical, with a viable implementation framework
- A strategic social/environmental assessment (SEA) can be required for the whole set of development initiatives, as well as screening of specific interventions (and full-blown EIAs as required). These activities can be included in the roadmap as an element for subsequent implementation
- The roadmap should be revised regularly, to adapt to new challenges, new opportunities, and new knowledge
- A framework for progress monitoring can be prepared separately

Suggestions

... as relevant from case to case:

- Scoping can be supported by scenario analysis, by SWOT analysis (of strengths, weaknesses, opportunities and threats), and/or by logframe analysis. A logframe analysis is not adequate in itself, however, since it tends to overlook dormant (potential) development opportunities - it looks at the trees as much as the forest
- Consider both structural and non-structural development needs and opportunities, in an economic, social, environmental and institutional perspective, as relevant in the context
- Inevitably, many questions will emerge during the roadmap formulation. Are implementing bodies available or do they need to be identified - or even formed? Is there a need of additional data and knowledge? ... basic cost estimates? ... an over-all design and monitoring framework? ... a strategic social and environmental impact assessment? ... impact screening of individual projects? ... full EIAs for some of the projects? ... and pre-feasibility and feasibility studies? If so, please don't stop and wait, but add these activities to the roadmap. Like a Chinese box, the roadmap can include '*sub-roadmaps*' for project cycle activities and for preparation of major development interventions



- Big and small (expensive and inexpensive) elements can be included side by side. Sometimes they can add value to each other, and small development initiatives can have large benefits
- Include priority initiatives, and only those, but don't spend too much time on a detailed ranking
- The roadmap should preferably be self-sustaining. Assumptions on developments that are external to the roadmap - such as major national or regional infrastructure projects - should be duly observed. If some initiative is particularly risky, a preparatory study may be considered. On the other hand, a master plan or a feasibility study (or a roadmap!) serve no purposes in themselves - their usefulness depends on tangible outcomes '*on the ground*'
- It will facilitate implementation whenever an implementing organization can be indicated '*up front*' for the different roadmap elements. It will in many cases be someone else than the RBO. It could be a public agency, a private company, or an NGO

F.2 Example 1 - 4-Ps Basin, Cambodia

This minimalistic indicative outline is from CamboWP and CNMC (Mar 08)

Notes

This framework highlights IWRM at the basin level. A suitable extent of harmony with the national, provincial and commune levels of planning (and their governing development policies) should be aimed at, and a steady convergence should be pursued in the course of time.

Time horizons for planned achievements are not included but may be added if so desired. They are not necessary, though - a clear sense of direction is useful even if the time of arrival at the destination is uncertain.

Basin-level development priorities (preliminary)

- Improved access to safe water and sanitation
- Support in many ways to water-dependent rural livelihoods, including coordinated development of water, agriculture and fisheries
- Infrastructural development and trade facilitation
- Hydropower development
- Tourism development
- Support to risk preparedness and management: Floods, drought, pests, climate variability
- Human resources development; consolidation and expansion of management capacity at the province level, the commune level, and the water user group level
- A functional framework and modalities for basin-level IWRM

Management framework and modalities

Subject	Status	Target
Basinwide IWRM development priorities	In preparation	Priorities discussed, amended and endorsed during public consultations Priorities agreed among institutional stakeholders
Inter-sector coordination at province level	Coordination body functional for each province	IWRM aspects mainstreamed into the province-level inter-sector coordination
Basin-level coordination (between provinces)	Minimal; conducted on an ad hoc basis	Functional modality established for IWRM-based basin-level coordination
De-central capacity for planning and management	Scope for consolidation at all levels; efforts to this respect in progress	Improvements at province level, including improved linkages with the local levels Improvements at commune level Improvements at the water user group level
De-central capacity for public participation	Functional at commune level; scope for consolidation	Improved dialogue with the private sector (at province and commune level) Improved awareness of potential IWRM-related benefits
... and more??		

IWRM-based development

Subject	Status	Target (to be elaborated)
Coverage of safe water & sanitation	Low, particularly in remote rural areas	Visible improvements over-all Visible improvements in remote areas
Rural livelihoods and income generation	Widespread poverty; clear scope for development	Visible improvements within value generated; diversification; and access to markets Visible improvements in remote areas
Reduced risk exposure	Floods are an occasional problem, but drought and ' <i>social shocks</i> ' (including health) are more severe	Visible improvements over-all Visible improvements in remote areas
Infrastructure and trade	Significant progress in recent years	Improved coverage of remote areas Increased cross-border trade (and tourism)
Tourism	Some income generated; attractive potential for further development (related to improved infrastructure and reflecting international trends)	Expansion (in terms of livelihoods and value generated)
... and more??		

Supporting basin-level development programmes/projects

Title	Implementing agency	Scope and benefits
.....
.....
.....

F.3 Example 2 - Citarum River Basin, Indonesia

This more comprehensive example is a slightly edited version of Annex 2 of ADB (Jan 07). This roadmap builds on an existing master plan and a set of preparatory studies

Foreword

The development of a roadmap for the Citarum River Basin has followed the basic methodology of strategic planning.

Fundamentally, the approach has been to ask the following three questions:

- Where do we want to go (with water resource management in the basin)?
- Where are we now (that is, what are the existing issues/problems)?
- How can we get from where we are now to where we want to go (the 'road' we need to take)?

The key issues are well documented in a variety of documents produced in the last decade. The problems are numerous and cover a variety of areas, including deterioration of water quality, deforestation and degradation of upland catchments, mining of groundwater, and degradation of water control infrastructure. These problems have severe economic and social consequences to the people of the basin.

The roadmap itself is simply a set of strategies (and projects/actions to implement those strategies) that define the path between the present situation with respect to water resources in the basin and the desired outcomes (or vision) for the future – that is, what needs to be done to achieve the objectives. This has been achieved using the following 'vision-oriented' approach:

- Reaffirm and more clearly define a shared vision for the future of the basin (to 2020);
- Compare the status of water resources in the basin to the vision, in order to identify the strategic direction that needs to be taken (the 'road' so to speak);
- Formulate objectives in a number of key areas that would, if achieved, lead to fulfilment of the vision;
- Develop, for each key area, a set of interventions (projects and activities) that would, if successfully implemented, achieve the objectives.

Close to 70 interventions have been identified as necessary for the achievement of the objectives (and hence the vision) for the Citarum River Basin. These have come from a variety of sources. The costs that have been assumed for each these come from those sources (factored into 2006 dollar terms) and can only be considered as indicative.

Vision for the year 2021

'The government and communities working together for clean, healthy and productive catchments and rivers, bringing sustainable benefits to all people of the Citarum River Basin.'



Strategic framework

A strategic framework was developed in consultation with a broad range of basin stakeholders to ensure that an integrated approach to the formulation of the roadmap would be ensured. This is represented in the 'house' diagram (below), where the vision for the basin is supported by activities in a number of key areas, five of which are seen to be 'pillars', with a foundation of two cross-cutting key areas – the 'foundation'.



Key areas

Key area	Definition	Objectives
Institutions and planning for IWRM	<p>In the definition of this key area, the term '<i>institution</i>' is used in its broadest sense, that is, dealing with organizations, as well as legislation, policies and other protocols that define the relations among those organizations.</p> <p>IWRM-based river basin planning is seen as a mechanism for promulgating and implementing policies of government, and as such is included in this key area. Accordingly, the following activities are included:</p> <ul style="list-style-type: none"> • Organization restructuring; • Organizational capacity building; • Policy development; • Implementing the legislative framework; • Planning for IWRM; • Regulation (such as licensing of water utilisation and wastewater discharge); • Setting of water tariffs; • Institutions for participatory irrigation management. 	<ul style="list-style-type: none"> • Effective organizational frameworks, clearly defined responsibilities and working partnerships with other stakeholders in place, encompassing both '<i>in-stream</i>' and '<i>off-stream</i>' aspects. • An effective coordination mechanism for water resources management. • Harmonious and comprehensive legal framework for effective water resources management. • Transparent, effective and holistic water resources planning mechanisms linked to spatial planning, and inclusive of stakeholder needs and aspirations • Effective regulatory (licensing) mechanisms in place and operating for surface and groundwater utilisation and wastewater discharge (including tariffs). • Agencies concerned with water management to have appropriate technology for effective and sustainable water resource management. • Decision makers, technical experts and other key stakeholders to have the capacity to effectively carry out their responsibilities with regard to water resources planning and management, including EIA procedures

Key area	Definition	Objectives
Water resource development and management	<p>This key area includes those activities that are related to exploiting water resources – that is, increasing water availability to authorised users, and operating and maintaining the infrastructure developed in the process. The main activities included are:</p> <ul style="list-style-type: none"> • Project planning, including '<i>master planning</i>' (that is, planning that focuses on development of infrastructure, and distinct from broader basin planning); • Construction of infrastructure for storing and delivering water (including reservoirs, canals and pipeline systems); • Operation and maintenance of infrastructure; • Promoting efficient and effective utilization of water; • Drilling of wells for use of groundwater. 	<ul style="list-style-type: none"> • New or improved sources of water for domestic, irrigation, industry, hydropower, aquaculture, leisure and other uses developed, consistent with water availability and sustainability. • For all people in the basin to have access to adequate water supply and sanitation. • All water supply infrastructure capable of operating at design capacity. • Sustainable asset management practices in place for all water-related infrastructure.
Water sharing	<p>This key area is often overlooked, particularly where water resources are plentiful. It covers the process of establishing and protecting water rights and allocating water among competing uses and users, as well as setting priorities for water entitlement during times of shortage. It does not include water use registration and licensing, which is a regulatory mechanism, and thus comes under the key area for Institutions and Planning for IWRM.</p>	<ul style="list-style-type: none"> • An equitable water sharing arrangement among the upper and the lower basin and transboundary water resources (water supply to Jakarta). • Clearly defined water utilization rights for all authorised water users. • All conflicts over utilisation of the water resources of the basin resolved quickly and satisfactorily.
Environmental protection	<p>In this key area are included activities for the protection of the environment (that have an impact on water management), such as rivers, lakes, wetlands, forests and other natural ecosystems, and rehabilitation (enhancement) of already degraded environments (aquatic and terrestrial).</p> <p>Out of all the key areas, this one probably is the most difficult to define clearly, as environmental protection and enhancement normally must be achieved by a combination of structural and non-structural measures that may include infrastructure (for instance, wastewater treatment plants), improved institutional (regulatory) arrangements, community participation, and so on.</p> <p>Enhancement of environment management capacity in the organizations charged with this responsibility is included under the institutional key area.</p> <p>Water quality and environmental monitoring and research activities are included in '<i>Data, Information and Decision Support</i>'.</p> <p>Provisions for mitigating the potential adverse effects of specific projects are built into the projects themselves.</p> <p>Legislation and other regulatory processes aimed at minimising adverse impacts come under '<i>institutions</i>'.</p>	<ul style="list-style-type: none"> • Comprehensive land use plans in place, and adhered to, in order to minimise the impacts of human activities on the environment. • Forest protection measures in place and have no further reduction in the existing forest area. • Priority catchments improved through reforestation and adoption of appropriate land use and agricultural practices to minimize erosion. • Maintained and, where possible, enhanced biodiversity, without further degradation. • Minimal pollution from domestic, industrial and agricultural sources entering the waterways of the basin. • Adequate water share for ecological maintenance (environmental flows), for example, minimum dry season flow to prevent salinity intrusion, sedimentation and pollutant accumulation near coastal areas, and protect river and coastal fisheries.
Disaster management	<p>In this context, '<i>disaster</i>' includes only those disasters related to water, such as floods and mud flows.</p>	<ul style="list-style-type: none"> • Effective disaster preparedness plans for floods and mud flow events. • Appropriate works in place to minimise the physical impacts of floods and mud flow events. • Effective drought management plans.
Community empowerment	<p>Involvement of the community in planning and implementation, monitoring and evaluation of IWRM activities is essential. It may be considered as a '<i>foundation</i>' key area, as it supports the five '<i>pillar</i>' key areas described above. There is a strong feeling among stakeholders that empowerment of the community to participate should be an important theme. In this context, community empowerment includes:</p> <ul style="list-style-type: none"> • Education and awareness raising (capacity building); • Dissemination of information about water resource management and related activities; • Facilitation of participation of the community in water planning and management; and • Developing community-based '<i>self-help</i>' programs and specific projects to provide local improvement in water supply, the environment, water quality and so on. 	<ul style="list-style-type: none"> • A high level of awareness of local communities about conservation, utilisation and protection of natural resources. • Local communities to have the opportunity and forum to participate meaningfully in the planning and management of the water resources of the basin. • Enabling conditions (institutional, financial and capacity) in place for local community involvement in provision of local water supply and sanitation services, watershed management and waste management

Key area	Definition	Objectives
Data and information	<p>This key area is another <i>'foundation'</i> key area, as data is fundamental to all aspects of decision-making in water resource planning and management. It includes:</p> <ul style="list-style-type: none"> • Monitoring and other data collection; • Data archiving and management; • Data sharing and dissemination among government agencies, research establishments and so on, and providing public access to data. • Research within cause-effect relationships, and development of new technologies for water conservation and environmental protection. • Decision support tools, including GIS systems, hydrologic and hydraulic models, and other analytical tools. 	<ul style="list-style-type: none"> • A comprehensive database on land and water resources accessible to all that need it to facilitate sustainable management of the basin's water resources. • Implementation of community participatory methods for data collection and verification. • Effective arrangements for <i>'custodianship'</i> of the different water and catchment related datasets. • Effective data sharing arrangements among agencies within the basin and with central agencies. • Suitable models and decision support tools developed and operational to assist rational decision making about water resource management. • Research programs in place to fill knowledge gaps about water-related processes and scenarios.

References

ADB (Aug 08): Indonesia: Integrated Citarum Water Resources Management Project. Draft design and monitoring framework

ADB (Jan 07): Indonesia: Integrated Citarum Water Resources Management Project. Report on roadmap and program development, prepared by the Phase 3 Consultant Team for Ministry of Public Works, Directorate General of Water Resources

CamboWP and CNMC (Mar 08): Piloting a river basin approach to IWRM in Eastern Cambodia (ADB-RETA 6325), Mid-term Progress Report prepared by Cambodia Water Partnership and Cambodia National Mekong Committee

Appendix G: Draft framework for assessment of national IWRM implementation

What?

The assessment relates to the implementation of IWRM at the national level, but with a particular view to basin-level management.

Why?

The assessment can provide guidance for capacity-building and institutional consolidation, in support of the various social, economic and environmental benefits that can be achieved by IWRM. Another aim is regional knowledge-sharing.

How?

The following steps may be considered, as relevant from case to case:

- Conduct a screening of existing documentation (related to water resources management and water-related development in its broadest sense) (possibly including legislation, institutional framework, and national socio-economic strategic development plans)
- Compile a synthesis of the national agenda for water-related development
- Consult with resource persons and agencies
- Identify a set of operational (monitorable) indicators

Elements of analysis (examples)

... serving as a starting point for selection of performance indicators, as relevant from case to case:

- National agenda/policies for water-related social and economic development (including poverty and livelihoods), and the environment: Sector development, IWRM-based development, poverty alleviation, MDG-oriented development, climate proofing, ...
- International water-sharing (if any)
- Legislation (water resources, land use, other natural resources, the environment)
- Over-all administrative framework: 'Vertical' (central/decentral) and 'horizontal' (sector-wise); a national water resources agency or coordinating body (if any); RBOs (if any)
- National water sector apex bodies, key water agencies, RBOs: Authority, interfaces, responsibilities, capacity (including decision-making capacity)
- Monitoring routines, information flows, decision-support tools, knowledge base
- Decentralisation/deconcentration policies/ practices
- Private sector liaison policies/practices
- Public participation policies/practices
- Gender mainstreaming policies/practices
- Trends: Ongoing/planned reforms and initiatives

- Conduct an analysis of existing modalities for basin-level water resources management, on an indicative background of 'best practices', with a view to bottlenecks, gaps and overlaps
- At the same time, identify and explain innovative and/or successful initiatives/modalities
- Recommend on IWRM initiatives/investment programmes in support of capacity upgrading
- Prepare and circulate a draft assessment document with a summary of observations and suggestions
- Seek guidance and comments from stakeholders and resource persons
- Prepare and circulate a final version

Who?

The assessment is for guidance only and can be made by in-house and/or external capacity

Guiding principles

... as relevant from case to case:

- A distinction is made between (i) assessment of national IWRM framework and implementation; and (ii) river basin / RBO-level assessment
- It is acknowledged that each country has its own development agenda and implementation context
- An IWRM perspective is applied, emphasizing a holistic, cross-sector, balanced, and sustainable water allocation in accordance with national development policies and priorities
- Attention should be given to innovative and/or successful features that are suitable for replication or which can otherwise serve as an inspiration to others

Indicators

... to be considered, as relevant from case to case:

Resource management

- Water legally defined as a public good
- Water resources allocation policy in place, giving priority to household supplies
- Basin-level management institutions/mechanisms in place and functional, with clear mandates and interfaces
- Cross-border water-sharing mechanisms in place and functional
- Poverty alleviation/MDG strategy/plan available
- Climate change adaptation strategy/plan available

Institutions and regulation

- Water allocation mechanisms in place and functional
- Sewage disposal mechanisms in place and functional
- Sector bridging institutions/mechanisms in place and functional
- Public participation mechanisms/practices in place and functional
- Mechanisms in place for management of water-sharing and water-related disputes
- Rural land use regulation in place and functional, covering agricultural land ownership and state of aquatic habitats
- National water quality standards available
- Adequate funding for water supplies, sanitation, resource allocation, and for various monitoring functions (meteorological, hydrological, water quality, morphology)

Supplies and services

- Safe water and sanitation coverage
- Food availability
- Electricity availability
- Rural (water-dependent) livelihoods coverage; balance between agricultural livelihoods and agricultural GDP contribution
- Efficiency of water-dependent production systems
- Risk management mechanisms (floods, drought, pollution events) in place and functional

Aquatic environment

- Surface water quality
- State of aquatic habitats and biodiversity

Knowledge-base

- Knowledge-base available and accessible: Meteorology, hydrology, water quality, morphology, use of agro-chemicals, and water demand and availability
- Sector inventories and development plans in place: Navigation, hydropower, tourism, ...

References

- ADB (Nov 06): ADB Water Financing Program 2006-2010 - Helping to Introduce IWRM in 25 River Basins in the Asia-Pacific Region
- Jønch-Clausen, Torkil (Jan 04): Integrated Water Resources Management (IWRM) and Water Efficiency Plans by 2005 - Why, What and How? Global Water Partnership
- MRC (Apr 05): National water resources management frameworks. Draft document prepared by Mekong River Commission under its Basin Development Plan

Appendix H: Draft framework for RBO assessment

What?

An RBO assessment is a structured evaluation of its performance relative to '*best practices*', considering its stated responsibilities and operation.

Why?

The RBO assessment is intended as a guide for development and consolidation of IWRM-based river basin management, in pursuit of social, economic and environmental benefits.

The assessment is not intended for ranking or comparisons of different RBOs. It may, however, serve as a useful tool for structured sharing of experience and inspiration between participating RBOs.

How?¹⁵

A choice can be made between two levels of assessment:

- A performance screening (see Section H.1 below)
- A full NARBO performance benchmarking (see Section H.2 below)

In both cases, the assessment takes place in a structured way, and will identify '*aspects*' or '*critical performance areas*' with a particular scope for upgrading or consolidation.

Also, the assessment should identify successfully implemented solutions and modalities that are suited as inspiration to others.

Who?

The performance screening can conveniently be made by the RBO itself, with some external support, if so desired.

The NARBO performance benchmarking takes place in a collaboration between the RBO itself and external peer reviewers.

Guiding principles

... as relevant from case to case:

- A distinction is made between (i) assessment of national IWRM framework and implementation; and (ii) river basin / RBO-level assessment
- An IWRM perspective is applied, emphasizing a holistic, cross-sector, balanced, and sustainable water allocation in accordance with national development policies and priorities
- It is acknowledged that each RBO has its own development agenda and implementation context. For example, one basin may have a predominantly development-oriented agenda, while another may have a predominantly conservation-oriented one. Some basins are water-rich and others water-poor. National traditions and preferences regarding centralised versus de-central management also affect the authority and duties of its RBOs
- The question of '*where to go*' is the sole decision of each RBO and will inevitably be different from one RBO to another (as clearly demonstrated by existing RBOs). The benchmarking will not address the role as such of the RBO (but perhaps whether the role is clear). The main emphasis of the benchmarking is on the RBOs *ability* to '*go where it wants to go*'; and the related practices and procedures

¹⁵ An alternative (or supplementary) Basin Status Benchmarking procedure is suggested by Kei Saiki (Jan 08), focusing on water utilisation, disaster vulnerability, and environmental management

References

ADB (Nov 06): ADB Water Financing Program 2006-2010 - Helping to Introduce IWRM in 25 River Basins in the Asia-Pacific Region (*'25 IWRM elements'*)

ADB website: Introducing IWRM in river basins, <http://www.adb.org/Water/WFP/basin-roadmap.asp>

ADB and NARBO (Nov 08): Notes from completion workshop on *'Benchmarking river basin organizations'* (RETA 6351), Indonesia

Kei Saiki (Jan 08): A design of IWRM basin performance benchmarking program. ADB and University of Tokyo

NARBO (Jan 06): Guidelines for use of NARBO benchmarking service performance indicators

Documents in preparation

GWP and INBO are preparing a textbook on river basin management, scheduled for launch at the 4th World Water Forum, Istanbul, March 2009

Japan Water Agency and UNESCO are preparing a comprehensive set of guidelines for IWRM-based, basin-level water management, scheduled for launch at the 4th World Water Forum, Istanbul, March 2009

NARBO is preparing a review of lessons learnt from its initial RBO benchmarking activities

H.1 Performance screening

The screening may evaluate the following aspects, as relevant from case to case:

Resource management

- The RBO's role, responsibilities, and administrative interfaces (gaps or overlaps, if any)
- The RBO's political support, popular support, and decision-making capacity
- Water resources allocation modalities/plan
- Action-oriented, IWRM-based development plan / roadmap
- Poverty alleviation / MDG strategy/plan
- Climate change adaptation strategy/plan

Institutions and regulation

- Basin-level institutions/mechanisms for integrated management
- Water allocation and sewage disposal mechanisms
- Public participation mechanisms/practices
- De-central dispute management mechanisms
- Funding for basin-level management

Supplies and services

- Safe water and sanitation coverage
- Efficiency of water-dependent production systems
- Risk management mechanisms (floods, drought, pollution events)

Aquatic environment

- Surface water quality
- State of aquatic habitats and biodiversity

Knowledge-base

- Knowledge-base: Meteorology, hydrology, water quality, morphology, use of agro-chemicals, and water demand and availability
- Institutional capacity, including monitoring, impact prediction and decision-support, and dissemination
- Dialogue with other river basins - in-country and abroad
- Dialogue with the private sector and the academic community

- Sector inventories and development plans: Navigation, hydropower, tourism, ...

The screening may include the following steps:

- Select criteria that are relevant for the RBO, considering the ones suggested above, but perhaps skipping some while adding others, taking into account the RBO's particular responsibilities and operation. For example, a criterion can be '*not applicable*' if some task is undertaken by others than the RBO
- Conduct the assessment based on the selected criteria
- Evaluate present performance in relation to each criterion, using a table, and perhaps with a conceptual ranking as follows:

n/a	Not applicable		
0	Not in preparation	or	Clear scope for improvement
1	Planned but not yet initiated	or	Scope for improvement
2	In progress/ partly implemented/ partly available	or	Some scope for improvement
3	Implemented/ available/operational, but scope for consolidation	or	Good, but scope for adjustment
4	Implemented/ available/ operational, consolidated	or	Excellent

Add comments as required

- Clarify related observations, suggestions and recommendations on improvements, as prompted by the findings
- Prepare a synthesis of aspects with a particular scope for upgrading and suggestions on how to proceed
- Prepare a short draft report with a summary
- Circulate the draft, requesting comments and guidance, and update as required

H.2 NARBO performance benchmarking^{16 17 18}

Performance benchmarking routines have been developed by NARBO. They have been implemented on a pilot basis in Sri Lanka (Mahaweli) and Indonesia (several basins), but are still in a state of consolidation.

The benchmarking comprises two steps: (i) A self-assessment, and (ii) a review by external peers certified by NARBO. The peer review can relay experience from elsewhere and provide inspiration for streamlining.

The benchmarking considers five critical performance areas (CPAs) and a set of indicators, as follows:

1 Missions

- RBO status: Measure of the RBO development and extent of stakeholder involvement in, and quality of, the organizations decision making process
- IWRM: A measure of the national, regional and organizational frameworks that exist to support good governance

2 Stakeholders

- Customer involvement: A measure of the level of customer involvement in the decision making of the RBO and therefore their acceptance of the organizational goals and operation

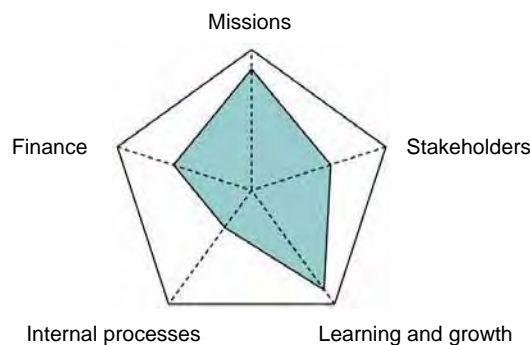
¹⁶ Extracted from Kei Saiki (Jan 08)

¹⁷ The completion workshop on '*Benchmarking river basin organizations*' (RETA 6351) (Indonesia, Nov 08) suggested an overhaul of the applied terminology

¹⁸ A NARBO workshop on the procedures, drawing on lessons learnt, is scheduled for 2nd quarter 2009

- Customer feedback: A measure of the level of customer involvement in the decision making of the RBO and therefore their acceptance of the organizational goals and operation
 - Environmental audits: A measure of the level of environmental awareness and intention to protect against environmental degradation
 - Basin livelihood: Measure of the overall change in livelihoods in the basin
- 3 *Learning and growth*
- Human resources development: A measure of the maturity and effectiveness of the human resources development system within the RBO reflecting its likely contribution to achievement of organizational objectives
 - Technical development: Measure of the level of commitment to adopt appropriate technology solutions which will aid in the delivery of the mission
 - Organizational development: Measure of the commitment to quality management through the application of QMS or similar management improvement tools¹⁹
- 4 *Internal business processes*
- Planning: To identify the level of planning operation within the RBO and its likely impact on delivery of mission
 - Water allocation: Measure water resource allocations in the basin that determine delivery and performance of water services
 - Data management: Measure of the commitment to and implementation of effective data management and information dissemination
- 5 *Finance*
- Cost recovery: A measure of the service to customers and the strength of budget management
 - Financial efficiency: A measure of the commitment to most efficient use of financial resources in pursuit of delivery of the mission

Each indicator is rated on a scale from 0 to 4. The rating can be absolute, if so preferred, by using the ratings directly, or it can be relative, if so preferred, by dividing the ratings with the maximum possible score. In any case, indicators with a particular scope for strengthening should be highlighted, and comments given on potential measures to this effect. The relative performance of each area can be illustrated in a pentagon diagramme:



¹⁹ QMS (Quality Management System) (of an organization): A set of policies, processes and procedures for planning and operation in support of good performance