

**Asia-Pacific Regional Document of the  
4<sup>th</sup> World Water Forum**

**FINAL REPORT**

**Part II  
Sub-regional Position Papers**

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**Section 1: Position Paper of the Central Asia Sub-region**

**Section 2: Position Paper of the Northeast Asia Sub-region**

**Section 3: Position Paper of the South Asia Sub-region**

**Section 4: Position Paper of the Southeast Asia Sub-region**

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## **Section 1**

### **Position Paper of the Central Asia Sub-region**

**“CHALLENGES AND ACTIONS FOR INTEGRATED APPROACHES”**

## LIST OF ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
ASBP	The Aral Sea Basin Program
BWO	Basin Water Organization
BMP	Basin Master Plan
CAREC	Central Asian Regional Ecological Center
CIDA	The Canadian International Development Agency
CAWATER	Information Portal for Water and Environmental Issues in Central Asia
CAREWIB	Project title on creation of CAWATER portal
EC IFAS	Executive Committee of the International Fund for the Aral Sea saving
EU WI	Water Initiative of the European Union
GWP CACENA	Global Water Partnership Central Asia and Caucasus
GWP	Global Water Partnership
GEF	The Global Environmental Facilities
GNP	Gross National Product
INBO	International Network of the Basin Organizations
ICSD	Interstate Commission on Sustainable Development
IWRM	Integrated Water Resources Management
IWRA	The International Water Resources Association
ICID	International Commission on Irrigation and Drainage
ICWC	The Interstate Coordination Water Commission in Central Asia
FAO	The Food and Agricultural Organization of the United Nations
NATO	The North Atlantic Treaty Organization
NGO's	Non-Governmental Organizations
MDGs	Millennium Development Goals
O&M	Operation and Maintenance
SPM	Strategic Planning and Management
SIC	Scientific and Information Center
SPECA	The UN Special Program for Economics of Central Asia
SCADA	Supervisory Control And Data Acquisition
SDC	The Swiss Development Agency
UNECE	The UN Economic Commission for Europe
UN ESCAP	The Economic and Social Commission for Asia and the Pacific of the United Nations
UNDP	The United Nations Development Program
USAID	United States Agency for International Development
WARMAP	Water Resources Management and Agriculture Project of TACIS
WB	The World Bank
WCC	The Water Canal Committee
WUA	Water User Association
WMO	Water Management Organization
4WWF	4 <sup>th</sup> World Water Forum

## PRESENTATION OF THE REGIONAL DOCUMENT

The collaboration among five states around water resources in Central Asia is unique example not only of joint planning towards achievement of MDGs, exchange of information, but also cooperation in real-time management, operation and monitoring of transboundary water sources and infrastructure in a cooperative way. Some reasons formed conditions for such collaboration are:

- common historical, ethnic, customary and even religious roots of all nations in the states;
- past mutual experience from the Soviet period;
- political will of leaders of the five states and understanding of decision-makers about the importance of water issues for the region;
- creation of proper "cooperation spirit" not only among water specialists and professionals, involved in water management, but also among other sectors such as environment, health, water and sanitation and others.

The countries of the region are recently on the way of broad IWRM concept implementation within the context of sustainable development programs aiming to achieve MDGs. This concept already accepted by the Water Codes in three of five countries, and some pilot projects demonstrated success of the practical approaches towards IWRM innovations for all countries. The principal regional experience and lessons with IWRM implementation are based on the outputs of a number of the on-going pilot projects ("IWRM in Fergana Valley", "IWRM in Lowlands of Amudarya and Syrdarya", "National IWRM and Water Efficiency Plan for Kazakhstan" and others). The real ongoing actions supported not only by governmental water management authorities, but also by the most part of stakeholders and NGOs.

Within the preparation towards 4WWF in Mexico the water authorities of the region organized *local actions*, which have two main directions.

### **1. Test of practices to implement IWRM principles in Central Asia in terms of pilot projects.**

Based on the on-going pilot projects outputs including organizational, institutional, technical and other measures under condition of satisfactory funding and capacity building the real progress can be achieved in reforming water sector over the Central Asian region, particularly aiming the following:

- To assist countries to meet MDGs related to water.
- Achievement of stable water availability; even and equitable water distribution by sub-basins along with significant reduction of unproductive losses.
- Introduction of democratic water governance principles by involvement of all concerned parties into water management process, including gender aspects.
- Partial solution of social problems connected with access to water and equitable water supply.
- Solution of ecological issues connected with human activity.
- Increase of water and land productivity.

To sustain the ongoing processes there are needed the following actions in coming future:

- IWRM national plans development for all countries in the region. Funds allocation through GWP and UNDP from Norway allowed Kazakhstan to start this activity that will serve good example for other countries of the region. Main task of national plan is create clear understanding of IWRM implementation, its objectives, effects, stages and scope of work.
- Give political support to water issues and IWRM implementation.
- Public participation at all hierarchic levels.
- Capacity development and training activity.
- Juridical and financial support to water sector.
- Technical measures (managerial tools dissemination).

## **2. Multilateral dialogue on ways for future development of water sector in Central Asia.**

The important outcomes would be reached in the result of action: scenarios of future development for each country and the region as a whole with proper orientation to the stable water availability, even and equitable distribution of water resources over sub-basins under significant reduction of unproductive losses; introducing principles of democratic water resources governance through all concerned parties involvement; solution of social issues connected with equitable water distribution particularly drinking water; solution of ecologic issues connected with economic activity; and finally, water and land resources productivity increase.

Present document summarizing the outputs of those local actions and is devoted to broad circle of water society including decision makers determining water policy and reforms in water governance and management. It is intended for civil society representatives interested in proper reforms realization. Readers should realize that human-being already faced serious water-related problems not only at the regional level, but over the globe. Everybody should understand that these problems could not be actually resolved by traditional methods. We believe that this document is a one more step forward to serve the problem resolution.

Also, it would be worth to mention that after the 3d World Water Forum in Kyoto Central Asian (March 2003) countries facilitated smooth transition from the command style of water management to new and more democratic water collaboration with the following principal results:

- The grave conflicts in water management, operation, and allocation among the countries of the region have been avoided.
- A range of important legal, financial, and institutional proposals have been prepared for submitting to the governments of the states, defining the principles of interaction on water issues.
- The practical measures for broad IWRM implementation were accepted by Water Authorities and Governmental Agencies in all countries.

## CENTRAL ASIA: BACKGROUND INFORMATION

Central Asia covers territory of five countries: Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan (Fig. 1). It is situated in the heart of the Eurasian continent with the total area of 3,882,000 square kilometres and the population over 53 million (2004) of which more than 82 % is living in the Aral Sea Basin (Table 1). It borders with Afghanistan and Iran in the south, with China in the east and with Russia in the west and in the north.



Figure1. The countries of Central Asia

The climate in the region is sharply continental, mostly arid and semi-arid. Average precipitation (concentrated in the spring and winter) is about 270 mm, varying between 600-800 mm in mountains zones and 80-150 mm in desert regions.

Social-economic development of the region has depended on water and land resources since immemorial time. Irrigated farming and livestock production formed the biggest part of welfare, but in the same time created vulnerable conditions and water limitations for ecosystems. The region started actively using irrigation in the 6-7<sup>th</sup> century B.C and still it is one of the biggest irrigation region in the world (with about 9.1 million hectares of irrigated crops). Population growth and irrigation development have significantly increased the demand for water in the region especially during the past 40 years. Actual consumptive water withdrawal in Central Asian countries varies from 20% of available water resources (Kazakhstan, Kyrgyzstan, Tajikistan) to 80-90% (Uzbekistan, Turkmenistan).

**Table1. The Basic Statistics  
(included only territory of the Aral Sea basin)**

<b>Indicator</b>	<b>Unit</b>	<b>1960</b>	<b>1970</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>	<b>2004</b>
Population	Million	14.6	20.3	26.8	33.6	41.8	43.8
Irrigated area Netto	1 000 ha	4510	5150	6920	7600	7896	8120
Irrigated area per capita	ha	0.31	0.27	0.26	0.23	0.19	0.18
Total water diversion	km <sup>3</sup> /year	60.61	94.56	120.69	116.27	105.0	102.0
Incl. irrigation	km <sup>3</sup> /year	56.15	86.84	106.79	106.4	94.66	93.0
Specific diversion per ha	m <sup>3</sup> /ha	12450	16860	15430	14000	11850	11450
Specific diversion per capita	m <sup>3</sup> /capita	4270	4730	4500	3460	2530	2120
GNP	Bln.US\$	16.1	32.4	48.1	74.0	27.5	34.4
Including agricultural production	Bln.US\$	5.8	8.9	18.3	22.0	9.0	10.2

A specific feature of the region from a hydrological point of view is the division of its territory into three main zones: (a) the zone of surface flow formation (upper watersheds in the mountain areas to the south-east), (b) the zone of flow transit and its dissipation (central part), and (c) the delta zones (to the north-west).

Available water resources (surface and underground) have always principal impact to the economic activities in Central Asia as limiting factor for development which is competing with ecological requirements. The largest rivers over the region are mostly transboundary and they are the following: the Syrdarya and Amurdarya (Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan), Chu and Talas (Kyrgyzstan and Kazakhstan), Tarim (Kyrgyzstan, Tajikistan, China), Ili (China, Kazakhstan), Irtysh (China, Kazakhstan, Russia), Ural, Ishim, Tobol (Kazakhstan, Russia).

During the last three decades of the Soviet era (1960-90), irrigated agriculture and the sectors of economy related to water management (processing of agricultural products, hydropower, construction and some others), contributed more than 50 percent to the GNP. Obtaining of independence by Central Asian countries and respective loosening of economic ties were accompanied by economic decline. This became the main cause of decline in gross national product and, particularly, agricultural production that represented large share of about 30% in GNP.

## **MAIN CHALLENGES FACING BY THE REGION REGARDING WATER ISSUES**

An analysis of the water management situation in the region has revealed existence of the following general destabilizing factors:

- Demographic growth and permanent large share of rural population;
- Lack of consideration of environmental demand in current basin water use and conservation master-plans;
- Different national priorities concerning joint use and exchange of water and power;
- Construction of the new water infrastructure exerting transboundary impacts without coordination with other riparian countries;
- Uncertainties related to global climate warming;
- Lack of conflict resolution mechanisms and procedures to recover economic losses due to breaching the agreements on water sharing;
- Insufficient information interchange among riparian countries, first of all, exchange of hydro-meteorological data to ensure the more accurate forecast of water availability and to improve transboundary water management;
- Lack of policies and programs of the regional economic integration, and insufficient cooperation to improve the irrigated farming productivity on the basis of the model that enables optimizing the differentiation of labor in the region; and
- Vagueness at the regional level such as the prospects of water use by Afghanistan etc.

Also, there are specific negative factors at the national level and it is extremely useful to pay attention to the following internal (national) water challenges:

- water scarcity and pollution at the sub-basin and local levels;
- poor access of the big part of population to the safe drinking water;
- low water and land productivity or low output of an irrigated hectare;
- insufficient developing of the national legislative regulations;
- high-accumulated depreciation of assets owned by water organizations;
- an insufficient material and technical basis of water management organizations;
- inability of water users to pay for water delivery services;
- institutional issues (organizational and governing shortcomings);
- the poor cross-sectoral integration (between main water users);
- shortcomings of the personnel policy in the water sector;
- return flow (waste water) management issues;
- absence of proper regulations for transboundary groundwater use.

## STRATEGIES SUGGESTED FOR IMPLEMENTATION

The first recognized in the region strategic document is “The Principal Provisions of Regional Water Strategy of Aral Sea Basin” (GEF Project 1996...1997, Task Manager Prof. J. Kindler). This document was prepared by a working group that consisted of the representative of all five states on equal base, and then it was confirmed by the five governments. Based on this document, the region formulated needs for future water development. The priorities were given mostly to the practical activities towards implementation of the IWRM concept. These priorities were later developed in more details, including five principal directions.

### **1. Legal base of interstate collaboration, which includes the following:**

To prepare, make agree and get the national governments approval for principal interstate agreements such as “Agreement on the Exchange of Information and the Establishment of the Regional Database for the Transboundary Water Resources”; "Agreement on Strengthening the Institutional Structure for the Aral Sea Basin Transboundary Water Resources Management, Protection and Development"; “Agreements on the Rules for Water Use on the Amudarya and Syrdarya rivers” (separately); "Agreement on the Ecological Sustainability of Transboundary Waters of Aral Sea Basin".

To assume the “common water use” doctrine as a basis for inter-sectoral water relations. Strengthening regional bodies of ICWC and ICSD along with enhancing their rights, authorities, and responsibilities are essential. There should be mandatory provisions to include in these organizations not only representatives of water management sector from the countries of the region, but also hydro-energy and water-delivery specialists, ecologists, and others. They should be granted by diplomatic status within the region and they should be free from requirements to follow decisions taken by the host country.

To establish well-defined regulations for operating regional organizations under various conditions and in different situations (water scarcity, floods, etc.); make these activities equitable, multinational, and transparent.

To lay down regulations for joint design, construction, and operation of multi-objective structures (for example Kamarata dam, Ragun dam, etc.), which will ensure that these complex hydro-structures will not be used in the interests of only one country or one sector.

To work out regulations for management of transboundary wastewaters returned to the main rivers.

### **2. Financial base and mechanisms for interstate collaboration, which includes the following:**

To provide reliable financial support by the states for water management agencies, hydrometeorological services, and nature conservancy authorities in zones of flow formation and delta.

As a substitution for fuel/energy-water exchange, put into practice payments for flow regulation in reservoirs (over an annual, seasonal, or other period) with participation by all countries

of the Aral Sea Basin in covering expenses for flow formation, as well as protection of the deltas.

To set well-defined limits on water withdrawal from the basins, taking into account ecologically viable volumes of water in the rivers, and allocate them among the countries in an equitable and reasonable manner. On the basis of these limits, make payments for exceeding the set levels of water withdrawal at a rate that reflects the price for water as a resource, and utilize this money for development of joint water saving activities in the basin.

To define, make agree and implement the mechanism of damage compensation as result of pollution, not-agreed actions along the river or deviation from approved order of water allocation. To make agree and implement the regulation on sharing expenses for monitoring of snow formation in upper watershed, snow melting and situation on the glaciers, as well as for operation on hydrometeorological network on the transboundary waters and information exchange.

### **3. General capacity development for ICWC and ICSD institutions, which should consist the following key items:**

To strengthen the existing information network (CAWATER info) between ICWC members and their partners from other sectors and NGOs from top to bottom within the countries, including:

- information system on transboundary waters;
- knowledge base;
- analytical tools.

To expand the information network “CAWATER – foreign partners” (for example IPTRID, Grid Arendal, CapNet, INBO).

To continue support for joint regional projects, mostly addressed to the IWRM implementation in large scale.

To strengthen existing training system.

### **4. Capacity building for BWOs “Amydarya” and “Syrdarya” includes:**

- equip headquarter and their regional units by modern computers, telephone and communication net;
- organize on this base dispatch service and information exchange;
- equip all head works of BWOs with automatic control and management system (SCADA) for prevention any possible uncontrolled water withdrawal from the river.

### **5. Capacity building for Hydromet Services at regional and national levels:**

- rehabilitation of existed and construction of new hydrological monitoring stations on the transboundary waters with installation modern equipment;

- rehabilitation of monitoring stations on main glaciers, which are indicative points for both rivers;
- organizing satellite network communication between monitoring stations and national centers;
- organizing Regional Hydromet Center which can merge forces national Hydromets and join them with end water-users (BWOs, ministry of waters, etc);
- improve system of river forecast by using modern models of precipitation and flow formation;
- arrange general public awareness, especially end-users in forecast and real data.

## **DISSEMINATION OF EXPERIENCE**

This position paper generalized proposed measures, decisions and their implementation to four super problems and subsequent sub-problems (table 2). Conclusion is very clear – all efforts concentrated on the smoothing growing transboundary problems and decisions regarding re-assessment of new approach to water governance and operational and prospective management. Decision-makers couldn't ignore these needs because it could create social disaster and catastrophic exposure of people's violence. That is why the priority needs were approved at the highest level within the so-called "Aral Sea Basin Program 2" (ASBP-2) in 2002. This new ASBP-2 covers most of the indicated problems. Unfortunately, two years has gone, but just only about 5 per cent of this program found formal commitment and financial support from the states and international donors. In any case, even movement started in the past few years is unique enough taking into account interstate specifics of the regional collaboration. What have been really done?

First of all, **preparation of legal tools for collaboration**, which has started within WARMAP Project (EU TACIS, 1995-2000). ICWC decision in 1996 stated a need to prepare at first stage four agreements, which would cover major directions of joint activities of the five states on the transboundary waters: institutional arrangement, information exchange, regulations of water use, environmental protections. In 1996...1999 drafts of these agreements were negotiated during the meetings of working group represented by each states and regional organizations. These drafts were agreed by all members of this group. One of the agreements – about information exchange - was signed by ICWC members and submitted to Board of IFAS for approval by the national governments.

USAID, initiated by Kyrgyz Government as result of growing deficit of this state in power and their priority to use water regime of Syrdarya in interest of hydropower, have organized other working group of water and power specialists for preparation of agreement on "water – power" exchange. This work succeeded in 1998 by signing other framework agreement well-known as Agreement 1998 on Syrdarya river, between Kazakh, Kyrgyz and Uzbek governments (later joined by Tajikistan) and agreed conditions of release water from Toktogul reservoir in summer with delivery gas, oil, coal and winter power. Although Agreement 1998 didn't pass the test of time and its provisions should be supplemented in reality each year by

the interstate protocol, but it played proper role in creation of legal conditions of water management on Syrdarya river.

Decision of the Presidents of Central Asian States in 2002 on ASBP-2 approval indicates that there is a need to finalize draft agreements and to prepare some new one, particularly, regarding conflict resolution mechanism, new construction on transboundary waters and other. Unfortunately, this legal work didn't proceed formally from Executive Committee of Interstate Fund to Save the Aral Sea (EC IFAS) that itself must be first provider of this activity. NATO, ADB tried to enforce this legal initiatives by assisting in conduct some principal workshops and conferences, but nothing happened.

#### **What are lessons learned from the above mentioned activities:**

- setting up adequate legal framework on transboundary waters requires permanent activities of a working group, authorized by the national governments with delegating them strong responsibilities;
- the working group should be multi-sectoral with representatives of all stakeholders interested in water use and ministries of foreign affairs to promote negotiations and diplomatic approaches;
- preparation of legal base should exclude any attempts to put pressure or set up priority rights of upper watershed;
- negotiation requires public participation and a lack of ambitions;
- donors assistance is welcome to enable permanent activities of the working group on legal issue.

**The second direction** was addressed to **strengthening of institutions for joint management**. Organizational structure of ICWC is good enough for the moment. It was organized well enough and represents strong sharing of obligations and rights:

- ICWC consists of five equal in their positions members, authorized by the states. ICWC takes all decisions only on consensus base;
- BWOs are responsible for planning and operational activities;
- SIC ICWC is responsible for analytical, information and perspective activity, it prepares recommendations to members ICWC as well;
- ICWC Secretariat is an official representative body of Commission.

Governments through the water authorities of the five states allocated to ICWC staff, budget, arrangement, official status and rights that permit experienced specialists organize successfully their work. Many donors, especially the EU, UNDP, World Bank, CIDA, SDC, NATO Programme "Science for Peace" have rendered technical assistance to ICWC bodies. One of the important elements of ICWC capacity building was setting up regional and national communication network, which interlinked regional bodies and national water-related agencies. This network is maintained by SIC ICWC and interconnects with many international organizations such as WWC, ICID, INBO, IWRA, GWP, UNECE and serves as a direct way to world water community and donors' window.

Delay with signing of the agreements that provide a common regulations for all organizational issues caused certain disadvantages because initial status of ICWC didn't reflect main changes in water situation:

- Representative of energy, water supply, environment and other principal stakeholders are not represented in ICWC (there is need for more close cooperation with ICSD);
- ICWC bodies has rather weak financial arrangements and not all countries has their representatives in these bodies;
- ICWC bodies has weak public participation;
- ICWC didn't embrace in the sphere of its activity the management of all types of water as well as water quality issues.

### **What are lessons learned from the above mentioned activities:**

Institutional structures are not “dead” formation – they should follow to changes of situation if we don't want to permit a lack and failure of regional collaboration. The establishment of ICWC and its bodies (1992...1993) was clear and right way, which could be developed on the example of International Joint Commission (USA–Canada) or Mekong Commission or according to other success examples. But attempt to keep national priorities in interstate collaboration led to creation of many parallel bodies with overlapping functions: Interstate Council, Interstate Fund, Commission of Sustainable Development, etc. Later, Interstate Council and Interstate Fund were merged, but absence of clear allocation of obligations in the sphere of coordination and fundraising disoriented donors and attempts of governments to concentrate their financing capacity on the real improvement of water situation in the basin.

**The third direction is creation of regional and national information system.** In accordance with Program 3 of the ASBP-1 the ICWC developed some interconnected information systems within each national authorities, BWOs and SIC ICWC. Setting up these system was done by common hierarchic method and as a result got single format and interconnected views thanks to assistance of SDC through CAREWIB (Central Asia Regional Water Information Base) project with assistance from UNECE and Grid-Arendal. This project has broad dissemination tools in e-net, internet, printed form and based on the pyramid of information sieve from down to top which supported by information inputs from different projects and sources, implemented by not only SIC but as well as other ICWC bodies and cooperation with ICSD institutions. Information system\* consists of:

- information portal with more than 20 different web sites including knowledge base, ongoing of ICWC, ongoing information about water resources picked up from Hydromerservice, ongoing situation on water allocation from information system of both BWOs;
- data base of dynamic social, environment, economic, land use information from all five states;
- set of analytical modules and models for analyze of situation on the basins, forecast of different situations which can be predicted on annual and multiyear water situation.

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\* Detail information about work of this system is available on our web sites [www.cawater-info.net](http://www.cawater-info.net) and [www.sic.icwc-aral.uz](http://www.sic.icwc-aral.uz)

Besides inert users of CAREWIB inside of ICWC there was observed permanent growth of other's' interest to the system, which lead to more than 1300 persons (2 GB) visitors per month.

### **Lessons learned**

- information system should have clear and convince interface and implementation of it need to be accompanied by training of users from “roots” to approach on system;
- information system need to include models and modules which permit to stimulate interest of user to support of system.

And the **fourth direction is training system**. Although a need for training have been very high as result of collapse of Soviet system's professional education, our first attempt to organize such education met with support just in the form of occasional thematic seminars and workshops up to 1999, when SIC ICWC together with CIDA and Israel arranged first training for water specialists. A series of the workshops presented advanced achievements of world practices in water management. Study tours for top-level water specialists to Canada, USA, Israel, Italy, France and Netherlands to review water management approaches in developed states was very useful and important.

In 1999 SIC ICWC in cooperation with McGill University submitted to CIDA a program of permanent training for specialists of Central Asian water agencies at interstate level. This program, namely ICWC Training Center establishment, was approved by CIDA and started its activity in 2000 in Tashkent. Later two branches of the Training Center were established: in Urgench for lowlands of Amudarya – Turkmenistan and Uzbekistan with assistance of CIDA and in Osh for seven provinces of Fergana valley in Kyrgyzstan, Tajikistan and Uzbekistan with assistance of SDC.

While past five years CIDA and ICWC Training Centre has become a center of improvement, which promotes advanced methods of water resources management and environmental protection in Central Asian region. Over 4500 specialists were trained in Tashkent office and in the branches. First of all ICWC found the opportunity to cooperate in solving the issues through the dialogue not only between governments but also between various sectors of economy, between governmental and non-governmental organizations engaged in water management issues. Proper efforts needed for cooperation building among ICWC and ICSD with involvement of CAREC. The idea of integrated decision-making, orientation to the hydro-solidarity was always highlighted during the workshops.

The role of SIC ICWC, as a center of excellence, and Training Center in promotion of best practices is well recognized in the region. The trainees passed courses were familiarized with new knowledge about irrigation, water saving, planning of water use, community mobilization issues, which were provided by different on-going projects, leaded and introduced by SIC ICWC. The participants obtained skills in water management, particularly in Water Users' Associations (WUA), O&M of irrigation and drainage structures, application of information systems for water management and land reclamation, development of water use scheduling for conditions of huge number of water users, which was comparatively less in the past times of large collective farms existence.

Some difficulties in this activity were connected with:

- a need to cross the national boundaries for participation in training;
- ability of the operational staff to attend training courses;
- unequal educational level of participants;
- lack of proper experimental base.

### **Lessons learned**

- net of training should be developed more broadly to meet current demand for training which is in fact in 10 times greater;
- training should be organized for specific audience not only for water specialists, but also water users;
- gender perspectives in water use and management should be considered;
- training activity should have a separate lines in the budget of national and regional water organizations.

**Table 2. Diagnostic analysis on water related problems  
in the Aral Sea Basin**

<b>Super Issue</b>	<b>Sub-Problem</b>	<b>Solutions and Actions</b>	<b>Implementing Project or Donor</b>
1. Appearance of the transboundary issues after the Soviet Union collapse	<ul style="list-style-type: none"> <li>• Transboundary issues and water allocation principles;</li> <li>• Different priorities of downstream and upstream countries and sectoral trend;</li> <li>• Inter-sectoral contradictions concerning flow regimes;</li> <li>• Difficulties of interstate financing for mutual activities;</li> <li>• Difficulties in efficient water governance;</li> <li>• Collapse of common system of water accounting and forecast;</li> <li>• growing of "Hydroegoism"</li> </ul>	Development of long-term policy and agreed objective criteria for water allocation and use	WARMAP (TACIS), WEAP (USAID), EUWI
		Enabling acceptable and equitable rules of management and regulation of basin in different conditions	ICWC Program, WARMAP (TACIS), USAID, NATO for Peace
		Development and approval of finance rules for interstate structures and joint works	ICWC Program, UN-SPECA
		Implementation of SCADA system and establishing basin public committees with stakeholders participation	CIDA, SDC, USAID
		Establishment of the regional hydrological center (Hydromet. Services)	SDC, USAID
		Development of common information management system with broad stakeholders involvement	WARMAP, CAREWIB (SDC), RiverTwin, UNECE
2. Collapse and weakening of strict "top-down" governance and necessity for integrated approach	<ul style="list-style-type: none"> <li>• Increased institutional disadvantages;</li> <li>• Weakening control over water allocation, accounting and use;</li> <li>• Weakening of governance;</li> <li>• Brain drain;</li> <li>• Absence proper attention to water conservation</li> </ul>	IWRM Implementation	IWRM-Fergana, SPM (UN ESCAP)
		Public involvement to management, (WUA, Public Committees (Councils))	ADB, TACIS, SDC, USAID
		New institutions with stakeholders participation	IWRM-Fergana
		Training system	CIDA, USAID, SDC, ADB
		Set of incentives (extension services, payment for services, privileges for water saving)	SDC
3. Economic decline and funding scarcity	Low water users' involvement to fund water sector	<ul style="list-style-type: none"> <li>• Establish progressive scale of water charges;</li> <li>• Establish credit systems for water users</li> </ul>	FAO, USAID

Super Issue	Sub-Problem	Solutions and Actions	Implementing Project or Donor
		to pay for water services;	
	<ul style="list-style-type: none"> <li>• Not proper mechanism to funding interstate infrastructure;</li> <li>• States reduced interstate structures funding by 10 times; there is no means for its reconstruction and modernization;</li> </ul>	Developing and approving by states norms of O&M funding; support of interstate infrastructures and bodies; obligatory fulfillment of responsibilities; under funds scarcity fund rising from donors and organization of priority funding of sustainable functioning;	ICWC Program
	<ul style="list-style-type: none"> <li>• water users can not pay for water delivery and services;</li> <li>• collapse of irrigation and drainage network, especially at in-farm level;</li> <li>• water sector lost its priority;</li> </ul>	<ul style="list-style-type: none"> <li>• establish gradation of water users' involvement in water sector funding depending on their specific productivity; include payment for households;</li> <li>• attract loans and grants from international financial organizations to improve water supply and fulfillment of priority obligations;</li> <li>• introduce special program "Irrigated land drainage".</li> </ul>	World Bank, FAO
	Neglecting interstate needs for trans-boundary objects modernization	Increasing status of water-related organizations and their transformation into inter-sector bodies, providing their needs including interstate funding as priority driven.	ICWC Program, UN-SPECA, UNDP, ADB
4. Neglecting the ecological demands	<ul style="list-style-type: none"> <li>• Aral sea shrinking and delta desertification;</li> <li>• River water quality worsening;</li> <li>• Growing soil salinity and water-logging;</li> <li>• Flow formation zone degradation by erosion and deforestation</li> </ul>	<ul style="list-style-type: none"> <li>• approval of obligatory releases to the delta and Aral sea; strict monitoring by ICWC and BWO;</li> <li>• set of nature protection measures for Priaralie new sustainable ecological profile establishing;</li> <li>• water conservation policy, return water recycling;</li> <li>• strict limits for salt disposal to the rivers;</li> <li>• priority-driven funding for measures on</li> </ul>	INTAS, NATO "Science for peace", UNDP, EUWI

<b>Super Issue</b>	<b>Sub-Problem</b>	<b>Solutions and Actions</b>	<b>Implementing Project or Donor</b>
		drainage O&M improvement and irrigated land reclamation; <ul style="list-style-type: none"><li>• development of strategy for flow formation zone conservation and establishing international programs on to support mountain landscapes and glaciers.</li></ul>	

## **FUTURE PERSPECTIVE: IWRM AND PUBLIC PARTICIPATION**

Integrated Water Resources Management (IWRM) is a combination of different institutional, managerial and technical measures which used as principal tool to involve stakeholders in these measures to combat various forms of “hydro-egoism”. From regional point of view IWRM is a system of management which characterized by principal features of transition:

- from administrative boundaries to hydrographic one (basin and system);
- from sectoral management to inter-sectoral one;
- from "top-bottom" approach to bilateral one: "bottom-up" – requirements and "top-bottom" – limitations and support;
- from command-administrative method to cooperative management with water users participation at all hierarchic levels;
- from resource management to demand management;
- from close professional systems of water managers to open information-confidential involvement of water users and stakeholders.

Region suggests to consider IWRM as a **management system** based on taking into account and interactions of available waters (surface, ground, return) and associated land and other natural resources within hydrographic boundaries, connecting interests of various sectors and water and environment use hierarchic levels involving all stakeholders in decision making, planning, funding, support and development to meet society and nature needs sustainable.

Management system (IWRM) should ensure achievement (or approaching) of potential water productivity by all water users – industrial, agricultural or municipal – taking into account, that water spent for production unit is close to biological or technological requirements under minimum losses during water intake, transportation, delivery and use. This requires both close coordination of technological processes of water supply and distribution and technological requirements observance.

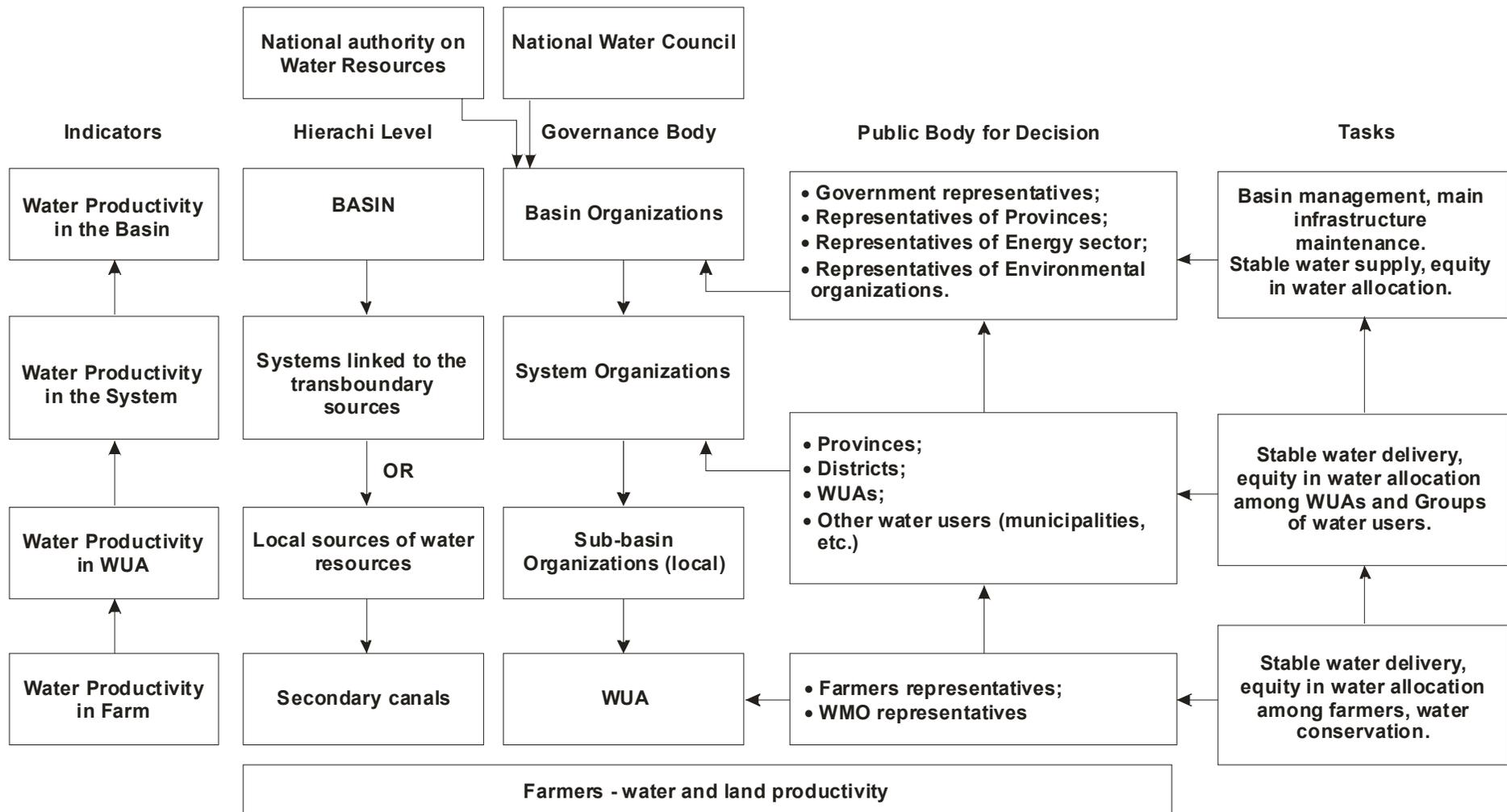
In irrigated agriculture, for example, it means necessity of reclamation and agrotechnique rules following and soil fertility maintenance, species selection; in water supply – treatment systems, wastes utilization, process technology; in industry – advanced technologies introduction, water recycling, solid waste utilization. Thus, IWRM framework often exceeds the limits of water use and protection and includes all spheres of water use as a main limiting factor.

The constructions of IWRM are oriented on the interconnection of all levels of hierarchy in their implementation of its principal role – meet of water demands and create of possibility for achievement of potential productivity. From this point IWRM needs to follow water demand from “bottom to top” and water limitations from “top to bottom” (Fig. 3).

The extremely important element of IWRM is broader involvement of public institutions in the management. Water management problems need to be considered in the context of relationship between the civil society and the government. Public participation should create the atmosphere of *transparency* and *openness*, in which the probability of making decisions that

do not meet public interests decreases. The broader public participation, the less favorable conditions for corruption and public interest neglect. This would help to prevent local or agency level egoism in water use. This is a platform for equitable, responsible decisions on water allocation under growing water shortage with respect to the nature and other members of society.

Public participation is the most important factor for creation of hydro-solidarity in the region. Even if under previous existed administrative way of water management water users faced **administrative hydro-egoism**, under which decision makers of administrative territorial agencies have practiced dictates for their own benefits, with high opportunities for corruption, despotism, and infringement of other entities' rights, transition to hydrographic management as such do not imply transition to IWRM – such approach opens the way for **professional hydro-egoism** since, in the absence of public participation, water-management organizations themselves plan, establish limits, correct these limits and control them. Therefore, public participation is a guarantee of equity, equality and consideration of all interests in the management. Role of the public could be increased by establishing, parallel to water-management organizations, public structures in form of “Union of water users”, Councils or Committees. These are representative bodies that manage relevant systems. Representation implies participation in the process guidance of all interested parties, namely: representatives of water-management bodies; representatives of water use sectors (municipal sector, industry, fishery, etc.), direct water users, local authorities, public organizations, and non-governmental organizations. Union, Committee or Council coordinates activities of legal and physical entities of water relations, water management and use within an area, which is served by water management organization.



**Fig. 3. IWRM Hierarchical Levels and their Links**

## ROAD MAP FOR FUTURE WATER DEVELOPMENT IN CENTRAL ASIA

Actions plan can be built up taking into account the provisions of “Diagnostic study” and problems analysis (Table 2). This process we describe as “Road Map” provided with proper legend, which allows to indicate which problems, how and when will be solved.

The principal role in providing and carrying on this plan should belong to “The Strategic planning of regional collaboration”, which started with support from the Asian Development Bank (ADB) within ADB RETA project in 2005. The activity aims to prepare a strategic vision of future strengthening of ICWC institutions and cooperation with ICSD institutions. The all regional bodies would be evaluated from view point of existing shortcomings and needed measures for improvement should be suggested. Previous activities within framework of “The Principal Provisions of Water Strategy” (GEF and WB), UN - SPECA and GEF-2 projects should be accepted as a basic material for this activity.

It is expected that “Road Map” will initiate the program and agreed content of demanded legal and institutional works described in the Fig 4 and Table 3. The first phase should produce revised provisions of Regional Water Strategy that will include reassessment of proposed structure of regional organizations. On the basis of this document proper legal work on the finalizing and approval of draft agreements prepared earlier and their organizing implementation would be developed. Next step is a strategy for future improvement including simplification of structure of regional bodies for avoiding duplication of their activities and mandates, a feasibility study for setting up Water Energy Consortium, and inclusion of all transboundary waters under the jurisdiction of ICWC and interconnection with Hydrometservices. This strategic work should lay the foundation for a start of preparation “The Transboundary Water Code”. The approval of this document would open door for institutional final reforms, as well as a ratification of the mentioned Water Code – same for reform recommendations, including setting up the Water Energy Consortium.

Strategic work needs to be developed in the direction of analysis of ongoing changes in the results and situation as well as proper plan of development activity in information example especially – in IWRM as main tools for penetration of idea to increase water productivity at all strata of water hierarchy. This work should overlap the results of "IWRM-Fergana" project, implementation of national plans of IWRM by Global Water Partnership in Central Asia and the Caucasus (GWP CACENA), as well as components of IWRM in other projects, provided by World Bank, ADB, TACIS.

The strategic activity should continue even later through permanent analysis of situation, change and especially preparation of framework for transfer from IWRM to IEWRM – **Integrated Environment and Water Resources Management**. First approach to this region is trying to create within RiverTwin EU project for Chirchik–Angren–Keless sub-basin and “IWRM for delta of the Amudarya” and “IWRM for delta of the Syrdarya” NATO project, which must be followed by proper new legal work and institutional changes. Simultaneously by development of all other lines of capacity development the mutual Strategic planning will be move accordingly.

Implementation of the described “road map” should provide the following key achievement over the region:

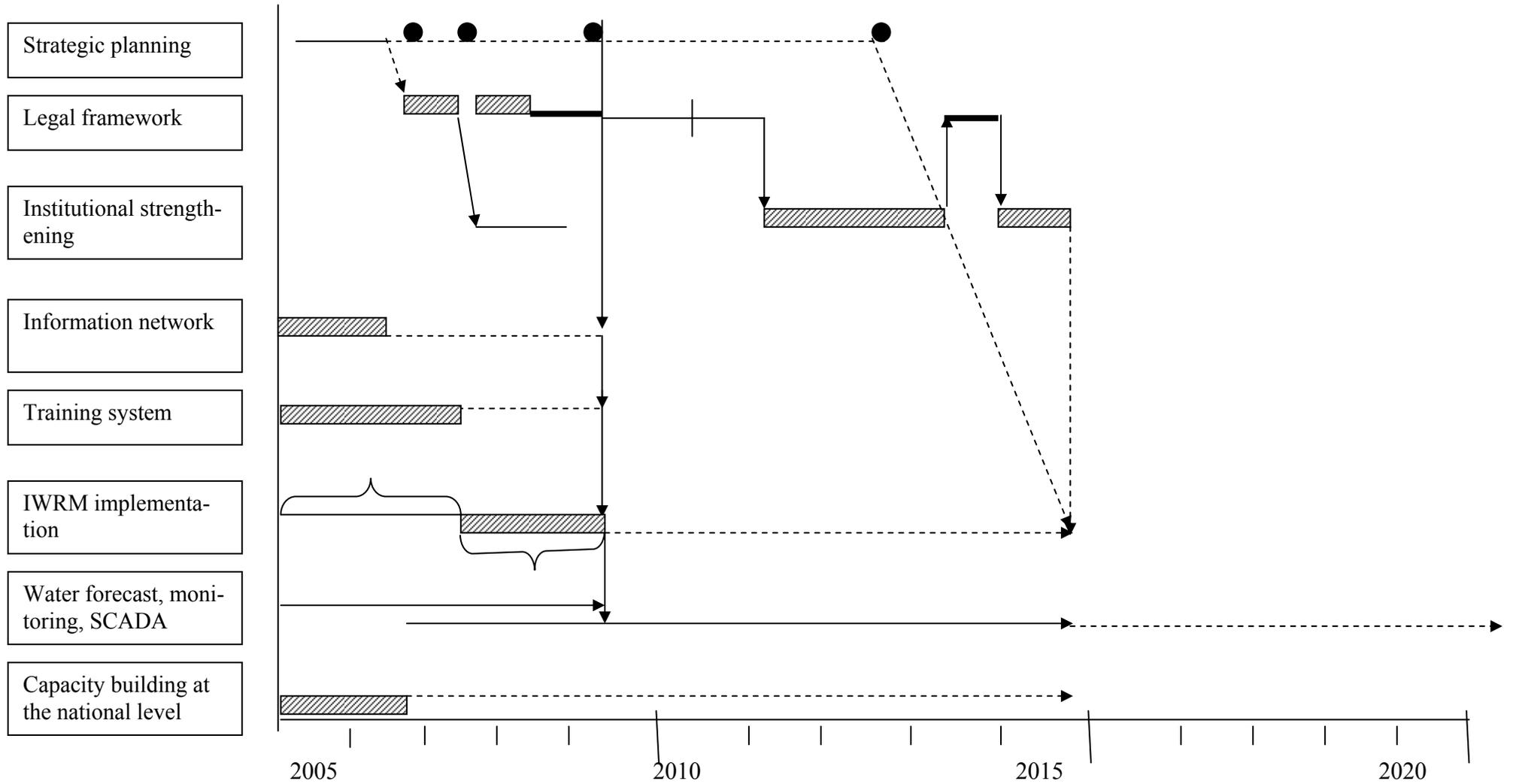
- to stabilize interstate water management to 2010;
- to create legal and institutional framework up to 2015;
- to create national capacity development to 2015;
- to achieve broad implementation IWRM to 2015 with full overlapping of all water branches of economy to 2020...2025.

**Table.3. Details of the strategic road map**

Steps within the Road Map	Problems could be solved
1 – Finalizing and approval of five draft agreements prepared earlier	<ul style="list-style-type: none"> <li>• agreed rules of operation, management;</li> <li>• regulation of interstate activity;</li> <li>• involvement of stakeholders in Basin Water Management;</li> <li>• providing conditions for sustainable functioning all regional organizations and network;</li> <li>• regulation of information activity</li> </ul>
2 – Transboundary Water Code of Aral Sea 2a – agreeing 2b – approval and ratification	<ul style="list-style-type: none"> <li>• ground water and return flow are managed by ICWC;</li> <li>• BWOs manage all rivers with special divisions in deltas;</li> <li>• management of quality;</li> <li>• proper mechanism for constructions and rehabilitation transboundary infrastructures;</li> <li>• polluter pays principle;</li> <li>• targets of water saving;</li> <li>• conflict resolution</li> </ul>
3. First stage of institutional restructuring regional organization	<ul style="list-style-type: none"> <li>• creation of Water Council of basins;</li> <li>• internationalization of regional bodies;</li> <li>• openness and mutual trust of states and principal stakeholders</li> </ul>
4. Second stage of institutional restructuring regional organization	<ul style="list-style-type: none"> <li>• spreading institutional capacity of BWOs and their scope of responsibilities;</li> <li>• avoiding duplication and overlapping in regional organization activities</li> </ul>
5. Preparation of legal framework for reforms towards IWRM	Ecological requirements should be priority of water use and development
6. Implementation of the environmental component of IWRM	<ul style="list-style-type: none"> <li>• creation of IWRM Council in sub-basins;</li> <li>• creation of managing bodies for deltas Amudarya and Syrdarya rivers;</li> <li>• limitation of pollution on rivers;</li> <li>• hydro-ecological complex of upper watershed</li> </ul>
7.a. Development of sustainable self-sufficiency of CAREWIB on the regional and national level	<ul style="list-style-type: none"> <li>• transparency and openness information to broad scope of stakeholders of basin;</li> <li>• preparation of a framework for assessment consequences any national actions on transboundary issues;</li> <li>• preparation of a single approach of MIS, GIS for implementation at the national level</li> </ul>
7.b. Achievement of workability of Regional Hydrometeorological service	<ul style="list-style-type: none"> <li>• approach to regional Database on rivers and climate for BWOs and ICWC;</li> <li>• increase degree of correctness hydrological forecast;</li> <li>• coordination CAREWIB and Regional Hydrological center</li> </ul>
8. Development National Information System	Creation flow of data from "bottom – to top"

Steps within the Road Map	Problems could be solved
9. Development of training system on the sustainable way	<ul style="list-style-type: none"> <li>• self-sufficiency of the Training Center of ICWC and its Urgench branch;</li> <li>• creation of two TC branches in Tajikistan;</li> <li>• same in Kyrgyzstan and Kazakhstan</li> <li>• involvement of public participation at all levels of water hierarchy;</li> <li>• improvement of water education in colleges and universities</li> </ul>
10. Implementation of IWRM, including IWRM Fergana	Development of extension services and water saving
11. National plan of IWRM in Kazakhstan	Political commitment and support for IWRM
12. Nationals plans of other four states	
13. IWRM in Lowlands of the Amudarya and Syrdarya	Transboundary component of IWRM
14. Broad development of IWRM at all states	Payment for water service
15. Improvement of monitoring and water allocation network on transboundary rivers	<ul style="list-style-type: none"> <li>• rehabilitation of all monitoring section on trans-boundary rivers;</li> <li>• implementation of SCADA and dispatch serving on all transboundary rivers;</li> <li>• improvement of water management quality</li> </ul>
16. Same at the national level	
17. Capacity building at the national level a) preparation of national measures for capacity development at the national levels; b) implementation of national plan capacity development	<ul style="list-style-type: none"> <li>• increase financial potential of WMOs;</li> <li>• allocation expenses between government and stakeholders;</li> <li>• business plan of WMOs;</li> <li>• communication network of low-level WMOs;</li> <li>• connection it with WUAs</li> </ul>
17c. Support in capacity building for reclamation organizations	<ul style="list-style-type: none"> <li>• involvement of all vertical and horizontal drainage in work;</li> <li>• improvement of workability of recommendation by expedition with implementations of GIS and RS;</li> <li>• planning for improvement of soil reclamation situation on the agricultural lands</li> </ul>

**Fig. 4. Road Map for future capacity development led by ICWC**



## ROLE OF THE INTERNATIONAL DONORS

Financial contributions by International Financial Organizations and donors are of great importance to maintain collaboration between developing states on transboundary waters. Certainly, level of regional cooperation depends heavily on funding and the development of joint actions, but they are also often affected by the lack of possibilities for appropriate communication - to meet and exchange information, experiences, lessons learned, etc. The region have enjoyed excellent examples of real collaboration with such donors as CIDA, SDC, the EU Copernicus, "Science for Peace" NATO and organizations like GWP, UNECE, UN ESCAP, all of which adhere strictly to the following very useful and efficient rules in their sponsorship:

- donors and recipients are partners: both participate in the development of action plans and common methodology, and they work together in the same way;
- broad use is made of local expertise and project implementation under the control of an independent steering committee, with participation from donors. SDC, for example, authorized ICWC and BWO Syrdarya to contract the local company Sigma, which operated a SCADA system for years at a cost per gate of only \$6,000 per unit (instead of the \$30,000-40,000 expended on similar structures by other donors using their own labor and equipment);
- payment for work should be made only after its completion and after acceptance of the output by the beneficiaries.

Very often donors may use recipient states as a base for economic penetration into the region, exerting pressure and obtaining local initiative and "know-how" without payment. Some donors employ their own staff and consultants to implement up to 80 percent of the so-called "grants." The Aral Sea Basin experience can provide many examples of these situations. There are examples of projects executed by foreign consultants which achieved no results in the long run, as well as of cases where the activities of various donors sometime duplicate, overlap, and even contradict each other. Wider acceptance by other donors of the rules and type of interrelation between donors and recipients adopted by the EU, SDC, USA State department, and "NATO for Peace" - along with stricter coordination of programs between donors, and between donors and recipients - should assist in improving efficiency in the use of donors' scarce financial resources.

It is also important that donors activities on transboundary rivers support as many regional programs as possible, and assist actions on which riparian states and their representatives should work together, increasing cooperation, trust, consensus, and mutual understanding. Our experience of the implementation of regional programs, especially on regional training and joint preparation of action plans and strategies, shows the relative efficiency of such work, compared to that arising from attempts of donors to satisfy the needs of individual riparian states rather than considering regional interests.

Coordination between donors from one side, between donors and regional recipients from other side is very important from view point to avoid overlapping and duplication of efforts, and in the same time to “target” flow of limited funds.

## **KEY REFERENCE DOCUMENTS**

1. Local Actions towards 4WWF: the regional process of preparations for 4WWF in Mexico was organized in the form of open virtual dialogue around two local actions using regional information portal ([www.cawater-info.net/4wwf/](http://www.cawater-info.net/4wwf/)).
2. Agreement between the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan, Turkmenistan and the Republic of Uzbekistan on cooperation in interstate sources' water resources use and protection common management (1992)
3. The Joint Communiqué of the Heads of Central Asian Countries about Creation of the International Fund for Saving the Aral Sea. Tashkent, January 4, 2003.
4. Nukus Declaration of the States of Central Asia and the International Organizations on Problems of Sustainable Development of the Aral Sea Basin, Nukus, Uzbekistan. September 20, 1995.
5. Almaty Declaration of the Heads of States. Almaty, Kazakhstan, February 28, 1997.
6. Ashgabat Declaration of the Heads of States. Ashgabat, Turkmenistan, April, 9, 1999.
7. Tashkent Statement of the Heads of States. Tashkent, Uzbekistan, December 28, 2001.
8. Dushanbe Declaration of the Heads of States. Dushanbe, Tajikistan, October 6, 2002.

## **Section 2**

### **Position Paper of the Northeast Asia Sub-region**

## **1. Basic Characteristics**

Though there are several definitions for the Northeast Asia, in this Report we define Northeast Asia as the Geographical sphere including five countries; China, Democratic People's Republic of Korea, Japan, Mongolia and Republic of Korea.

### **CHINA**

China has 2800 billion m<sup>3</sup> of water resources and ranks 6<sup>th</sup> in the world. The characteristics of water resource in China include low water resources per capita and uneven distribution in time and space. Considering the current population, water resource per capita in China is only 2200 m<sup>3</sup>, no more than 1/3 of world average. It is estimated that by 2030, China's population will reach its peak and water resource per capita will decrease to 1760 m<sup>3</sup>. Water resource is unevenly distributed in space, which is not matching with land resources distribution. Northern China has 47% of total population, 65% of arable land, produces 45% of GDP, but has only has 19% of total water resources. Southern China has 53% of population, 40% of arable land, produces 55% of GDP and enjoys 81% of water resources. In terms of temporal distribution in China, sharp variation of yearly precipitation results in rainy years or dry years in succession. Precipitation during flood season (4 months) is above 70% of annual precipitation while the other 30% concentrates in non-flood season.

### **DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA (DPRK)**

The mountain in D.P.R of Korea occupies more than 80 % of the land and therefore most of rivers have mountainous river characteristics. It rains a lot during Jun. to Sept. owing to topical cyclone and typhoon and therefore floods and landslides have often happened.

Owing to "greenhouse" effect of the globe, precipitation and water resources have been decreasing in all over the country. During last 100 years, annual average air temperature has increased 1.9□ and since 1960s, precipitation has decreased continually for 30 years and 5~10% more than average year during recent ten years. So discharge in rivers has been decreased systematically, especially, during recently 20-30 years decreased 10-15% than before, but demand of water has been increasing rapidly.

Many hydraulic structures like dikes, dams, reservoirs and irrigation tunnel systems have built by national and regional government's effort to prevent disaster from heavy rainfall, flood and drought, but disaster has never disappeared.

Because of decreasing of water resources, increasing of urban population and expanding of economy parts, quality of water resources has been got worse than former and there are many issues to supply water for several parts of economy.

### **JAPAN**

Japan is an island country located on the eastern edge of Asia and in the northwest of the Pacific Ocean, and occupies an area of approximately 380,000 km<sup>2</sup>. Approximately four-fifths of the countries are covered with mountains with few expansive plains.

The climate is generally moderate. Four seasons are distinct. The average annual precipitation is approximately 1,700 mm, nearly double the world's average of 970 mm. The per capita annual average precipitation is approximately a quarter of the world's average. The per capita potential quantity of water resources is 3,300 m<sup>3</sup>, nearly half the world's average. Precipitation concentrates in the typhoon season (September and October) and rainy season (June). Rivers are generally short and run rapidly in numerous sections, which lead to great fluctuations in discharge and frequently cause droughts despite high annual precipitation.

Precipitation has been declining for a period of approximately 100 years between 1898 and 2004. There has been a great yearly variance in precipitation since the mid 1960s. Increases in scale and frequency of droughts and local heavy rainfall due to future global climate changes are of concern.

### **MONGOLIA**

Mongolia is a country in Northeast Asia between latitudes of 41°35' N and 52°09' N and the longitudes of 87°44' E and 119°56' E covering an area of 1.564 km<sup>2</sup>.

The climate of Mongolia is harsh continental with well-defined seasons, high annual and diurnal fluctuations and low rainfall. The annual precipitation amount is low, averaging 200-220 mm for the country and ranging from less 50 mm per year in the Gobi desert region to 400 mm in some area in the North. Most precipitation occurs in June, July and August (about 85-90 per cent of total precipitation falls in summer months as rain). The resident population of Mongolia is 2.6 million. Although the natural environment of Mongolia has been comparatively well preserved, during the last 40 years, more than one million hectares of arable land has eroded, huge pasture has been overgrazing. Main branches of economics are livestock, mining, agriculture, food and power production.

### **REPUBLIC OF KOREA (ROK)**

The Korean peninsula is about 1,300km long and 300km wide. It is located between the Yellow Sea and the East Sea on the eastern end of the Asian Continent. The east coast of the peninsula runs directly along the skirt of the steep mountain slope range, while the west and south coastlines have the curved shape with wide alluvial plains. Therefore, rivers running to the east coast are short and steep, but rivers running west or south coast have long and mild stretches such as the Han River, Geum River, Nakdong River, and Seomjin River. The climate of Korea is characterized by four distinct seasons: spring, summer, autumn and winter. Winter is bitterly cold, while summer is hot and humid. And spring and autumn are sunny and dry. Average annual precipitation is 1,283 mm. The monsoon front approaches the Korean Peninsula from the south in late June, moving gradually to the north bringing rainy season for about 30 days until late July. The so-called *Jangma* season brings more than 60% of annual precipitation. Another short period of rainfall comes in early September due to typhoons. Generally, two or three typhoons pass over the Korean Peninsula out of average 28 that occur in the Western Pacific in a year. With these basic characteristics, Korean government has made great efforts to develop irrigation water resources for stable rice production, Korean staple food. As of the end of 2003, 78% of total paddy field was converted into irrigated paddy field.

## **2. Main Challenges**

The main challenges regarding water issues commonly appear in the region as follows. Water shortage issue, frequent flood issue, water quality issue and the administration issue were mainly recognized. Also soil erosion and water pollution were pointed out as important issues. The increasing of disaster by flood and landslide from heavy rainfall, decreasing of forest resource, decreasing of water resources due to the effect of “greenhouse” were exposed as the water issues related to the environmental change and big seasonal and regional variation of annual precipitation were also high ranging. The increase of water demand of the irrigation system were not ignored either.

### **CHINA**

China is facing 4 major water related problems, namely flooding, water shortage, soil erosion and water pollution.

Flooding has always been a serious problem in China. In the 1990s, China witnessed river basin floods in 6 six years, local floods occurred every year and 7 typhoons hit China annually.

Water shortage is serious. If groundwater is not over-exploited, according to current basic demand, we have a water shortage of 30 to 40 billion cubic meters annually; area hit by drought disasters reaches 326 million mu, resulting in a food production decrease of 14 million tons. 400 cities do not have adequate water supply and over 110 extremely lack water supply

Soil erosion area which reaches 3.56 million square kilometers accounts 1/3 of the total territory. 5 billion tons of soil eroded every year. Reservoir sedimentation totals more than 20 billion tons in the whole country.

Water pollution is another serious problem. In 2004, disposed polluted water was 69.1 billion tons. According to the evaluation on rivers totaling 130000 kilometers long, 12.8% was Grade IV and 27.8% was Grade V or worse

### **DPRK**

Main water crisis are as follows:

- Increasing of disaster by flood and landslide from heavy rainfall and decreasing of forest resource, etc.
- Decreasing of water resources due to the effect of “greenhouse”
- Increasing of water contamination due to lack of water resource and expanding of economy

### **JAPAN**

#### **1) Floods**

Japan is vulnerable to various types of damage by such disasters as heavy rains and high tides because of its natural conditions including geographic location, topography and climate. Concentration of people and property in low-lying, alluvial-fan areas is highly likely to lead to devastating damage in case of a great disaster. Recent steady river improvements have been reducing levee breaches and flooding in large rivers. In small to

medium rivers, however, flooding has been occurring frequently. In 2004, ten typhoons hit the country, more than in any other year on record. Frequent local heavy rainfall induced flooding or sediment disasters throughout the country. Floods claimed 215 lives and inundated 170,000 houses in 2004.

In recent years, increases of local heavy rainfall due to climate changes and urbanization have been causing frequent urban flood disasters such as rapid stormwater runoff, sudden flooding and inundation of underground facilities.

## 2) Water resources development and water use

Precipitation has recently been decreasing. There has been low precipitation in numerous years causing frequent droughts. Global climate changes seem to be resulting in years with extremely low or high precipitation. Disruption of stable water supply has been of concern.

Most of the agricultural water that accounts for approximately two-thirds of water used in Japan serves diverse purposes including environmental conservation or is used repeatedly for irrigating paddy fields.

Water systems have been in service since the 1880s in Japan contributing to the improvement of public health conditions. At present, 96% of households are supplied with water. Safe drinkable water is supplied at low costs. Needs have recently been rising for "safer and more tasty water" and advanced water treatment has been actively introduced. Consumption of mineral water has been increasing and home water filters have been adopted more widely.

Other issues include the improvement of water quality in rivers and lakes that serve as water sources, effective use of existing facilities for water supply, water use for other purposes than originally planned, encouragement of water saving, and conservation and revitalization of reservoir areas. A large number of water supply facilities that have been in service now require renovation. Securing maintenance and renovation funds and establishing an organizational setup for renovation are considered another challenge because of the expected scarcity of public funds due to the stagnant economic conditions and aging of society with declining birthrate.

## **MONGOLIA**

Due to specific climatic and geographical condition, water resources distribution very uneven. Northern part of the country is relatively wet and quality of water is also quite suitable for different water use including drinking. But in the south, there is nearly no surface of water and quality of water is not often suitable for drinking. There are several water related problems can be identified. Open mining activities, mainly gold, seriously threatening to water resources in terms of quantity and quality in some regions. Due to lack of financing and proper management, pasture watering became vital important for herders. Very poor coordination of between water related institutions and law enforcement.

Finally, poor budgeting research activities and extension of surface and groundwater monitoring network in terms of time, space and program.

## ROK

The main and natural challenge Korea has faced in managing water resources is big seasonal and regional variation of annual precipitation. As mentioned above, more than 2/3 of annual rainfall usually concentrates during summer season, which, in turn, results in the repeated severe droughts during winter and spring and severe floods during summer almost every year. Annual variations in the precipitation are also high ranging from 754mm during the driest year of 1936 to 1,683mm during the wettest year of 1956, which is about 2.1 times the driest value. Annual precipitation in Korea is largest in *Jeju* Island and the south central area, and it is smallest in the mid-eastern area.

Current issues regarding water resources development and management in Korea are as follows:

- First issue is Water Shortage Issue: Although there have been many constructions of multipurpose dams and reservoirs, water shortage still remains as the main obstacles to better life and economic growth. A government report says that expected water deficits in 2006 would be one hundred million cubic meters and 1.8 billion cubic meters in 2011, while the annual total water consumption in 1998 was estimated about 33 billion cubic meters.
- Second is Frequent Flood Issue: There has been an increasing amount of flood damage recently to the lack of flood control dams and reservoirs. Urbanization is another reason for it. Also due to climate changes such as greenhouse effects and the *El Nino* phenomenon, the number of severe droughts and floods has increased not only in numbers, but also in frequencies and intensities. Flood damages by typhoon in 2002 and 2003, respectively, resulted in more than hundreds of casualties and billions US dollars worth of estates.
- The third one is Water Quality Issue: Urbanization and industrialization are the main causes of water quality degradation in Korea. Although huge amount of investments has been put for water quality mitigation in the lakes and rivers, mistrust of the water quality by people is growing more and more.
- The fourth, the Administration Issue: Comprehensive water resources development and management including flood control belong to the Ministry of Construction and Transportation, while the domestic water administration to the Ministry of Environment, agricultural water administration to the Ministry of Agriculture. Sometimes the uncooperative and uncompromising attitude among multi-lateral water administration makes the comprehensive water resources development and management more difficult.
- The last and hottest Issue in Korea is such that the water resources policy driven by government faces the strong objections from the environmentalists and some NGOs. Since early 1990s, the voices of environmentalists have been getting louder and louder to make a dam projects finally canceled after 10 years planning, investigation and vast investments. Yeongwol Multipurpose Dam Project was canceled in 2000. At this moment, our plan for constructing 12 new dams is at the standstill.

### 3. Implemented Strategies

## CHINA

Since 1998, China put forward new development strategies to address the problems arising in water resources management which should satisfy the demand of socio-economic development.

- Increase input to water projects construction. After 1998, China formulated the guideline of “post-flood construction, rivers and lakes’ training and water projects development” in water management. Through large-scale development and construction, we have raised the disaster mitigation capability of the water infrastructures to secure socio-economic development.
- Promote sustainable utilization of water resources. The government attaches great importance to water resources management, especially emphasizing allocation, saving and protection of water resources. Guided by the philosophy of harmonious coexistence between man and nature, we strive to build a water saving society, rationally allocate water resources, and attach importance to water for ecology and environment, highlight water protection, development water resources scientifically to support sustainable socio-economic development with sustainable utilization of water resources.

### **DPRK**

DPRK’s strategies to face the water issues were making and implementing the education and research plans for establishment of flood and drought forecasting operation system and capacity building. Also DPRK constructed the large, medium and small-scale power stations, reservoirs and irrigation systems and expanded their capacity building. Establishment of flood and drought early warning system, settlement of making approach for flood hazard mapping, establishment of the decision making system for sustainable water resource management and the water resource information service system were implemented as the part of the strategies.

### **JAPAN**

#### 1) Hydrological cycle

Five ministries involved in water administration formed an inter-ministerial commission concerning the establishment of a sound hydrological cycle system, and defined the sound hydrological cycle as a "state in which functions of water both for activities of human society and for environmental conservation are achieved in a proper balance". Specific actions are now being taken in each river basin or region.

#### 2) Implementation of comprehensive flood control measures

To cope with frequent urban flood disasters after the rapid economic growth, comprehensive flood control measures have been implemented since the 1980s centering on the maintenance of functions for storing or retaining stormwater runoff in river basins and the reduction of disaster damage. To promote comprehensive measures, additional measures were defined in 2004 for reducing inundation by specified urban rivers. As a result, responsibilities of river administrators, sewage system operators and local municipalities were clearly defined, and private sector entities were obliged to control increases in runoff accompanying land development.

Lessons learned from recent disasters indicate the importance not only of the improvement of facilities but also of the enhancement of procedural solutions such as flood forecasting, early warning and provision of Hazard mapping, flood risk and evacuation information under normal conditions.

#### 3) Establishment of agricultural water protection and control system

Agricultural water used for irrigating paddy fields, together with farmland, is a basis for agricultural production. They are also social properties for making the best use of diverse functions of agriculture. The "new master plan for food, agriculture and rural areas" specifies the need of establishing measures for appropriate protection of the properties. These properties have been protected by local communities led by farmers. Recent progress of under population and aging of communities, however, has been making such protection difficult. It is important to establish a system not only for agricultural producers but also for local residents to make concerted efforts to protect and keep in excellent condition the agricultural water, an invaluable resource for the local community, for the future.

#### 4) Forests

Forests serve public purposes such as land protection, water resources recharge and conservation and creation of natural environment. Using forests for public health, and cultural and educational purposes is also required. Forests are properly improved and protected to enable them to perform their diverse functions continuously. The forests required for water resources recharge are designated as protection forests and controlled accordingly.

#### 5) Waterworks vision

The Ministry of Health, Labor and Welfare developed the "Waterworks vision" in June 2004. It comprehensively provides specific measures and steps concerning the future directions of waterworks. Its long-term goals are a) supply of safe and tasty water to the public, b) anytime anywhere provision of domestic water, c) strengthening of the basis for operation according to regional characteristics, d) contribution to environmental conservation and e) international contribution through the overseas transfer of Japan's experience. The definition of the "Waterworks vision" enabled the refinement of waterworks services and enhancement of international competitiveness.

#### 6) Sewage works vision 2100

The Sewerage and Wastewater Management Department of the Ministry of Land, Infrastructure and Transport defined "Sewage works vision 2100" presenting future direction of sewage works for the next 100 years and specific ideas for implementation. The basic concept is to shift from the conventional policy for supplying water to more households to sewage works of the 21st century that will create sound hydrological cycle and recycle resources.

#### 7) Environmental Basic Law

In 2000, a new Basic Environment Plan was approved by the Cabinet. The plan specified strategic commitments for developing a comprehensive environmental policy and achieving focused and effective results with the goal of creating a sustainable society. The plan defined measures for ensuring environmental conservation and the establishment of a sound hydrological cycle as key strategic programs for the future.

### **MONGOLIA**

Since 2000, the National Water Committee was established with the aim to coordinate and monitor water policies, developed and implemented action plans for implementation National Water Program adopted by the Government of Mongolia. The Committee is re-

sponsible coordination water policies and actions by the ministries and local governments. This coordination allows the government to keep the links between the policies initiated and implemented by the previous governments. The Committee is trying to provide the conceptual linkage of policies. Every year NWC reports its annual activities to Government.

The Water law, Water Use Fees Law and some 20 other legislative regulations have been passed, in fact most of them are not being strictly enforced and therefore they need further updating. According to the Water law adopted in 1995, renewed 2004, administrative authorities of all levels, from Parliament itself down to the local level, are given responsibilities and obligations in respect of water management, which they must exercise and carry out. Government of Mongolia adopted the National Water Program in 1999.

This Program reflects overall related issues on water management activities including water resource, water quality, water uses and protection from deterioration and pollution of the water resources. The Program defined main and priority objectives as implementation of multi-stage activities on preventing from negative impacts on health of population by improving of water supply and quality, creation a economic and legislative environment aimed at improvement of the level of proper use of water resources and wastewater treatment activities.

The NWP defines the basic strategic trends on water sector and has three phases of its implementation (I phase up to 2000, II phase 2001 - 2005, III 2006 - 2010).

### **ROK**

In Korea, massive population and industrial facilities are located near the down stream areas of the major rivers. And the greater priority for the water supply is given to the domestic and industrial uses, though the greatest amount of water is still consumed in the agricultural purposes.

In the mid 1960's, Korea established an ambitious economic development plan by introducing heavy industries and started several challenging national projects. To support those nation-wide development projects, we have constructed a number of multipurpose dams and reservoirs, meanwhile the multi-regional water supply systems equipped with the long distance pipelines and treatment facilities as well.

This water resources development projects were launched with the establishment of the Specific Multipurpose Dam Act and the Korea Water Resources Corporation Law. As a consequence, the first multipurpose dam construction was completed in 1973. The name of the dam is Soyanggang Multipurpose Dam. Now there are fifteen multipurpose dams in Korea, while there are about 1,200 large dams with other purposes.

In order to mitigate flood disasters, major river channels have been improved by straightening and embankment works along the shorelines, while flood forecasting and early warning systems were established since 1974.

In order to mitigate water quality degradation, urban sewage treatment facilities have been installed since 1980s, however, animal wastes and wastewater is still a major source of water pollution.

In the part of irrigation, irrigation water development is expanded to develop integrated agriculture and rural water development including upland irrigation, living and industrial water in addition to paddy irrigation, and irrigation water management measures are strengthened through repair & reinforcement of aged existing irrigation facilities and setting up of TM/TC systems etc.

#### **4. Successful Experiences and Local Actions**

##### **CHINA**

China has implemented water management strategies and achieved evident progress:

##### **1) Water project construction**

- Intensify water management planning  
The following planning has been formulated: Planning on Flood Prevention in seven key river basins, National Water Resources Protection and Utilization Planning, Renovation and Reconstruction Planning on Large-scale Irrigated Area, Water-Saving Irrigation Planning, Planning on Water Management in Key Areas and River Basins, etc. Integrated Water Resources Planning and Planning on Urban and Rural Drinking Water Security are in the process of formulation.
- Increase investment  
The central government has raised financial input to water resources management. The total input from 1998 to 2002 is 178.6 billion Yuan, 2.36 times of the input in the period from 1949 to 1997.
- Water project construction in full swing  
Flood-control ability of dams on key rivers and lakes was strengthened; controlling projects for some key rivers were constructed; risk reservoirs affecting cities, high-population density areas, important industrial zones and traffic facilities have been reinforced; water resources development and utilization projects have been accomplished, contributing 50 billion cubic meters of water supply capacity. Drinking water projects are implemented to achieve UN MDGs. South-to-North Water Transfer Project has started and is going on well.
- Protect water environment  
From 1998 to 2004, 332,000 square kilometers of soil eroded area has been controlled. Attributed by integrated water quantity regulating, the Yellow River has stopped running dry. Integrated management and transferring water for ecology are conducted in Tarim River and Hei River to maintain and better ecology and environment.

##### **2) Water resources management**

- Reinforce water legislation  
Revised Water Law was enacted in 2002; Flood Prevention Regulations was amended in 2005; amendment on Regulations for Water Drawing Permit and Water Resources Fee Collection will soon finish.
- Facilitate reform on water resources management system

Institutional reform of river basin management has been promoted, which enabled river basin authorities to better play a coordinating and monitoring role. Water affairs management authorities are now taking care of the regional water related issues due to the reform on regional water resources management systems. Water users and all stakeholders are encouraged to participate in water management.

- Strengthen water resources protection  
Since 2000, water function zoning has been implemented according to river basins nationwide. Currently, drinking water security planning and registering for pollution discharge outfalls are conducted.
- Build a water-saving society  
According to the guideline of “clarifying water right, implementing water demand management, promoting water right transferring, regulating water market by water pricing, reinforcing the supporting role of technology”, the nation is building a water-saving society.

### 3) Progress achieved in local areas

- With more investment input, construction of flood control and water supply infra-structures has obtained evident progress. Provinces, autonomous regions and municipalities have established water project construction fund and are exploring new mechanism of how to increase water input through social financial.
- Local authorities have amended and completed regional river basin planning based on the status quo of local socio-economic development and water resources.
- The local authorities give emphasis to water right system when build a water saving society. They’ve carried out following measures in pilot areas to improve water utilization:
  - ✓ define water quota in different regions, industries and water users;
  - ✓ organize water user associations;
  - ✓ conduct water trade
  - ✓ control regional water use quantity
- The reform of regional integrated water management system has witnessed remarkable progress. By April 2005, 56.6% of administrative areas above county level have established water affairs bureaus or water resources bureaus are mandated to manage relevant affairs.

### **DPRK**

Central and local government had instituted the “month for territory management” and the title of “a model territory management county” for territory and nature conservation and normalized to maintain and repair rivers, streams, reservoirs and nominated the model units and persons in all over the country. And also constructed many lock gates, reservoirs, dikes and measures for water control and preventing of disaster in many rivers as structural measure to prevent disaster from flood and landslide governmentally and on a mass scale.

Government established the policy for planting trees and made effort to perform it. And determined policy for planting trees in all the country and made lot of effort.

Hydrology Research Institute (SRI) played key role to solve water issues. They have been improving flood and drought forecasting operation system and studying to construct

landslide forecasting and warning system. Evaluation and forecasting of flood and drought and service of the information to parts of agriculture, electric power, forestry, transport, municipal management, etc had been performed.

Also, DPRK performed evaluation of total water resources of the country by using the observation data that belong to one of recent 30 years. In HRI, flood hazard mapping, flood warning and decision making system has been establishing using GIS. For this goal, Kwangwon Province to pilot area for landslide forecasting, Sinuju City, North Pyongan Province to pilot area for flood hazard mapping and flood warning and decision making system establishment was selected and institutional works have been implementing.

To renovate forecasting model computation system, implemented projects are as follows; Unit hydro graphics modeling and maskungum method had been introduced individually or combined each other in river basins. Recent projects are as follows; flood forecasting operation system by numerical solution of unsteady moment equation in downstream of Amprok River, reclassification of sub-basin in all of the basins, determination of parameters on instant unit hydro graph model, establishment of flood pick forecasting modeling based on artificial neural network techniques (ANN), establishment of flood control computation modeling for preventing of water contamination and flooded water in cultivated land and protecting ecosystem.

Nowadays, outlet test from upper reservoirs to solve simultaneously flooded water and contamination issues has been performing by Hydrology Research Institute and they are strengthening cooperation between stakeholders like electric power station, agriculture and environment protection parts.

Government have made investment huge sum to the project which construct lock gates and reservoirs step by step in Taedong River for preventing of flood disasters and sustainable use of water resources and completed the project. And also government has implemented the “Kaechon-Taesong lake nature flow irrigation” project which ensure water supply demand for agriculture and drinking water in middle and downstream area with water resource in upstream area, then has generalizing the example throughout the country.

Through the cooperation with Hydrology Group, TC, some projects like as flood early warning system, flood hazard mapping and hydrology information service was implemented in downstream area.

## **JAPAN**

In Japan the public involvement, public-private partnership, networks and the foundation of Japan Water Forum (JWF) were mainly exposed.

### **1) Public involvement**

#### **➤ Environmental Impact Assessment Law**

Environmental assessment has been applied to public works projects since 1972. The Environmental Impact Assessment Law was officially established in 1997, which defines opportunities for the general public to express their opinions to project implementers on the documents of project implementation method and preparation.

#### **➤ Participatory irrigation management for good agricultural water management**

Not only agricultural producers but also the residents in the region or in urban areas are now participating in proper protection and management of agricultural water.

➤ Reflection of public opinions in river improvement plans

With the revision of the River Law in 1997, procedures were introduced for reflecting local opinions in river improvement planning. A system was also put in place for coordination among various water users at the time of drought. Diverse stakeholders have been participating in the protection, restoration and maintenance of river environment such as public authorities, citizens and NPOs.

## 2) Public-private partnership

For water supply, the Water Supply Law was revised in 2002 and an institution was established for enabling water service providers to contract out water supply services to third parties. Studies are being made on public-private partnership (PPP) in water supply.

## 3) Networks

Following the 3rd World Water Forum, a network was formed with the Japanese government serving as the secretariat.

➤ NARBO (Network of Asian River Basin Organization)

NARBO was officially established in February 2004 to promote integrated water resources management (IWRM) in monsoon areas of Asia. The objective of NARBO is to strengthen the capacity and effectiveness of RBOs in promoting IWRM and improving water governance, through training and exchange of information and experiences among RBOs and their associated water sector agencies and partner organizations.

➤ IFNet (International Flood Network)

IFNet has the objective of facilitating international cooperation in flood management in order to reduce the loss of life and damage caused by floods and to promote policies and practices which can break the vicious circle of poverty and environmental degradation and lead to a safe and sustainable future.

➤ WEPA (Water Environment Partnership of Asia)

WEPA is a new initiative in developing a platform for strengthening water governance and capacity building to solve water environmental problems in the region. The main activities of WEPA are development of databases that will serve as a common information platform on water environment.

The databases will be made public through the Internet among the relevant stakeholders including governmental officials and NGOs as a common asset.

➤ INWEPF (International Network for Water and Ecosystem in Paddy Field)

INWEPF was established to meet three challenges, "food security and poverty reduction", "sustainable water use" and "partnership". The present goal is to disseminate information on actual water use in the Monsoon Asian area and diverse functions of paddy agriculture (use of agricultural water).

➤ The Conference of promotion for Lake Biwa-Yodo River basin area Renaissance

In order to strengthen the partnership among the stakeholders in the Lake Biwa - Yodo River Basin, where the 3<sup>rd</sup> World Water Forum took place, the "The Conference of promotion for Lake Biwa-Yodo River basin area Renaissance" consisting of the ministries and local governments was established in 2004. There is another basin networking initiative of the 6 local governments for the conservation of water environment in this basin.

#### 4) Japan Water Forum

The Japan Water Forum (JWF) was launched in April 2004 as an NPO to provide a stage for cooperation among Japan's NGOs (non-governmental organizations) in the industrial, public and academic fields with a view to "contributing to the solution of global water-related problems". Three major activities are 1) providing think tank services, 2) disseminating information using networks of water-related organizations in the world and 3) developing human resources and implementing public awareness programs.

JWF is working as the secretariat of Northern Water Network (NoWNET), which is a network of country-level water partnerships in the industrialized countries for sharing knowledge, linking stakeholders, raising awareness and organizing meetings. A NoWNET member should be a nonexclusive and recognized network, which represents the water sector of its country to the international water community and encourages an active participation of multiple stakeholders (governments, private sector, NGOs and academia) in water-related activities.

#### **MONGOLIA**

- Legislative improvement- main point is introduction of concept of River basin Management and water saving issues.
- Expansion of use of hydropower in provinces and rural area- there are several ongoing projects on power station construction and already 2 hydropower stations (small sized) now are operating.
- Irrigated agricultural land – For intensive agriculture production, to pay more attention to the qualitative aspect of the agricultural production. In previous experiences in agricultural production, main policy was quantitative development of agricultural production which much depends on climate and natural condition of the country.
- Local action-Local communities have organized several movements or some kind of NGOs.

“River Ongi movement” – of this movement was local communities of the small village and main objective of this movement was to protect Ongi River which originate at south slope Khangal mountain range and drains into lake in Gobi area. The river flows through the 4 provinces and total basin area is 52920 km<sup>2</sup>. The Ongi River is important water-course in the Gobi region and local people use the water for different purposes including drinking, pasture water. One important role of the river is to sustain small lake in Gobi area which is very important for natural system of the region. Main problem is that a last few years the Ongi river could not reach the lake and the lake now is drying. Local people consider that main reason of ecological problem is that in upper river basin many cold mining companies too much use surface water of the river and its some tributaries.

#### **ROK**

Formulation of flood resistance land, Stable supply of clean water, Formulation of eco-friendly water environment, Comprehensive long-term water resources plan and Water information system are the five big successful experiences and local actions carried out in Korea.

Formulation of flood resistance land include Comprehensive River Basin Flood Control Plan which is focusing on the concept of the whole basin preventing flooding through

embankments, dams, retention sites and flood control sites. This plan maximizes the flood control capability of each basin. It secured its legal background in the River Act of 2001, and is established for a ten-year period, but can be revised, if necessary, after considering its relativity every five years. The plan is also provided to increase the current Dam's flood control capacity. Considering the worst-case scenario of rainfall that may occur from recent unexpected climate, after checking the safety level of existing dams, Korea implemented proper adjustments for better flood control.

Secondly, the stable supply of clean water of the 30years target was provided. Until the 1970's, many regions were able to acquire water from rivers directly. After 1970, due to water demand and pollution, a multi-regional water supply system from multi-purpose dams needed to ensure stable sources of water. From this action, more water can be provided to water shortage-areas, can resolve the imbalance of water supply among regions. This action's goal is to provide stable water supply even in emergency, the restoration of healthy and live river environment, development of safe and clean drinking water sources, the enhancement of common society between upper and down region and to introduce total maximum daily load system(TMDL).

Thirdly, Korea focused on the Formulation of eco-friendly water environment as the standard of living increases, demand for water environment grows. To meet this demand, Korea has strived to form an eco-friendly water environment to establish a new water culture. For systematic approach related to this, MOCT composed a "Close-to-Nature River Maintenance Plan" with residential participation plans management by area such as conservation area, restoration area and water friendly area using environment friendly flood control method.

Comprehensive long-term water resource plan is the Nation's highest plan for water resources utilization, development and conservation. This plan is for the stable supply of clean water and protection of people's lives from droughts and floods and at the same time this plan is to make the sustainable share of limited water resources with the next generations and efficient water projection on water demand and supply, water use plan, flood control plan, river environment plan, and water resources investigation, research and development plan.

Water information system is lead by the development of IT Technology. With the development of IT Technology, World Wide Web provided Integrated Water Information System to various users and MOCT is operating IT-based Water Resources Management Information System to manage national water information efficiently, investigating supplementary water resources, drought & flood events and established National Comprehensive Water Resource Plan.

Also, New Dam Policy is one of the successful experience lead by Korea. Since the 1990's, Korea has established a guideline for "environment friendly dam design" to minimize the environmental impact caused by dam construction. The guideline calls for developing environmentally sound and sustainable dams. To do this, pre-survey and environment impact assessment have been carried out; resident councils have been formed to consider and reflect opinions from local and civil organizations.

## **5. Conclusions, Learned Lessons and Future Perspectives.**

### **CHINA**

In the future, China will attach importance to the following aspects:

- 1) China will continue to emphasize dam construction, reinforce risk reservoirs and speed up the construction of flood storage and detention basins to improve flood-control capacity. At the same time, the government will strengthen further flood-control management.
- 2) The government will accelerate hydraulic facilities construction to serve and provide safe drinking water to rural areas, agricultural industry and rural residents. It will manage to protect drinking-water sources for urban and rural areas and control pollution to improve drinking water quality.
- 3) The government will continue to promote the construction of a water-saving society which is centering on water demand, emphasizing two systems of macro-control and micro-quota and taking full advantages of water pricing.
- 4) The government will strive to clarify water rights for regions and users to establish a water right system.
- 5) We will put more effort water resources protection and water environment construction. Based on the management of water functioning zones, we should control pollution, protect drinking water sources, strengthen water and soil conservation, rationally allocate water resources, reserve water for ecology and environment, control groundwater exploitation, etc.

### **DPRK**

Until now, lot of success was achieved to solve water issues but in order to cope climate change there are many disadvantages. Especially, implemented water management projects was by all for providing water demand of one or two parts of economy and reduced disaster related with water in special region, so that there are quite differences with aspect of integrated water resource management and environment management. Therefore, it is important to institute and introduce aspects and approaches of integrated water resource management according to condition of our country.

We think it is important to establish integrated water resource management plan for basin or regional sustainable development in our country, and to solve the issues like rational basin management plan, partial water demand and supply management, collection, processing, evaluation of information and decision making for natural disaster protection by remote sensing(RS) and geographical information system(GIS) technique, cooperation between stakeholders on hazard protection and financial support resource.

### **JAPAN**

Japan makes efforts to promote sound hydrological cycle system to implement Integrated Water Resource Management. In Japan, disaster prevention must be regarded as a core national policy and must be promoted jointly with the residents and development of water supply systems contributed to the improvement of public health conditions. Recently, needs for “safer and more good-tasting water” have been rising and advanced water treatment has been actively introduced.

## **MONGOLIA**

From past practice we learned that for water resources development and management main constraints are very little financing to the water related issues and very inappropriate use of existing small budget. Another important issue is poor law enforcement although we have quite well developed law and other related legislative documents. One of the main reasons of such poor law enforcement is lack of economical bases for law implementation, poor public awareness.

At the institutional level, the capacity and funds are limited for implementing a range of programs and policies.

As mentioned there several ministries and agencies are responsible for water-related issues but again very poor coordination between the institutions. Lack of adequate data especially on groundwater resources and dynamics other constraints for good decision and policy.

Inefficient use of water very common in our case and therefore very important issue is Water saving. We must save water everywhere, any time in all respect.

Besides above mentioned points need to take account the environmental and socio-economical situations of the country such as large territory and less population, recent transitional economical stage, very uneven distribution of water resources and harsh continental climate with high seasonality.

Future perspectives:

- Development Integrated River Basin Management Principles in selected river basins
- Proper Coordination of between existing institutions on the policy, program and management structure
- Law enforcement
- Extension of surface and groundwater monitoring network in terms of time, space and program
- Anthropogenic influences and impact of climate change force to improve hydrological modeling techniques in national and regional level to assess and predict water resources, its changes and future availability.
- Important research directions: water balance study, isotope hydrology, glacier
- Development of master plans for most important river basins in economic zones in Mongolia is essential for water resources management and ecosystem protection.
- Promotion of environmental and water education is high priority issue in the country.
- Introduce market based pricing for demand management and efficient use of water
- Hydropower production and irrigated agriculture

## **ROK**

- 1) The sustainable development and management of water resources in Korea is still

given on the securing plentiful and clean water resources to meet the future demand.

- 2) 12 medium and small-scale multipurpose dams are under planning stage for meet the water deficit issues and frequent flood issues.
- 3) More emphasis is given on the construction of environment friendly dams and promoting the welfare and incomes of residents in the surrounding areas of dams. The law for supporting the areas surrounding dams was enacted in 2001 and changed priorities of considerations on dam designing and construction.
- 4) Integrated agriculture and rural water development and management measures should be strengthened for efficient irrigation water use.
- 5) Through the implementation of the integrated water resources management (IWRM), we are hoping to achieve the goal (in which minimum development of new large scale water project, consequently the least change of natural environment and ecology, and the increasing capacity of water supply can meet the future demand of water resources).

## **6. Main Organizations and Technical and Financial Support Institutions**

### **CHINA**

Ministry of Water Resources is mandated by the State Council to conduct water administration at the central government level. Water resources/affairs departments/bureaus are mandated to manage water related issues at provincial, prefecture and county level. The ministry has 7 river basin management authorities; Yangtze River Water Resources Commission, Yellow River Conservancy Commission, Huaihe River Commission, Hai River Water Conservancy Commission, Pearl River Water Resources Commission, Songliao Water Resources Commission and Taihu Basin Authority.

### **DPRK**

- 1) State Hydro Meteorological Administration (SHMA)
- 2) Hydrology Research Institute (HRI)

### **JAPAN**

- 1) Ministry of Land, Infrastructure and Transport  
- Total coordination for water resources development, water supply and demand planning, reservoir area development, sewerage systems and river administration
- 2) Ministry of Health, Labor and Welfare - Water supply systems
- 3) Ministry of Agriculture, Forestry and Fisheries - Agricultural water and conservation of headwater forests
- 4) Ministry of Economy, Trade and Industry - Industrial water and hydroelectric power generation
- 5) Ministry of Environment - Water quality and environmental conservation

### **MONGOLIA**

- 1) Ministry of Nature and Environment  
- Water resources protection, management, monitoring research studies, survey and data base
- 2) Ministry of Food and Agriculture - Pasture watering, rural water supply
- 3) Ministry of Urban Development - Drinking water supply, waste water treatment

## **ROK**

Administrative authorities at the central governmental level

- 1) Office of the Prime Minister
  - 2) Ministry of Construction and Transportation (MOCT)
  - 3) Ministry of Environment (ME)
  - 4) Ministry of Agriculture (MOA)
  - 5) Korea Meteorological Administration (KMA)
  - 6) National Emergency Management Agency (NEMA)
- Financial support institution
- 7) Korea Institute of Construction and Technology (KICT)
  - 8) Korea Water Resources Corporation (KOWACO)
  - 9) Korea Agriculture & Rural Infrastructure Corporation (KARICO)
- River Basin authorities
- 10) River Basin Flood Control Offices (Han, Nakdong, Kum, Youngsan River)
  - 11) River Information Center
  - 12) Regional Construction of Management Office

## **7. Reference of key documents about the country**

### **CHINA**

China's Agenda 21 includes long-term and medium development goals of China in 21<sup>st</sup> Century, including policies, measures and corresponding reforming actions for the development of water resources management.

### **JAPAN**

- 1) River Law.  
Water resources development
- 2) Specified Multipurpose Dam Law  
Water use
- 3) Water Supply Law
- 4) Sewerage Service Law  
Water quality and environmental conservation
- 5) Water Pollution Control Law (1970)
- 6) The Environmental Basic Law
- 7) Law for the Promotion of Nature Restoration

### **MONGOLIA**

- 1) The Water Law (adopted initially in 1995 and newly amended in 2004)
- 2) National Action Plan on Water

### **ROK**

- 1) Water Resources in Korea, 2005, Ministry of Construction and Transportation
- 2) Dams and Korea, 2004, Korea National Committee on Large Dams

### **Section 3**

#### **Position Paper of the South Asia Sub-region**

**“TOWARDS REDUCING POVERTY AND VULNERABILITY IN SOUTH ASIA”**

## **1. Introduction**

Japan Water Forum (JWF) the Co-ordinator for the 4<sup>th</sup> World Water Forum (4WWF) assigned to GWP South Asia Regional office the responsibility for preparing the South Asia 'sub-regional paper' reflecting the issues, themes, strategies, best practices and the way forward for South Asia at the 4WWF. GWP

South Asia made use of this opportunity to revisit its water vision and regional strategy as well, taking in to account the recent and unfolding scenarios in the region and elsewhere. The Regional Program Redesign (RPR) which preceded the sub-regional meeting held in Sri Lanka on 13 October 2005 assembled a number of regional partners to reflect on a wide range of issues focused on poverty and IWRM with the objective of redesigning the program for a medium term strategy. The two events combined to make the 'Joint Forum'.

Concurrently, the JWF support was obtained to undertake an independent evaluation of its Area Water Partnerships (AWP) program in order to draw generic lessons for replication while the synthesis report presented at the Forum will contribute to the local action component of 4WWF and will complement the global study of local actions undertaken by GWP.

This paper has benefited from the collective wisdom gained from the regional water vision, the SAWAF meetings, the self assessment and learning review of 2004 and the deliberations of the Joint Forum

## **2. Background**

Home to some 1400 Mn (22% of the world population) people, projected to grow to 1800 Mn (25%) by 2015 and concentrated on 4.5 Mn. Sq. Km of land, South Asia is a Region of contrasts and contradictions. Per capita availability of arable land is expected to decline further from the current 0.16 Ha to a mere 0.12 Ha by 2015 forcing the rural poor to move to marginal lands or to margins of urban centers, while wide variations in water availability causes widespread and acute water stress-too much or too little throughout the area. South Asia has the highest number of poor in the world. Under-developed agriculture, unplanned urbanization and inadequately regulated industrialization have contrived to drive 36% of the population (over 515 Million) to live in absolute poverty well below the \$1 a day mark and around 75% below \$ 2 a day, with drastic economic and social consequences overall not to mention the imperceptible and long term adverse effects on the environment.

In many parts of the Region, the water crisis has indeed 'arrived'; with some 235 Mn. people without access to safe drinking water and 938 million without access to basic sanitation, the achievement of MDGs, if business remains as usual, is certainly a nightmare.

Nevertheless, the Region is rich in natural and social capital; exemplary forms of water management have traditionally supported people and civilizations over several millenia. Longstanding traditions of learning and creativity supported by durable democratic forms of governance and peoples institutions, a vibrant and responsive media, coupled with a recent economic growth momentum, if sustained and managed has the potential to pull a large segment of the teeming millions out of poverty –“ a Region of Promise”!

Thus a strong incentive for investments in South Asia is its absorptive capacity especially at the local level.

### **Contrasts and Contradictions**

The Region presents a range of contrasts in topography and terrain, climate and weather land and water availability, population densities and demographic trends and in resource availability and use. There are also many variations and inconsistencies in policies and priorities, social systems and management modes. Rapid economic development and enlightened policy responses currently under way will certainly help to bring some relief, provided they are linked to MDGs, PRSP and similar goals and pursued consistently with higher levels of community involvement.

By way of illustration, massive investments have been made in the water sector in South Asia for over a century resulting in the location of over 30 % of the global area under irrigation; yet its productivity is abysmally low using some 94% of the developed water resources. Ground water which has transformed the lives of many communities has been subject to excessive and irreversible overdraft while water logging and salinity have caused major socio-economic and environmental disasters. Many of the above ills can be attributed politely to 'poor management'. GWP experience has shown that even if right policies are in place, clearing institutional and administrative road blocks that pre-empt the flow of funds to the local level and prevent horizontal integration still remains a challenge that inhibits the momentum for people-centred sustainable development.

Frequent occurrence of natural and man made disasters (floods, droughts, arsenic contamination, have compounded the problems affecting especially the livelihoods of the poor.

### **3. General characteristics of the Region**

South Asia is a large land mass stretching from the high Himalayas to the Indian Ocean often called 'the sub-continent'; its climate encompasses arctic temperature in the high mountains, a temperate environment in the foothills and Indo Gangetic plains and tropical conditions on the Deccan plateau and below. The Region is made up of seven nations viz: Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka all members of the Regional grouping 'SAARC'. SAARC has recently decided to invite and admit Afghanistan to the group as member.

Total annual precipitation in the region ranges from 5000mm in parts of North East India to almost zero in some parts of arid and semi arid deserts in the North western parts. The region is also characterized by wide spatial and temporal variations in rainfall which causes flash floods and persistent droughts. Overall, South Asia today is the region with the lowest per capita availability of water resources and will only worsen with further increases in population.

South Asian region has a network of rivers and streams replenished by rainfall and snow melt resulting in wide fluctuations in river flows in wet and dry seasons. Region has good fresh water aquifers with large brackish ground water profiles. It is therefore possible to identify large agro-climatic regions and socio economic profiles which cross national boundaries and thus could promote cross-boundary collaboration. Although currently South Asia has adequate water resources 'per capita', the definition masks the reality of

‘scarcity of fresh water in localized areas’ which the UN has recognized as the second most pressing concern(after population growth); this natural condition is exacerbated by the absence or ineffectiveness of inter governmental protocols to share the resource and reduce fluctuations.

The South Asian regional profile of key indicators given below summarizes the contradictions that exacerbate problems in the region.

**Table 1**

<i>Country</i>	<i>Land Area (unit:000Ha) and % of arable land*</i>	<i>Renewable water resources per capita (m3)</i>	<i>Total Population(Mn)</i>		<i>% with out access to safe wa-ter(Mn peo-ple)2002</i>	<i>Urban pop as a %of total pop. 2003 2015</i>
			<i>2003</i>	<i>2015</i>		
<b>India</b>	297,319 57	1754	1071	1260	25 (267.5mn)	28 32
<b>Pakistan</b>	77088 29	1415	152	193	14 (21.25mn)	34 39
<b>Bangladesh</b>	13017 65	8000	136	168	28 (38.2Mn)	24 29
<b>Sri Lanka</b>	6463 30	2600	20. 22.		22 (4.4mn)	21 22
<b>Nepal</b>	14300 23	8171	26	33	16 (3.6mn)	15 20
<b>Bhutan</b>	4700 04	41000	02	03	38 (0.8mn)	08 15
<b>Maldives</b>	-	-	0.3	0.4	16 (0.00048)	29 35

Source Human Development Report 2005

\* earthtrends.wri.org/pdf\_library/data\_table/for12005pdf

**ASIE DU SUD**

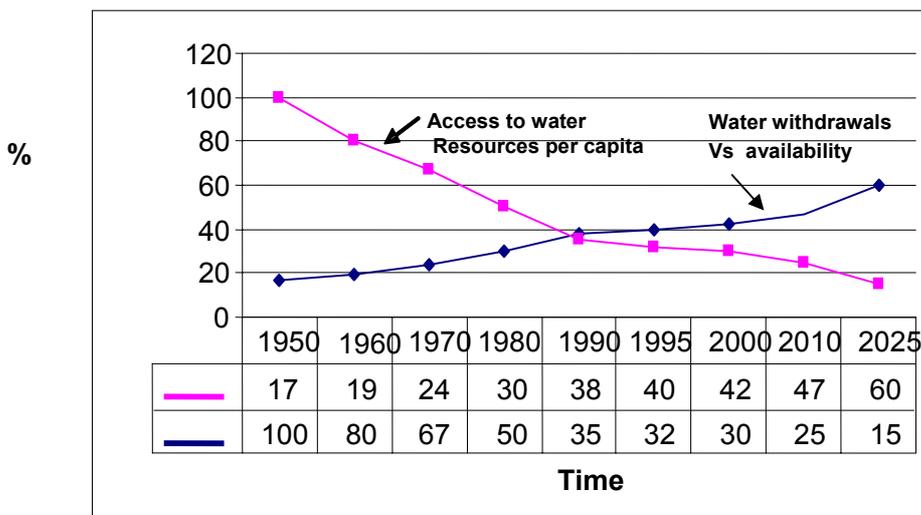


**MAP of SOUTH ASIA**

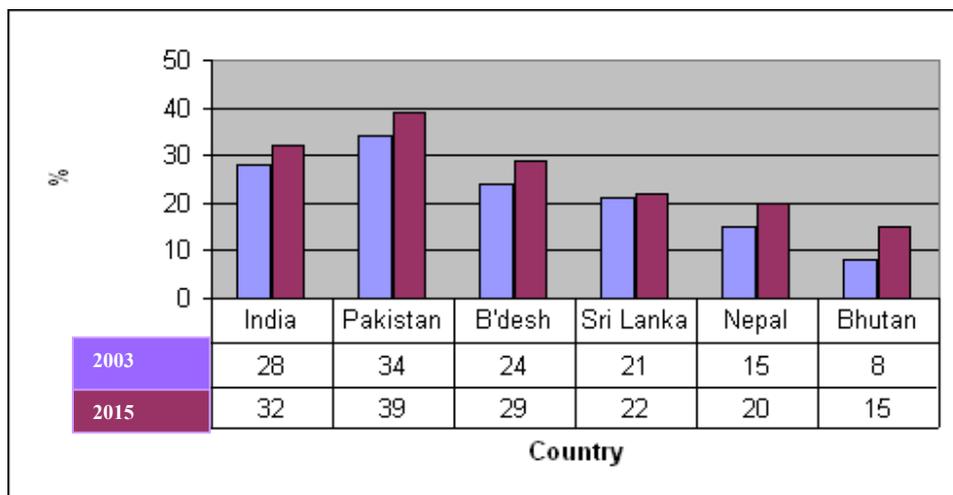
Low water availability when coupled with high water withdrawals and high level of waste generation, accentuates scarcity. Within the Asia Pacific Region, water withdrawals are the highest in Central Asia (85%) followed by South Asia ( 48%)

**Source :** Guidelines on strategic planning and management of water resource  
United Nations New York 2004

**Access to water per capita and water withdrawals in South Asia**



### Urban population as a% of the total population 2003 and 2005



#### 4. Water Vision 2025:

In formulating the Water Vision 2025 and the Framework for Action for the 2<sup>nd</sup> World Water Forum in 2000, South Asia was unique in articulating its overarching goal as:

**“Poverty in South Asia will be eradicated and the living conditions of all people will be uplifted to sustainable levels of comfort, health and well being through coordinated and integrated development and management of the region.”**

at a time when the water – poverty nexus was not explicit in the global agenda. It is acknowledged that water being both a cause and effect of poverty plays a pivotal role in transforming the livelihoods of the poor. Water has thus emerged as a key instrument for achieving the twin goals of poverty reduction and equitable economic development.

#### Vision to Action

During the intervening period (2000 – 2005) GWP in South Asia has led the way in collaborating with a wide range of partners at national and local level in establishing durable and unique partnerships viz Country Water Partnerships (CWP) and Area Water Partnerships (AWP) and in championing the cause of IWRM for local action.

Concurrently thematic networks on flood management, water and energy, ground water river basin management, gender, water law and the like have been established or attempted at regional level. CWPs have collaborated closely with national and sub-national governments in policy setting, IWRM plan preparation and in pursuing the MDGs. This trend is gaining acceptance and momentum and needs to be intensified and sustained.

#### 5. Follow on from WSSD and 3WWF

The World Summit for Sustainable Development (WSSD), which emphasized the commitment to halving the proportion of population without access to safe water and sanitation by 2015. Demonstrating donor commitment, the United States (WSS), EU (“Water for Life”) and the Asian Development Bank (‘water to Asian Cities’) led the way in providing substantial resources for WSS.

These commitments were reinforced by the UN in declaring MDGs to ‘free fellow men, women and children from abject and dehumanizing conditions of extreme poverty’. MDGs were a bold vision rooted in a shared commitment of all stakeholders with clear time bound targets. Goal 7, of MDGs is directly relevant to improving access to water and sanitation, while goals 1, 4,5 and 6 are closely linked to water while the rest of the goals (2,3, and 8) have some association with improved access to water.

World Water Forum 3 held in Kyoto underlined the need for stakeholder participation in Water Resources Management. The logical progression of events from the Hague to Kyoto underscores the need to translate “vision to action”. - action to be performed by stakeholders, to whom water resources management matters most - in fashioning their livelihoods.

**Box 1 NARBO-SASNET RBO**

Network of Asian River Basin Organizations (NARBO), established after 3 WWF is an initiative to share knowledge and build capacity for IWRM throughout Asia was supported by ADBI, ADB and Japan Water Agency. NARBO expects to enhance capacity for IWRM, ensure sustainable use of water among all stakeholders, capacitate policy makers, professionals and practitioners on IWRM and share knowledge and information for effective implementation of IWRM and conflict resolution. NARBO has been actively supporting IWRM initiatives in Southeast Asia and provides an opportunity to SASNET-RBO the network initiated by GWP South Asia in promoting IWRM activities at river basin level in South Asia.

## **6. Issues and Underlying Causes**

6.1 The wide variation and diversity in natural phenomena apart, contrasts, contradictions and inconsistencies in policies strategies and management systems have given rise to numerous issues and underlying concerns that need to be addressed in improving the livelihoods of the poor in South Asia. Population growth, low literacy, social systems that limit access to resources and access to education for girls are major road blocks that constrain the achievement of MDGs. Three main concerns that have engulfed the region have been identified viz.. lack of water security, poor access to education for women and vulnerability to natural disasters.

### **6.2 Access to Safe Drinking Water, Sanitation and Hygiene**

Though South Asia is rich in water resources, access to safe drinking water and quality of water is poor. Most rivers in their mid and lower reaches are contaminated by point and non point source pollution and occurrence of nitrates, flourides, heavy metals, and pathogenic agents. It is widely believed that increase in investments and political commitment holds the key to improving access to water for all by 2025.

South Asia is currently facing a decline in per capita access to land and water resources in order to maintain a sustainable livelihood for most of its poverty stricken people. Conventional approaches to policy-making amidst declining resources have forced most of the able population to migrate to the fringes of urban areas. Hence, the rapid increase in urban population currently under way will accelerate over the next decade. Unplanned urbanization denying the basic needs of those at the margins will compound the prob-

lems of the poor. **Table 1** indicates the trends in urban population growth in major South Asian countries up to 2015. Though statistics may mask the severity of the problem, the absolute figures are stark; urban population in the Region will increase by nearly 150 million or 36% and by 2025 over two thirds of the regional population is expected to be city dwellers; more than half of the world's mega cities are in Asia already.. This will increase exponentially the demand and pressure on limited natural resources like land and water.

**Despite improvements in access to improved water resources, Human Development Report 2005<sup>1</sup> indicates that South Asia will fall short of achieving its MDGs of halving the population with access to improved water sources by approximately 104 million people, if the current trends continue. Out of five regions, including Sub Saharan Africa, South Asia will have the highest shortfall in meeting its MDGs for access to safe water by year 2015 (Table 2).**

**Table 2**

Status of Access to Clean Water meeting MDGs

<i>Continent</i>	<i>2002 (million)</i>	<i>2015 (million)</i>	<i>Shortfall</i>
Sub Saharan Africa	278.2	198.6	80.1
Arab States	46.7	19.0	6.7
East Asia and Pacific	419	190.7	14.6
<b>South Asia</b>	<b>232</b>	<b>108.9</b>	<b>103.6</b>
Latin America & Caribbean	55	8.1	4.9

Source – Human Development Report 2005

Therefore, to improve access to safe water to a larger population and more importantly to the ‘dropouts’<sup>2</sup> water productivity in the region needs to be improved significantly. Such improvements have to come through a package of technological and management innovations coupled with regulatory regimes that ‘work’ South Asia has been a pioneer in this respect, introducing innovative rainwater harvesting systems mainly in the dry and desert areas of India (Rajasthan and Gujarat) and Pakistan (Cholistan and Thar). Many South Asia countries have formulated their own water resources policies that emphasize improving water productivity through introduction of economic instruments. Such best practices need to be replicated..

It is in this context that water policy reforms and the adoption of the ‘river basin/sub basin’ as the unit of future water resources management. in order to rationalize water sharing, reduce pollution and maintain equity are important principles.. While new legislations will have to strengthen river basin management, sector -based legislation has to be revised or repealed to reinforce IWRM at basin level. Managing water in a basin context will certainly help to better identify and attend to the needs of the poor. le

<sup>1</sup> Human Development Report UNDP 2005

<sup>2</sup> Those who are unable to join the mainstream water provision due to abject poverty

## 6.4 Water Security

The concept of 'water security' or 'household water security' is a recent phenomenon which attempts to express "timely availability of safe water in adequate quantities to meet household water requirements". Most South Asian countries being signatory to the general comment No 15, of Committee on Economic, Social, and Cultural Rights of the United Nations Economic and Social Council accepts that "human rights to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic use".

**Table 4.**

Renewable Water Resources per capita (cu meters) -2000

<i>Country</i>	<i>Per capita availability (m3)</i>	<i>Per capita withdrawals (m3)</i>
India	1754	635
Pakistan	1415	1187
Bangladesh	8000	576
Sri Lanka	2600	678
Nepal	8171	433
Bhutan	41000	204

Source – Human Development Report 2005

Meeting household water security, therefore, is an issue of improved management and of conservation.. Many rural water supply and sanitation programs implemented in SA countries have attempted to provide water to households, thus improving 'household water security'. Research conducted in Sri Lanka on rainwater (roof water) harvesting have shown that water security has been improved by 30 -35% due to availability of rainwater at the homestead level.

In Pakistan, pro poor interventions like, rice-wheat combination, zero tillage, raised bed cultivation technologies, crop-livestock-fish farming systems, paddy – fish farming systems and livestock fish farming systems have all contributed to conserving water and improving water productivity. These interventions coupled with household water conservation techniques have improved water and food security for the poor in SA countries.

## 6.5 Specific Issues

### 6.5.1 Water Productivity

South Asia experiences one of the lowest or perhaps the lowest level of water productivity of any region. Huge investments made over the past century especially in irrigation projects are not realizing their full potential. Obsolete infrastructure, inflexible irrigation technology, ineffective institutions and management systems and failure to focus on the poor all conspire to retain large irrigation systems at low levels of water productivity denying the benefits owing to society. Urgent action is needed to improve water use efficiency and productivity through cost effective technological and management innovations. These need strategic thinking and a combination of innovations and investments. It is argued that a mere two fold increase in water productivity which is considered feasible

will make dramatic changes in access to water resources to large segments of society, especially the poor.

### 6.5.2 Water Related Disasters

Water related disasters have been a phenomenon in South Asia; however the increase in frequency and severity of such disasters is a new feature that is causing concern. Furthermore as population and poverty increases, the poor move to more risk-prone areas.

Table 5. Impact of Natural Disasters in South Asia

<i>Country</i>	<i>No. people killed 1993-2002</i>	<i>No. people affected 1993 -2002</i>
India	77,125	802,063
Pakistan	6037	8,989
Bangladesh	9132	73,368
Sri Lanka	590	4,675
Nepal	3894	1,147,785
South Asian Tsunami (Sri Lanka and India)	51,788 (2004)	1.6 Million (2004)

Source – ITDG-South Asia and RDPI - Pakistan

Economic cost due to disasters can be massive. In 2001, estimated loss to the state of Gujarat due to the earthquake was 2-3% of the Gross State Domestic Product (GSDP)<sup>3</sup> 2001-2002 drought in Rajasthan affected 40 million cattle and 89.47Mn ha of cropped land. 2000-2001 floods in Pakistan caused an estimated damage of over Rs 78,000 million, while floods and cyclones in India and Bangladesh from 1988 -1998 have caused a loss of US \$ 20 billion. Recent destruction by Tsunami in 2004 caused a damaged US \$ 2.3 billion in Sri Lanka and India. Respective governments in South Asia are now facing the challenge of mitigating disasters. The specific challenge is to provide poor communities with alternative livelihoods out of disaster prone areas. Tendency of the poor is to live in flood plains, mountain slopes and arid areas where disaster strike more often. Disasters result in either too much or too little water quite often for periods longer than acceptable while resulting inadequate sanitation causes health problems and epidemics all of which affects the productivity and livelihoods of the poor.

While arsenic contamination in ground water is a water quality problem affecting drinking water, the present magnitude of the problem has transformed it to disaster level in Bangladesh (approx: 50 Mn) and to a lesser level in India and in Nepal. Most of the victims are poor women and children who have to depend on shallow ground water wells for drinking water. Other disasters are less perceptible, like drought, which is a perennial slow acting disaster. Landslides, riverbank erosion, watershed degradation are becoming

<sup>3</sup> ibid 2005

more widespread. Earthquakes and Tsunami which cause immense destruction to lives and property in South Asia are becoming more common place which underlines the need for preparedness, monitoring and community action. Unfortunately, it the poor who are most affected in all these disasters.

### **Water Pollution**

Primary source of municipality/ domestic water is surface rivers and water bodies. However, there are countries that draw water from ground water sources for both domestic, agricultural, commercial and industrial use. In parts of South Asia, rivers are most polluted near urban stretches due to dumping of waste. Bagmathi river in Kathmandu valley, Yamuna river in Delhi and peripheral rivers (mainly Buriganga river) in Dhaka suffer from severe pollution. **Table 6** indicates water quality levels in South Asia

**Table 6**

Water Quality Levels in South Asia

<i><b>Pollutant</b></i>	<i><b>Rating</b></i>
Pathogenic Agents	1 -3
Stalinization	0 -1
Fluorides	0 -1
Heavy metals	0 -1
Sediment load	0 -2
Organic matter	1 -3
Nitrate	0-1
Eutrophication	0 -1
Pesticides	0 -1
Acidification	0

Source – NORAD/UNEP State of the Environment South Asia 2001

Note 0 – No pollution

1 – Some pollution but water can be used if appropriate measures are taken

2 – Major pollution

3 – Severe Pollution affecting basic water use

Under normal conditions, ground water is less prone to pollution; however, due to current agricultural practices and irresponsible waste disposal there is considerable pollution of groundwater. In the region, Lahore and Dhaka cities are almost totally dependant on groundwater for their domestic and industrial water needs.<sup>4</sup> Due to human actions, groundwater has been contaminated with arsenic in Bangladesh and west Bengal, Fluoride in parts of India, Nitrates in Nepal and parts of Sri Lanka.

Watershed degradation and unplanned urbanization are major causes of water pollution; urban settlements which disrupt natural drainage systems is also a major factor of urban flooding. Uncontrolled toxic effluents and waste disposal into water courses results in water quality degradation. Further more, ‘once through processes’ in industry with little attention to re-cycling and in-house treatment adds to the problems especially in urban areas.

<sup>4</sup> NORAD/UNEP 2001. State of the Environment 2001

Effects of pollution of water bodies are having a direct impact on the poor; although mortality due to diarrhea has decreased in the region morbidity has not declined in the same proportions. This is due to inadequate investments in preventive care and lack of emphasis on hygiene promotion. Often water supply and sanitation projects fail to give adequate attention to hygiene education which results in poor achievement of anticipated goals. However, compared with infant mortality rates in 1970, South Asia has improved in terms of number of deaths caused by water related diseases. Hence, investment in improving water quality is bound to yield high dividends in terms of a healthy work force. Inadequate and ineffective legislation shortcomings in hygiene education and in integrated management of river basins have been cited as reasons for deterioration of river water quality.

#### **6.5.4 Ground Water Overdraft**

Groundwater extraction for irrigation industry and drinking water is common in the Region. A fall in ground water levels and water quality due to over extraction and contamination has increased beyond tolerable levels. Groundwater extraction has exceeded recharge, in many locations resulting sea water intrusions in coastal areas and draw down of fresh water lenses ( Maldives). Some bore wells draw water from depths of 800 - 1000ft (Pakistan) and continue to deplete.

In India (Tamil Nadu) pricing policy on electricity and subsidies for agriculture are causing over-exploitation of groundwater. In Bangladesh and West Bengal over extraction has caused mineralization leading to arsenic contamination of ground water. Spacing of agricultural wells in Sri Lanka and in parts of Maharashtra have caused over extraction of shallow aquifers leading to environmental impacts. In Tamil Nadu and Gujarat states in India ingressions of sea water has caused salinity of ground water; and in Pakistan salinity and water logging due to poor water quality and poor irrigation/agriculture practices have degraded approximately three million hectares of land with an overall annual economic loss of US \$2 billion<sup>5</sup>

At present groundwater utilization exceeds replenishment in many South Asian countries. Hence, there is a need to emphasize on conjunctive use of surface, groundwater and rainwater harvesting and initiate strict regulatory measures to overcome this situation.

### **7. Challenges for South Asia**

Some 27% of people in South Asia live without adequate food while 50% of the children under 5 years are malnourished. Reliable water supply not only for improved production, but even for subsistence agriculture, fisheries and tree crops will make a dramatic difference for the lives of the poor. Access to basic water supply and sanitation is a key factor in reducing gender disparities in primary and secondary education which have multiple spin-offs for girls and women.

#### **7.1 Meeting the MDGs**

The challenge for South Asia today is whether the MDG targets can be achieved and if so how? Have the countries in South Asia, and more so as a region, agreed on the method-

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<sup>5</sup> NORAD/ UNEP State of environment, South Asia 2001

ologies and the actions. A conceptual framework as well as practical steps need to be agreed upon at several levels and across sectors like health, education public investment. Within the 10 year timeframe up to 2015, intermediate targets need to be agreed upon. National governments and Regional bodies such as SAARC with the support of the UN system necessarily have to take the lead, GWP family has a duty and the capability to seek ways of building partnerships at each level to complement these endeavors.

It is now widely acknowledged that water is a key factor in practically all the Millennium Development Goals and its targets; eg. water is a factor of production in agriculture, industry and other economic activities which will improve the incomes and purchasing power of the poor and improve food security. Public investments in water infrastructure for both development and management will serve as a catalyst for increased incomes as well as reduce vulnerability and risks in investments by the poor. Further more, if investments are targeted to reduce eco-system degradation livelihood systems will become more secure and sustainable.. Thus improving water productivity will clearly improve food security which in turn will improve nutrition and incomes at household level.

Likewise, investments in water supply and sanitation will have direct and immediate benefits in terms of improved hygiene health and by extension opportunities for a better education. To meet all these challenges South Asia not only needs investments but institutional reforms as well to ensure that the right policies and strategies that reach out to the poor are in place, that data and information are reliable and that available knowledge and experience are shared.

### **7.2 Institutional Challenges**

The Region is plagued with a plethora institutions and legislation with overlapping and conflicting mandates relating to water resources management. This has resulted in confusion and conflicts among water users and managers leading to inefficiency and inertia.. Present water resources management systems which are largely sector based, centralized and state driven fail largely to meet the needs and rising aspirations of the public for whom water use is a decentralized and integrated function..

### **7.3 Investments**

Investments in water resources development is a crucial requirement for meeting MDGs. International funding for water supply and sanitation has fallen over the years and has always been a fraction of the public investments at national level. One of the reasons for inadequate investments for water resources development is the still current conventional approaches to prioritizing of investments in education and health. This indicates that national governments need to reprioritize and decentralize their investments while local governments, private sector, and water users will have to play a major role both in investing and in targeting the investments to the most needy and vulnerable groups..

### **7.4 Involvement of Women in improving water security**

Throughout the developing world, gender division of labour typically assigns women the responsibility of securing water for household use. This affects largely the uneducated women in poor families.. This situation is depicted in 'gender development index' (GDI) as indicated in the United nations 'Human Development Report" 2005 (**Table 7**)

**Table 7.**

Gender Related Development Index

<i>Country</i>	<i>GDI</i>	<i>Life expectancy at birth</i>		<i>Adult literacy</i>		<i>Estimated earn income PPP (US \$)</i>	
		M	F	M	F	M	F
Sri Lanka	0.747	71.5	76.8	92.2	88.6	5009	2579
India	0.586	61.8	65.0	73.4	47.8	4130	1569
Pakistan	0.508	62.8	63.2	61.7	35.2	3082	1050
Nepal	0.511	61.2	62.0	62.7	34.9	1868	949
Bangladesh	0.514	54.9	57.9	69.2	49.9	2289	1245
Bhutan	-	61.7	64.7	-	-	-	-

Source – Human Development Report 2005

GDI captures three basic dimensions, long and healthy life, knowledge and a decent standard of living. It is evident from **Table 7**, that status of women with respect to the three indicators mentioned above has a significant impact on household water security, infant motility and education security of children.

### **8. Meeting the Challenge!**

8.1 There are a great many actors responsible for and committed to achieving the MDG targets and poverty reduction goals. National governments, political systems and development agencies play the major roles; increasingly local government bodies are asserting a new role with strong links to communities and to civil society. Public-private partnerships, even if not formalized, are on the increase. GWP South Asia, over the past five years has positioned itself at country and local level to collaborate with all stakeholders to establish platforms and forums for dialogue and action on IWRM. Countries have either prepared or are preparing IWRM plans for implementation. The time has come for GWP South Asia to tie these efforts at regional level for a more focused program based on its comparative advantage and move for higher dividends over the next five years, in order that regional efforts could reinforce and accelerate the ‘local action’ initiatives. The Dhaka Declaration adopted at the end of SAWAF III (July 2004) sets out the road map from which priority programs can be identified. It is with this objective that in preparing for the 4 WWF, GWP South Asia revisited its Regional Program and attempted a Redesign focused on “Poverty Reduction through IWRM and Partnership Building.”

**8.2 The Regional Program Redesign (RPR) - July-October 2005** was a multi-country, multi-level stakeholder collaborative effort involving national policy makers and institutions, knowledge centres, practitioners, partnerships championing IWRM and civil society organizations with hands on experience who formed the key players in a core team for the consultative process. Theme papers on water productivity, climate variability and disaster management, water health and environment, IWRM in a River Basin context and Multi Level Partnership Building for IWRM were developed on a multi country basis to address the critical water issues from a poverty and livelihood focus and looked at strategies that GWP South Asia could work in partnership with other key actors. A distinguished Regional Review Panel (RRP) of eminent professionals drawn largely from within the Region provided guidelines and direction for quality control.

The RPR was complemented by a synthesis of the results of an independent evaluation of GWP South Asia's flagship program – the Area Water Partnerships (AWPs)- in an effort to evaluate the effectiveness of AWPs as a Local Action initiative and its potential to meet global challenges.

Following intensive deliberations at the Joint Forum held in October 2005 the group agreed on a priority set of options and a strategy to address them. The Forum which effectively represented South Asia agreed on the following priority thrust areas to achieve the goal of Poverty Reduction through IWRM and Partnership building.

### **8.3 Thrust Areas:**

#### **(a)- Themes and sub-themes:**

##### **IWRM for Poverty Reduction-:**

##### **(i) Improve Water productivity for multiple uses with an immediate focus on :**

- ◆ food security
- ◆ water security

##### **(ii) Increase Investments in Water Supply and Sanitation for Improved Hygiene**

##### **(iii) Incorporate water – related disaster (risk) management in IWRM**

##### **(iv) Environment Conservation to improve the Health of Ecosystems**

##### **(v) Explore Innovative Financing Mechanisms**

#### **(b) Partnership Building for IWRM –the Institutional Processes**

A multiplicity of institutions with overlapping mandates and jurisdictions engender duplication and confusion in management. Unfortunately this is a common feature in South Asia. Further, current management systems are based on political-administrative boundaries which truncate natural boundaries

The need to move to hydrological boundaries based on river basin and sub –basins with decision making devolved on the principles of 'subsidiarity' though appreciated is not formally accepted region-wide. The fusion has to be attempted over a long term time frame as administrative boundaries cannot be changed rapidly

The Forum agreed that IWRM should be attempted where possible in a river basin context and that multi-level, multi functional partnerships should be promoted and supported for greater synergy and speed in the achievement of set goals. This mode will also help to reduce tension and resolve conflicts amicably by establishing links with civil society.

AWPs and CWPs will play a catalytic role in galvanizing all key players committed to IWRM and poverty reduction towards a common cause. They will also help to synthesize local and country experiences in order to garner generic lessons for upscaling to the regional and global levels thus-local action for global challenges.

#### **8.3.1 Roles and Relationships**

Recent dialogues and practical experience has demonstrated clearly that every segment and layer of society has a comparative advantage and competence to play a role in promoting IWRM which makes water 'everybody's business'. The Joint Forum recognized at least 4 groups of partners at country level who could form the nucleus of multi-level partnerships viz Governments at policy and strategy levels, academe/professionals and business at for technology and management innovations at intermediate level and local government and communities at the local level.

## 8.4 Local Action

The 4<sup>th</sup> World Water Forum(4WWF) in Mexico will explore new vistas in searching for water related issues and attempt to reduce poverty while contributing to economic development. What is new in Mexico will be the space for local actors to participate and share experiences and bring in new knowledge in combating water related poverty.

Local actions are activities focused on solving a problem related to management of water resources benefits of which are tangible at local level. Local actions are not necessarily small scale or individual but those that require multi stakeholder participation, networking, synergy and collaborating among many different types of social actors and policy sectors which in turn have relevance across countries and regions

South Asia is well placed both to contribute to and to benefit from this novel initiative given the path it has followed over the past many years in reaching out to the local level and placing a premium on community led growth South Asia is rich in diversity and hosts a number of local actions that have had an impact on over all management of water resources.

### Box 2

#### **GWP's experience at local level:-**

- An innovative creation of South Asia are the Area Water Partnerships (AWPs) which create platforms and forums for all stakeholders to promote the concept of IWRM.
- AWP's have influenced policy on various issues. Building water storage tanks and renovation of small reservoirs in India, awareness on river sand mining in Sri Lanka and influencing university curriculum to include IWRM in Bangladesh are some of the policy influences made by AWP's.
- It is anticipated that AWP's while serving as the 'voice' of all local level stakeholders will also eventually become 'building blocks' for river basin planning and management.

### Box 3

#### **Other notable Local Actions:-**

- Community Water Supply and Sanitation Programs(CWSSP) - Sri Lanka- introducing community managed sustainable tariff systems
- ADB led National Water Sector Apex Bodies(NWSAB) making rapid progress in policy and institutional reforms
- Establishment of water tribunals – India - and proposed water resources tribunals - Sri Lanka -
- Water User Associations and Farmer Managed Irrigation Systems in India , Nepal and Sri Lanka
- Watershed management programs with local government and CBO participation –(India )– hold potential for sharing among countries
- Disaster Risk Reduction Livelihood model- a 'paradigm shift' from emergency management to disaster risk management
- Establishment of flood forecasting and warning centers - Bangladesh
- Postgraduate level study courses in IWRM - University of Peradeniya Sri Lanka - now expanded to Bangladesh and Indian Universities.

## **9. Way Forward:**

9.1 Analyzing the challenges faced by the South Asia, it appears that the greatest challenge is in establishing effective and sustainable institutions. Over the past decade all countries in the Region have attempted to focus on developing water resources policies and enabling legislation. All countries have developed their water visions up to 2025. Some countries have specific policies which address their specific needs like disaster management or ground water. Nevertheless there are many gaps to be filled for South Asia to get on to a consistent plan and program for accelerating the IWRM process systematically

**9.2 The challenge for GWP South Asia** is to build the platforms that could bring the diverse range of actors to a common and effective forum that would vigorously pursue IWRM in all its dimensions. GWP South Asia is currently in the process of developing a Strategy (2006-2010) that would address a set of selected priority areas such as those listed in sections 8.3 and 8.4 above for implementation at sub regional and local level. The Strategy once adopted will be operationalised through annual as well as multi year programs at country, regional and sub regional levels. **‘Partnerships and Networks’ will be the key operative words**

### **9.3 Implementing Innovations:**

#### **Technological:**

- Introducing pro poor technologies- especially water management and agriculture technologies need to be more receptive to the needs of the poor and should promote IWRM at local level. Gender sensitivity in introduction of new technologies is an important issues highlighted in the region.
- Integrated farming systems. successfully adopted in many parts of South Asia eg Pakistan has led to improvement in nutritional status of people and conservation of water and energy; this experience can be replicated
- Recognizing climate variability in designing appropriate technologies for water infrastructure development
- Introducing appropriate low cost technologies for water conservation, sanitation and ground water recharge. holds potential for private sector and community participation in improving food and water productivity and the environment.

#### **Knowledge Sharing:**

- Promote sharing of knowledge (encourage dialogue) and establish linkages for moving knowledge from Research to Outreach
- Establishing Partnerships with Regional bodies and Networks and agree on collaborative activities and roles
- Help develop a Policy on free exchange of data and information

#### **Improving water security**

- Effective protocols between riparian countries for equitable sharing of water
- Legal and institutional mechanisms to minimize water pollution
- Advocacy and influencing policy by up scaling issues from the local level and promoting policy level round tables to arrive at multi-partisan consens

- Assigning high priority to hygiene extension
- Establishing clear water rights

**These core areas will form the basis of a South Asia Regional Strategy and will be implemented over the period 2006-2010.**

**Annex 1**  
**List of Potential Collaborators**  
**Regional Bodies, Networks and their functions**

Following are some of the Regional Organizations and their functions

**Regional Bodies**

SAARC	South Asia Regional Planning and Development
SACEP	Environment
ESCAP/UNDP	Development Assistance
UNICEF	
HABITAT	

**Knowledge Centers**

IWMI	Water Research
ICIMOD	Mountain Hydrology, Natural Hazards and Risk Management
IUCN	Bio diversity

**Professional Associations and Networks**

SACOSAN	Sanitation
ICID	Food Security and Water Productivity
CapNet	Capacity Building on IWRM
NARBO	Net Work of River Basin organizations
JWF	Japan Water Forum

**External Support Agencies(ESA)**

ADB, World Bank Multi lateral  
JBIC Dutch, DFID, Bilateral  
CIDA, NORAD  
Ford Foundation

**Civil Society Organizations (CSO)**

CSE  
AKRSP  
Sarvodaya  
CARE  
PANOS International

## **Section 4**

### **Position Paper of the Southeast Asia Sub-region**

**“STATE OF IWRM IMPLEMENTATION IN SEA COUNTRIES”**

## **1. INTRODUCTION**

Southeast Asia (SEA) has an average annual water resource of 6,476 km<sup>3</sup>, representing 15% of the world's total freshwater resources. More than 90% of the freshwater withdrawals go to agriculture; the remaining 10% to household and industrial uses.

Given the importance of water resources in the region, it is important to address water management issues at various levels. Among the issues are the escalating demands on water resources brought about by rapid urbanization and industrialization, and the resulting water stress reflected in reduced water quantity, low water quality, low reliability of supply and high costs of water.

In November 2003, the First Southeast Asia Water (SEAWF) Forum was conducted to define specific recommendations to address the water issues in the region. Among the many recommendations were to:

- Promote regional cooperation, by developing legal and policy frameworks conducive to collaboration, encouraging government, NGO and private sector cooperation in mitigating the negative effects of floods and droughts.
- Build and strengthen capacity to implement integrated water resources management (IWRM).
- Ensure participation of all stakeholders in water resources management and development.
- Organize biannual regional water forum to educate and exchange information among water resources managers and other stakeholders.

Notwithstanding the above, the emphasis given to water is again echoed in the Second Southeast Asia Water Forum held in Bali, Indonesia on 29 August – Sept 3<sup>rd</sup> 2005, which has the theme of better water management through public participation. This is in view of the importance given to water resources planning for the public and to enhance efficiency, equity and productivity of water uses in agriculture, urban, industrial and other sectors.

The results of these two main forums and the various national and regional workshops and forums held in the region thus far, will form the basis for presentation in this position paper and the session by Southeast Asia in March 2006 in Mexico.

## **2. BASIC CHARACTERISTICS OF THE REGION**

Southeast Asia lies within the intersections of two main tectonic plates, with heavy seismic and volcanic activities around the 'ring of fire', stretching from the Philippines right across to Ache in Indonesia, where such calamities often occur. The island arcs and [archipelagoes](#) lie towards the southeast where Indonesia is located right towards the eastern [Asian](#) Sunda Shelf. Southeast Asia consists of 10 countries and is geographically divided into main two regions, namely, continental Southeast Asia consisting of Laos PDR, Cambodia, Vietnam, Thailand and Myanmar, while maritime Southeast Asia consists of the Malaysia, Brunei, Philippines, Singapore and Indonesia.

The total land area of these countries exceeds 435 million hectares or 4.4 million km<sup>2</sup> (Figure 1) and (Table 1). The climate is generally humid tropical, with average annual rainfall varying from 1600 mm to 3400 mm. Continental Southeast Asia experiences a more monsoonal type of climate with a single heavy monsoonal season during the northern summer spreading towards the end of the year to maritime Southeast Asia where the heaviest rain is received during the northeast monsoons. The maximum average rainfall occurs in the countries lying closest to the equator. Although the whole of the Asian region has high rainfall, the pattern of rainfall distribution is uneven with some areas having more rainfall than is required whilst others experience deficits at certain periods of the year, causing problems of floods in the former and droughts at the latter.

The region has one of the richest ecosystems with high biodiversity and rarity in the world. Forests cover over 48% of its total land area of about 4.4 million km<sup>2</sup> with crops taking another 40%. It has a total coastline of 173,000 km, and possesses 35% of the world's mangrove forests and 25-30% of the world's coral reefs and has 19 wetland sites of global significance covering over 620,000 ha.

The total population of the region is more than 500 million at the end of the 20<sup>th</sup> century and is expected to increase by around 50% or by an additional 250 million by year 2025 (Table 2). The average population density of the region will rise from 1.2 persons per hectare (1997) to 1.8 persons per hectare after 25 years, while per capita natural water availability will drop from 11,000 m<sup>3</sup>/capita/year to 7,300 m<sup>3</sup>/capita/year in 25 years time. In daily per capita values, natural water availability will decrease from 30 to 20 m<sup>3</sup> per person per day (GWP SEATAC, 2000). This value is still much higher than most sub-tropical and marginal rainfall deficit areas.

**Table 1. Land area, annual rainfall, and water availability in Southeast Asia.**

Country	Land area (million ha)	Average annual rainfall (mm)	Water source availability	re-avail-	Surface-water availability (km <sup>3</sup> /yr)	Groundwater availability (km <sup>3</sup> /yr)
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			(km <sup>3</sup> /yr)		
Brunei	0.6	3,389	5.9	5.9	0.014
Cambodia	18.1	na	88	na	na
Indonesia	191.9	2,190	2,986	1,847	na
Lao PDR	23.7	1,750	na	270	na
Malaysia	33.0	3,000	630	566	64
Myanmar	67.7	2,000	1,323	828	495
Philippines	30.0	2,400	358	326	32
Singapore	0.07	2,844	na	na	na
Thailand	51.4	1,600	229	226	3
Vietnam	32.9	1,976	371	313	58
Total	449.4		5,591		

Na – not available Source: GWP SEATAC, 2000

The demands versus water availability for various sectors are shown in Table 3. Agriculture remains the main water user in the water availability equation. As much as 90% of the water is tapped for irrigating the paddy crops that require most water during their growing season. As all the countries except Singapore and Brunei (none to very little paddy cultivation), are growing an average of two crops per year, the amount of water required is thus very high, although there is augmentation from rainfall during the replanting and growing periods.

With the exception of the island state of Singapore, where water demands represent 54% of the available internal surface water, the other countries have relatively abundant internal water for use. Most countries in the region have their own internal water sources, but there are four riparian countries in the region that share a common source of water, the River Mekong. These riparian states are Laos PDR, Thailand, Vietnam and Cambodia. They are signatories to the 1995 *Agreement on Cooperation for the Sustainable Development of the Mekong River Basin*. The Agreement provides for the members to agree on such things as the minimum acceptable monthly natural flows along the mainstream, but it contains no specific provisions for volumetric water sharing. Instead, it relies on the principle of international water law known as 'reasonable and equitable utilization' and specifies a range of agreed cooperative actions such as, data exchange and notification and prior consultation concerning various water uses. The net result of all this dynamic approach to Mekong waters is that, it is impossible with certainty, to determine the annual volumes of water available to these riparian countries. In fact for the region as a whole, availability of a good set of hydrological and socio-economic data is still a problem and therefore the statistics on water availability and demands for these countries are approximates only. It is often said that you cannot manage what you cannot measure, and therefore clearly, the need for good database is a major challenge in the region.

Individual country's responses to meet water demands ranged from traditional engineering methods such as construction of dams and reservoirs to highly sophisticated demand manage-

ment techniques such as the use of recycling technology to increase supplies. Of late, the responses have been, amongst others, to move towards integrated water resources management and integrated river basin management, a move that is aimed at regulating water resources more closely and equitably, in line with the individual country's water vision embodied in the Dublin's Principles (1992), which concisely propounded the thrust of water management in countries subscribing to it. The focus of the Dublin's Principles is that, water is a finite and vulnerable resource, essential to sustain life, development and the environment and therefore, water can be considered as having an economic value to all its competing uses and should be recognized as an economic good. It emphasized that water development and management should be based on a participatory approach involving all users, meaning that activities are not confined to the interests of limited groups of users, geographical boundaries or sectoral institutions or national jurisdictions, but should be associated with well defined national and regional policies that would benefit the most people, which the First and Second Southeast Asian Forums have tried to bring the message across to the region.

In terms of water demand for the environment, the countries in the region have yet to develop an environmental flow policy that could guide them in their flow releases to sustain the aquatic and ecotonal environments. It is therefore explicable that management of water pollution has not been so successful. The requirements of the environment, especially to sustain river health and its ecosystems, have not been taken into consideration through adequate environmental flow releases. There are many examples of neglect of river health in the region and the cost for river rehabilitation is extremely high, to the detriment of the public.

Groundwater resources availability is in the range of 10% to 20% of the magnitude of internal surface water resources. Generally, groundwater resource management is not as well developed as surface water resources management. Groundwater is extracted from aquifers in large cities such as Bangkok in Thailand and Rangoon in Myanmar, which is now causing land subsidence and exacerbating floods in these cities during heavy monsoonal rains. In the rural areas, groundwater is extracted through wells but the volume is low in comparison with the amount of surface water being used.

**Table 2. Population estimates in Southeast Asian countries**

Country	Population in 2000			Population projections ('000)		
	'000	% of SEA	Persons/ km <sup>2</sup>	2015	2025	2050
Brunei	370	0.1	57	420	470	570

<b>Country</b>	<b>Population in 2000</b>			<b>Population projections ('000)</b>		
Cambodia	13,100	2.5	72	18,590	22,310	29,880
Indonesia	212,090	40.7	117	250,070	272,900	311,300
Lao PDR	5,280	1.0	23	7,330	8,720	11,440
Malaysia	22,220	4.3	67	27,910	31,330	37,850
Myanmar	48,123	9.2	71	55,260	60,240	68,550
Philippines	75,650	14.5	252	95,880	107,070	128,380
Singapore	4,018	0.8	5,885	4,760	5,000	4,620
Thailand	62,810	12.0	122	72,490	77,480	82,490
Vietnam	78,140	15.0	236	94,410	105,490	123,780
Total	521,761	100.0	119	679,930	691,010	798,860

Source: ASEAN, 2001.

Figure 1: Map of Southeast Asia



**Table 3: Water availability and demand for ASEAN countries**

<b>Water availability and demand (mcm/year)</b>	<b>Brunei</b>	<b>Cambodia</b>	<b>Indonesia</b>	<b>Lao PDR</b>	<b>Malaysia</b>	<b>Myanmar</b>	<b>Philippines</b>	<b>Singapore</b>	<b>Thailand</b>	<b>Vietnam</b>
Available Internal Surface Water	3 425	116 000*	1 847 246	270 000	566 000	873 000	226 000	No data	213 423	275 000
Available Internal Groundwater	0.06	17 600*	5 330	38 000*	64 000	28 000	180 000*	No data	2 700	60 000
<b>TOTAL AVAILABLE INTERNAL WATER RESOURCES**</b> <i>(Ignoring overlap of common resources)</i>	3 425	133 600*	1 852 576	308 000	630 000	901 000	406 000	600	216 123	335 000
<b>CURRENT DEMANDS</b>	39	30	2 759	570	1 909	80	2 233	208	1 311	3 074
Industry	Nil	No data	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Mining	No data	455	78 272	4 674	7 015	28 000	25 533	Nil	48 172	62 200
Ag/Irrigation	92	136	5 125	456	2 413	153	2 172	118	3 188	1 042
Domestic	No data	146	4 500	Nil	No data	10	No data	Nil	15 326	72 833
Environment										
<b>TOTAL CURRENT DEMAND</b>	131	767	90 656	5 700	11 337	28 243	29 938	326	67 997	139 149
<b>DEMANDS est at 2025</b>										
Industry	245	100	5 040	No data	3 946	184	4 154	No data	No data	6 168
Mining	Nil	146	Nil	Nil	Nil	Nil	Nil	Nil	Nil	No data
Ag/Irrigation	No data	1 000	94 370	No data	6 324	No data	72 973	No data	No data	80 084
Domestic	110*	350	9 360	No data	4 234	495	7 430	No data	No data	3 098
Environment	No data	146	14 670	No data	No data	106	No data	No data	No data	10 907
<b>TOTAL DEMAND ESTIMATED AT 2025</b>	355	1 742	123 440	No data	14 504	No data	84 557	No data	No data	100 257

NOTES: Report on State of Water Resources management in ASEAN, CSIRO, 2005

\* Data marked with asterisk have come from sources other than questionnaires – principally FAO Aquastat ([www.fao.org/waicent/foainfo/agricult/agl/aglw/aquastat/main/index.stm](http://www.fao.org/waicent/foainfo/agricult/agl/aglw/aquastat/main/index.stm))

\*\* Countries riparian to the Mekong River (Cambodia, Lao PDR, Myanmar, Thailand, Vietnam) also have access to undefined shares of this international watercourse.

### 3. CHALLENGES AND ISSUES

Although the region as a whole is rich in water resources, the main challenge is that the resources and their potentials are being reduced at an alarming rate. Many countries are already suffering from poor water quality and shortages of water, while others though having adequate water resources, endure uneven distribution. This has caused a lot of sufferings during periods of floods and droughts.

**Pressure arising from human activities is also one of the main challenges in many areas in the region. About 90% of the abstracted water is used for agricultural purposes, leaving very little for other consumptive use. In short, water stress exists in many places in the region in the midst of plenty, resulting in serious water shortages and damage to the environmental ecosystems. Although industries and households are among the lowest water users, they are unfortunately the highest contributors to direct water pollution.**

The main challenges are summarized in Table 4. Essentially, these challenges are a reflection of poor distribution and allocation of water, and a lack of an enabling environment to carry forward the programmes designed to alleviate problems arising from floods, droughts, poor sanitation, river health and water pollution. Lack of water financing is also a critical challenge when some of these countries are now only coming out of a long depression that started in the early 1990s. For this reason, investments in water projects have been slow in view of the low returns on investments. Lack of capacity building is also another main challenge to support the water economy in many of the countries except Singapore. These challenges and issues are examined in more detail below.

#### (a) Access to safe water and sanitation

Rapid development has created weaknesses in the enforcement of water pollution, and the highly dense population in urban centres has converted many rivers into open sewers. Cities are well known for being polluters of the rivers and its aquatic environment, with pollution coming from sewage and municipal wastewater, industrial effluent and polluted urban runoff. Similarly, the farming communities pollute the environment with irrigation returns that contain fertilizers and pesticides, and animal wastes. River water quality is also degraded by sediments from land clearance and solid wastes. Addressing the water pollution challenge opens the dimension of the importance of public health, sanitation and hygiene. In the Philippines for example, considerable under-investment by the Government in sanitation and sewerage has caused a decline in coverage from 74.9% in 1991 to 69.4% in 1998. Communities already suffering from inadequate access to water and sanitation facilities will succumb to poor health leading to loss of incomes and opportunities to work and even demise. In some countries in the region, the distribution and reticulation of water are unequal because of geographical distance, or lack of manpower and financial funding. Linking it to the Millennium Development Goals (MGD), the challenge is clearly to half the proportion of the population whose income is less than USD1/day by 2015 and half their proportion suffering from hunger. The means to do this is through investments in water infrastructure as a catalyst for local and regional development, and a more equitably distribution and allocation of water. This is one of the key challenge and

associated with this, is also to improve water management, including pollution control and water conservation.

**(b) Creating an enabling environment for water programmes**

A critical issue confronting the water economy today is the apparent lack of appropriate institutional frameworks to adequately address the development and management of water and related land resources in an integrated manner. At present, there are many government agencies and offices dealing with water resources activities such as water supply, irrigation, watershed management, flood control, etc. Each of these agencies carry out their developmental undertakings solely to fulfill their respective functions. This fragmented approach to water management has resulted in overlapping functions and conflicts among agencies, leading to fractious water management and development, which is inadequate to meet the requirements for sustainable development in the water economy.

Creating an enabling environment is for good water governance that refers to the “range of political, social, economic and administrative systems that are in place to regulate the development and management of water resources and provision of water services at different levels of society” (GWP, 2002). The national and regional dialogues conducted by the Global Water Partnership - Southeast Asia Technical Advisory Committee (GWP SEATAC) in Southeast Asia, have identified the following major issues arising from weak water governance:

- Inadequate information on the status of water resources;
- Inequitable water distribution;
- Lack of enabling environment for sustainable water resources management, which includes: (1) poor law enforcement; (2) lack of systematic coordination and integration government structures and agencies; and (3) weak capacity for integrated water resources management;
- Inadequate mechanisms and incentives for private sector involvement;
- Inadequate participation of stakeholders in water policy and program planning, management and monitoring;
- Inadequate knowledge, understanding and awareness of the values and benefits of water, including water pricing, water rights and water management technologies.

The Second World Water Forum in 2000 have deliberated on some of these issues globally and has declared that the current water crisis is a result of a crisis of governance, noting that “there is a need for profound change in how water is managed if we are to achieve any sense of sustainable water use in the near future”, and that “the empowerment of the people at the local level to manage their water resources (i.e., referred to as the “democratization of water management”) is needed. In other words, there is a need to create an enabling environment for water to be managed efficiently and in a manner that benefits the most.

This call is echoed very strongly in the World Summit for Sustainable Development (WSSD) in Johannesburg in 2002, where countries are encouraged to develop their Water Efficiency Plans by 2005. Although it is impossible for many countries including those in Southeast Asia to develop these plans within the timeframe of 2005, nevertheless, the stage has already been created for countries to do so if they so desire. However, the most important aspect of the WSSD is not so much the plans, but the enabling environment it created whereby awareness is raised on the need to improve water management. It encourages countries to facilitate the establishment of public-private partnerships and other forms of partnerships that give priority to the needs of the poor, within stable and transparent national regulatory frameworks provided by the governments, while respecting local conditions involving all concerned stakeholders and monitoring the performance and improving accountability of public institutions and private companies. It also calls for developing programmes that promote efficient allocations of water to competing uses and for mitigating the effects of extreme water-related events. It supports the diffusion of technology and capacity building for non-conventional water resources and conservation technologies, while at the same time, requesting countries to develop and implement national strategies with regards to integrated river basin, groundwater management to improve efficiency of water infrastructure to reduce losses and increase recycling of water.

While the issues related to good water governance have been repleted in many regional and local plans for water resources, its requirements have yet to be fully understood and implemented. Governance is one of the most important and complex components of integrated water resources management, and offers a huge challenge by way of its definition, approach, and application. It entails the involvement of all stakeholders of various professional and socioeconomic backgrounds, sectors, and cultures, in a manner that will identify the best possible solution to a water governance issue that will benefit the majority. Moreover, modifying government policies takes time, and dealing with many government offices require patience and understanding of government dynamics, and good persuasion and negotiation skills, and overall creating an enabling environment for water reforms has become unquestionably one of the main challenges facing the region.

(c) Water financing

**While there is planning for water and water-related projects in each of the countries in the region, there is a great challenge in terms of financing them. Indeed, this is one of the biggest challenges because since the prolonged depression and stagflation of the 1990s, which seriously affected all the countries in the region, financing water projects is a tall order. National funding is limited while international funding has shrunk, with investors adopting a wait and see attitude. Many of the international agencies and sources of funds have many strings attached to their loans, leaving the countries in a dilemma. Until today not many countries have been able to carry out many of the planned projects.**

(d) Capacity building requirements

**Capacity building requirements differ from country to country, basically depending on their cultures, system of education and water governance. The trend of water management in the region**

seems to be moving towards decentralization, that is, towards river basin management and having river basin organizations (RBOs) and river agencies, with institutional reforms being planned towards its governance. Also, there is a shift towards demand management of water, a move that encourages water savings. Therefore in terms of capacity building, the focus will range from formal and informal training on water resources management to meet the manpower needs to carry out these reforms and also to raise awareness among the public and communities to educate them on need for demand management to save water. Formal training is most needed in countries that seem to have the most water related problems and where there are no or insufficient manpower with the knowledge and skill to tackle the problems.

Essentially the main challenge arises from two aspects. Firstly, there is a big gap in providing individual with knowledge or ability to carry out the water plans and reforms and secondly, the building up of the organizational capability of an agency or agencies to perform the job. In both cases, the methodology, tools and types of requirements are important as much as they are different. At the individual level, there must be opportunities to learn more about the technical issues. At the organizational level, there must be collaborative learning to build by the capability and there must be facilities to do so. These are the challenges that are being faced in terms of capacity building in the region.

**Table 4: Main Challenges by Countries in the Region**

Challenges	Malaysia	Indonesia	Thailand	Myanmar	Cambodia	Lao PDR	Philippines	Vietnam
Flooding	T	S	S	NA			NA	S
Water shortages	S	S	S	NA			NA	T
River Pollution	S	S	NA	NA			NA	T
River sedimentation	S	S	NA	NA			NA	T
Water rights demand and allocation	T	S	NA	NA			S	T
Sanitation	T	S	NA	NA			NA	S
Governance	S	S	NA	S			NA	S
Numerous Minister, Depts & agencies- overlapping of responsibility & function	T	T	NA	NA			S	S
Poor integration & coordination among implementing agencies	S	S	S	S			S	S
Lack of integrated institutional frameworks for water and land development and management	S	S	S	NA			S	S

Capital expenditures insufficient to meet estimated investment requirements	S	S	NA	S			S	S
Lack of effective cost recovery mechanism for sustainable water resources development	S	S	NA	S			S	S
Inadequate skills & resources	T	S	S	S			NA	T
Lack of data & access	T	T	NA	S			NA	S
Lack of effective mechanism for stakeholder consultation, participation & representation in decision making	T	T	S	S			NA	S

S = Serious; T = Tolerable ; NA= Not Available

#### 4. STRATEGIES ON SUSTAINABLE WATER RESOURCES MANAGEMENT

The strategies on sustainable water resources management by various countries in the region are shown in Table 5. Basically these strategies are to address the challenges as mentioned in Section 4 above, to:

- (a) improve distribution and allocation of water;
- (b) create an enabling environment;
- (c) importance of water financing;
- (d) capacity and capability building.

Each of the countries has developed short and long term policies to deal with the above challenges and issues. A number of countries for example Indonesia and Malaysia, have pointed out that many institutions are involved in water resources management and that the opportunities to rationalize the water sector have been fraught with problems. Their strategies are therefore to target water reforms through their national development plans, which in the Malaysian context, is divided into five years duration. Water law implementation in Laos PDR on the other hand requires the development of classification systems for water quality and quantity with their standards derived based on designated use objectives. Their strategy is therefore to facilitate capacity building to be carried out first so that they have sufficient skills and knowledge to ensure that they have the capability to carry out programmes to achieve their desired objectives in water reforms over the short to mid term timeframe.

The whole dynamics of responses to water resources management in the region have therefore hinged on two main elements. Firstly, the strategy is to have institutional realignment to national policies and needs, as well as taking part in the international water economy frameworks, and secondly, the strategy to adopt an approach that will endear the policies to the local communities. It is often said that unless the local community are in tune with the policies and strategies from above, very little could be

achieved in the long term. Thus as shown in Table 5, many of the strategies are geared towards the two elements as mentioned above.

**Table 5: Strategies on Sustainable Water Management**

Country	Strategies Toward IWRM's success
Malaysia	<ul style="list-style-type: none"> <li>• Developing an arching national policies</li> <li>• Reformation of government machineries               <ul style="list-style-type: none"> <li>– Ministry of Natural Resources and Environment → water as a resource</li> <li>– Ministry of Energy, Water and Communications → water as a utility</li> <li>– Ministry of Agriculture and Agro-based Industries → water for food</li> </ul> </li> <li>• Zoning/protecting catchment areas</li> <li>• Capacity Building</li> </ul>
Indonesia	<ul style="list-style-type: none"> <li>• National Institutional Frame Work Reform including releasing new law on water resource (Law No 7/2004).</li> <li>• The organizational and financial framework for water resource management and development</li> <li>• Regional water quality management and regulatory institutions</li> <li>• Irrigation management policy, institutions and regulations.</li> <li>• Establishment of National Team for Coordination of Water Resources Management, 2001. This team is regarded as an embryo of national water resources council.</li> <li>• Preparation of National IWRM Plan/Strategy is being processed. It is expected to be completed by the end of next year (2006).</li> <li>• 2 implementing government regulations (on water quality control and irrigation management) are completed and about 8 other regulations are now being formulated.</li> <li>• Dissemination of the new water law and its completed implementing regulations are now underway.</li> </ul>
Lao PDR	<ul style="list-style-type: none"> <li>• IWRM approach to reinforce links and synergies between water and land use, the environment and sustainable development               <ul style="list-style-type: none"> <li>- Law on Water &amp; Water Resources</li> <li>- Establishment of Water Resources Coordination Committee</li> </ul> </li> </ul>
Myanmar	<ul style="list-style-type: none"> <li>• Extension of irrigated land;</li> <li>• Paper operation and maintenance of existing irrigation systems and facilities;</li> <li>• Improve technology;</li> <li>• Improvement of the economy in rural areas;</li> <li>• Facilitation and formulation of related laws and regulations;</li> </ul>

Country	Strategies Toward IWRM's success
	<ul style="list-style-type: none"> <li>• Community participation and involvement; and</li> <li>• Adoption of an integrated approach.</li> </ul>
Philippines	<ul style="list-style-type: none"> <li>• Creation of RBOs/Water Resources Regional Councils within the water resources regions</li> <li>• Implementation of a rationalized raw water pricing mechanism</li> <li>• Revisions in the Implementing Rules &amp; Regulations of the Philippine Water Code.</li> <li>• Promoting the implementation of the IWRM approach</li> </ul>
Thailand	<ul style="list-style-type: none"> <li>• Solution for drought relieved <ul style="list-style-type: none"> <li>– Water supply for residence</li> <li>– Water supply for economic activities</li> </ul> </li> <li>• Solution for flooding in two main areas: <ul style="list-style-type: none"> <li>– Community</li> <li>– Agricultural areas</li> </ul> </li> <li>• Solution for wastewater problem <ul style="list-style-type: none"> <li>– Wastewater treatment at its source</li> <li>– Water Recycling</li> </ul> </li> <li>• Management <ul style="list-style-type: none"> <li>– groundwater management master plan</li> <li>– integrated water resources management</li> </ul> </li> </ul>
Vietnam	<ul style="list-style-type: none"> <li>• Formulation of Water Law (1988)</li> <li>• Formation of Ministry of Natural Resources and Environment (2002-2003) -Water resource management</li> <li>• Vision for Water Security in 21st Century</li> </ul>
Cambodia	<p>The enabling environment</p> <ul style="list-style-type: none"> <li>• Legislation, national and International water law</li> <li>• Financing management and investment</li> <li>• Policies on management and use of water resources</li> <li>• Strategies on management and use of water resources</li> <li>• Master plan on IWRM</li> <li>• Institutional capacity building.</li> </ul>

## 5. LOCAL ACTIONS AND SUCCESSFUL EXPERIENCES AND PROGRAMMES

As the theme in the Fourth World Water Forum is on local actions, Table 6 provides a short overview of the local actions undertaken as part of the national as well as Global Water Partnership (GWP-SEA) initiatives in the region. Many of the initiatives are working towards the World Summit on Sustainable Development (WSSD) declarations, where the international community took an important step towards more sustainable patterns of water management by including in the WSSD Plan of Implementation, a call for all countries to “develop integrated water resource management and water efficiency plans by 2005, with support to developing countries. These “plans” are milestones in a cyclic and long-term national water strategy process. They take time, and all countries of SEA are somewhere in that process, ranging from advance in their initiatives to some countries that have hardly begun (see Table below.)

**Table 6: Local Initiatives towards Integrated Water resources Management**

	<p style="text-align: center;"><b>Local Actions</b></p> <ul style="list-style-type: none"> <li>• <b>Awareness &amp; Advocacy</b></li> <li>• <b>Education programmes</b></li> <li>• <b>Capacity Building</b></li> <li>• <b>Water Reforms</b></li> <li>• <b>Management plans</b></li> <li>• <b>Public Participation</b></li> </ul>
<p><b><u>Country</u></b> Malaysia</p>	<p style="text-align: center;"><b>Programmes implemented and action plans</b></p> <ul style="list-style-type: none"> <li>• Formation of Apex organization -(Selangor Water Management Authority - 1999)               <ul style="list-style-type: none"> <li>- adopt and implement IWRM at the river basin level</li> </ul> </li> <li>• Study on integrated catchment management of Sungai Damansara, 2003               <ul style="list-style-type: none"> <li>- involved four local authorities</li> <li>- to improve catchment management of Sungai Damansara</li> <li>- to incorporate StormwaterManagement Manual</li> </ul> </li> <li>• Sarawak IWRM master plan study (2004)               <ul style="list-style-type: none"> <li>- formulates a master plan for integrated development and management of Sarawak water resources</li> </ul> </li> <li>• National study for the effective implementation of IWRM in Malaysia (2005)               <ul style="list-style-type: none"> <li>- creates awareness and generates advocacy in IWRM</li> <li>- develops capacity building of implementing agencies in IWRM</li> <li>- develops best management practices in IWRM</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• National Water Resources Council - 2003</li> <li>• River Basin Master Plans -(basis for development within a river basin) -1998</li> <li>• Capacity Building <ul style="list-style-type: none"> <li>- MSc course on IWRM (2005)</li> <li>- Training modules for senior executives of the public sector (2005)</li> </ul> </li> <li>• Love Our River program -1993</li> <li>• National sewerage project- National Strategic Plan for Solid Waste Management (2002)</li> <li>• Guidelines for Installing- A Rainwater Collection and Utilization System 99'</li> <li>• 2002 - Six-liter toilet flushing systems</li> <li>• Programme of NRW reduction and rehabilitation of WTPs and distribution systems</li> <li>• National recycling campaign 2002</li> <li>• National Water Resources Council – 1998 <ul style="list-style-type: none"> <li>- pursue effective water management and services</li> <li>- involvement of Federal Government in the water sector</li> <li>- formulation of IRBM Master Plans for all river basins</li> </ul> </li> <li>• Application of stormwater Management Manual (2001)</li> </ul>
Indonesia	<ul style="list-style-type: none"> <li>• Program Kali Bersih/PROKASIH (Clean River Program)</li> <li>• Integrated Management in Less-Developed River Basins</li> <li>• People's empowerment for responsible water use and conservation</li> <li>• Participatory Water Management in Rural Area within FAO SPFS</li> </ul>
Thailand	<ul style="list-style-type: none"> <li>• Establishment of National Water Resources Committee</li> <li>• Establishment of River Basin Committee-</li> <li>• Preparation of river basin plans with stakeholder participation</li> <li>• Putting IWRM into practice at the river basin level</li> <li>• Department of Water Resources was set up in 2002</li> </ul>
Laos	<ul style="list-style-type: none"> <li>• Law on Water &amp; Water Resources</li> <li>• Establishment of Water Resources Coordination Committee</li> </ul>
Vietnam	<ul style="list-style-type: none"> <li>• Formulation of Water Law</li> <li>• Establishing RBO's (Red river, Cau river and Dongnai river)</li> <li>• Establishing of new institutions such as National Water Council , RBO, grass-roots water-user organization</li> </ul>

Myanmar	<ul style="list-style-type: none"> <li>• <i>Water User Groups</i> at township level successful &amp; replicated for other areas</li> <li>• <i>Myanmar Water Resources Committee</i> formed as National Apex body for controlling, guiding and implementing water resources development work for sustainable development of the country</li> </ul>
Philippines	<ul style="list-style-type: none"> <li>• Development of innovative financing schemes such as raw water pricing and water revolving fund</li> <li>• Creation of Regional Councils and River Basin Organizations</li> </ul>
Cambodia	<ul style="list-style-type: none"> <li>• Set up national committee for IWRM 2005 dialogue</li> <li>• Establish national capacity building for IWRM 2005</li> <li>• Create national institution for IWRM and coordination with line agencies and NGOs</li> </ul>

## 6. LESSONS LEARNED AND EXPERIENCES THAT CAN BE SHARED

Southeast Asia has diverse cultural and ethnic groups, with different forms of government. Therefore, in terms of governance of water and water management, there are a lot of lessons that can be shared within and among regions. Even within a country, there are geographical differences and generic measures may not fit all. This paper provides a general overview, which requires more in-depth re-assessment of specific problems and issues, when making decisions on a specific solution to the problem. Among the lessons learned are:

- Century-old water laws need to be reviewed and amended or repealed, and/or amended or new laws be enacted for a unified water resources law.
- Water reform takes a long time but various actions, such as Water Visions and Framework for Actions have already been done to carry forward the IWRM process in all the countries in SEA.
- Implementation of Water Efficiency Plan and other Integrated Water Resources Action Plans is limited although each country is trying to abide by the requirements of the WSSD and the MGD.
- Effective implementation can only be achieved through community participation.
- Huge investments needed to improve the water sector and in many cases, this is not forthcoming as intended.
- Attempts to attract private financing should require more immediate and credible mechanisms to mitigate foreign exchange risks.
- Development of innovative financing schemes to bridge funding gaps in the water sector.
- Importance of knowledge & information and the process of dissemination of these same, needs strengthening in all the countries.

## **7. FUTURE PERSPECTIVES**

While policies and plans are static documents, the implementation process of these plans is dynamic as it involves human activities, technical knowledge and the state of the art, which are changing and evolving all the time. Future perspectives on water resources management will have to consider it as a dynamic system whereby the whole water economy can take many forms and evolve over any given time-frame. For example, it is no longer possible to think of water security to the population and the environment, unless there is a reassurance that the hydrologic regions (river basins) are well managed. In the same vein, it is not possible to provide sufficient water to the population unless there is a good system of administration of the water economy with sufficient investments for water infrastructure development.

Other perspectives include:

- Comprehensive and integrated legislations for managing water resources;
- Strengthening the legal aspects of IWRM in order to efficiently implement the new concepts through local administration;
- IWRM Planning to be adopted as basic to water management and development at national level, provincial level, district level and basin level;
- Water Demand Management is important to IWRM;
- Water use rights and equitable water allocation need further studies as they are related to the whole concept of water development, financing and human rights of access to water;
- Capacity Building and institutional development are crucial ingredients to upgrade the standard of knowledge for the implementation of IWRM in the entire water economy;
- Strengthening of related science and knowledge related to IWRM concept such as economics and environmental science to manage water better;
- Information Management and R&D.

## **8. CONCLUSION**

The paper has provided an overview of the background of the countries in the Southeast Asian region and the main challenges these countries faced in terms of water resources management. The countries in the region are at various stages of development and therefore experience different levels of water resources management based on their priorities of development and administration. Without exception, all the countries have faced the effects of the vagaries of nature in terms of floods and droughts, while wa-

ter pollution essentially stems from anthropogenic causes. The problems relating to water and environment are expected to intensify in the future and water resources need to be managed in an integrated and holistic manner. The most important element that is absent is a strong enabling environment within the political & administrative framework to commit to water resources management, which is so vital to support the multi functioning of the water economy to ensure success. Public awareness and public participation, which are sorely needed at present, could provide the opportunity to work together and share the commitments on good water resources management in the region.

## **Section 5**

### **Position Paper of the Pacific Sub-region**

## **Introduction**

The particular vulnerability and specific needs of Small Island Countries was acknowledged by the World Water Council through the inclusion of a “Water in Small Islands Countries” theme at the 3<sup>rd</sup> World Water Forum (3WWF) held in Kyoto 2003.

The regional consultation in preparation for 3WWF resulted in a strategic framework for the region to address small island countries water and sanitation issues, this being the Pacific Regional Action Plan on Sustainable Water Management (Pacific RAP), and a Type II Partnership known as the Pacific Partnership Initiative on Sustainable Water Management.

The “Water in Small Islands Countries” session in Kyoto allowed the sharing of issues and strategies with other small island regions of the Caribbean and Indian Ocean, and which resulted in a Water in Small Island Countries Session Statement; the Small Island Countries Portfolio of Water Actions; the Joint Programme for Action on Water and Climate (JPfA); and the Caribbean and Pacific Dialogue on Water and Climate Synthesis Reports.

Regional, national and local action programmes have been developed since 2003 based on the above strategies and partnerships and are in various stages of development and implementation. The Japan Water Forum (JWF) that arose from the Japanese 3WWF Secretariat approached the South Pacific Applied Geoscience Commission (SOPAC) to assist in drafting and finalizing the Pacific sub-regional part of the Regional Position Paper for Asia and the Pacific, which is to be presented at the 4<sup>th</sup> World Water Forum (4WWF) 16-22 March 2006 in Mexico.

The offer by the JWF allows the Pacific region’s stakeholders in water and sanitation to reflect on the strategic developments over the past 3 years and provides an excellent opportunity to review the implementation of the Portfolio of Water Actions and in particular the Pacific Regional Action Plan (RAP).

Opportunities to provide input to the Pacific position paper was possible through various regional water and wastewater consultations and meetings leading up to the Mexico Forum.

The Science, Technology and Research network (STAR) Water Working Group meeting on 26<sup>th</sup> September 2005 at the Kitano Hotel in Apia, Samoa held in association with SOPAC’s 34<sup>th</sup> Annual Session, provided a first opportunity for input into a draft Pacific Paper. The consultation was held in collaboration with the JWF and the Pacific Water Association (PWA).

The draft paper was placed on the Japan Water Forum Website [www.waterforum.jp/eng/apsubregions](http://www.waterforum.jp/eng/apsubregions) and circulated through the Pacific Partnership Initiative for further comment.

The position paper covers the basic characteristics and main challenges of the Pacific region, the developed strategies, regional and national actions, lessons learned and future perspectives as well as a reference to key documents.

## **Pacific Characteristics and Challenges**

In the Pacific region there are 14 island countries and several island territories which together consist of only 550,000 km<sup>2</sup> of land with approximately 7 million inhabitants, speaking in the order of 1,000 different languages, spread across 180 million km<sup>2</sup> of ocean or about 36% of the world's surface. Pacific Island Countries are no different to any other in that freshwater is essential to human existence and the sustainable development of small economies. However, the ability of the island countries to effectively manage the water sector is constrained by their unique characteristics of small size, fragility, natural vulnerability, and limited human and financial resource base to mention but a few.

The challenges and constraints of sustainable water resources management in Pacific Island Countries were categorized into three broad thematic areas at the regional consultation on Water in Small Island Countries held in preparation of the 3<sup>rd</sup> World Water Forum in Kyoto 2003. These are:

- 1) Small island countries have uniquely fragile water resources due to their small size, lack of natural storage and competing land use, vulnerability to natural and anthropogenic hazards, including drought, cyclones and urban pollution. This requires detailed water resources monitoring and management and improving collaboration with meteorological forecasting services;
- 2) Water service providers face challenging constraints to sustaining water and wastewater provision due to the lack of both human and financial resource bases, which restrict the availability of experienced staff and investment, and effectiveness of cost-recovery. Future action is required in human resources development, water demand management and improving cost-recovery; and
- 3) Water governance is highly complex due to the specific socio-political and cultural structures relating to traditional community, tribal and inter-island practices, rights and interests. These are all interwoven with past colonial and 'modern' practices and instruments. These require programmes to develop awareness, advocacy, and political will, at all levels to create a framework for integrated water resources management.

The challenges at the regional and international level can be summarized to include:

- Co-ordination and refocusing of aid programmes and project design to assist SIDS to develop water management capacity and to implement projects to improve the environmental sustainability of water supply and usage, consistent with regional priorities;
- Co-operation between existing regional agencies in the development of water sector related programmes and technologies; and
- Regional level support for national capacity building, advocacy and awareness.

## **Pacific Strategic development in Water and Sanitation**

The past 3 years have seen an unprecedented period of strategic water sector development in the Pacific region.

There are three main strategic documents that now drive regional water and sanitation development in the Pacific:

- 1) The Pacific Wastewater Policy and associated **Pacific Wastewater Framework for Action**, were both completed in 2001 in Majuro, Republic of the Marshall Islands and developed as part of UNEP's Global Programme of Action for the Marine Protection from Land-based Sources of Pollution (GPA).
- 2) The more holistic **Pacific Regional Action Plan on Sustainable Water Management (RAP)** was completed in 2002, Sigatoka Fiji in preparation for the Water in Small Island Countries session at the 3<sup>rd</sup> World Water Forum in 2003, Kyoto.
- 3) The **Drinking Water Quality and Health Framework for Action** which was developed as a complementary framework building on the Pacific RAP. The Framework was developed at the WHO facilitated workshop on Water Quality Standards and Monitoring in Pacific Island Countries (Nadi, Fiji, 7-10 February 2005).

#### Pacific Regional Action Plan (RAP)

The overarching Pacific Regional Action Plan (RAP) on Sustainable Water Management articulates the Pacific regional needs for both water and sanitation and it is therefore used as the point of departure for reviewing progress in the region. The product of eight months of consultation, the Pacific RAP is an attempt at a strategic holistic approach to achieving sustainable water management in the Pacific. The consultation process included the identification of national priority actions as determined by the participating countries on the basis of their national water strategies, national assessments and stakeholder consultations undertaken for the World Summit on Sustainable Development (WSSD) and the 3<sup>rd</sup> World Water Forum 'Water In Small Island Countries' Theme. It included the development of agreed regional actions through a regional consultation meeting process of plenary discussion, working group review and country delegation approval. Endorsed by 18 countries, 16 at Heads of State level, the Pacific RAP not only provides a coordinated and agreed approach but has significantly driven water up the national and regional agenda. This has been seen to varying degrees in the initiatives taken by countries on water resource management and the increased political support given by governments since 2003.

The Pacific Regional Action Plan consists of six thematic categories as follows:

**Theme 1: Water Resources Management - Water Resources Assessment and Monitoring; Rural Water Supply and Sanitation; IWRM and Catchment Management**

**Theme 2: Island Vulnerability - Disaster Preparedness; Dialogue on Water and Climate**

Theme 3: Awareness - **Advocacy; Political Will; Community Participation; Environmental Understanding; Gender**

**Theme 4: Technology - Appropriate Technologies; Demand Management and Conservation; Human Resources**

**Theme 5: Institutional Arrangements - Institutional Strengthening; Policy, Planning and Legislation**

**Theme 6: Financing - Costs and Tariffs; Alternative Models; Role of Donor Organizations and Financing Institutes**

Each Pacific RAP theme contains 3-5 key messages, which broadly address the 20 or so challenges and constraints to achieving sustainable water management in the Pacific. For each key message a series of actions has been developed along with identifying responsible parties for implementing the action (e.g. national government, water utilities, regional organizations, donors). In this framework, a comprehensive strategic approach has been built up.

### 3<sup>rd</sup> World Water Forum Outcomes

In March 2003, ADB and SOPAC facilitated the Water in Small Island Countries sessions at the 3WWF. The global SIDS position that resulted from this session was mainly the result of the Dialogue on Water & Climate (DWC) which linked the Pacific and Caribbean regions together on water and climate issues.

The close collaboration between the Caribbean and Pacific regions during preparatory work for the 3<sup>rd</sup> World Water Forum resulted in the formation of the **Joint Caribbean-Pacific Programme for Action on Water & Climate (JPfA)**.

The JPfA comprises 22 action elements, common to both the Pacific and Caribbean regional consultation outcomes, covering four collaborative areas: research, advocacy and awareness, capacity building and governance. From this immediate priority actions were identified in 6 areas. The JPfA was formally launched at Kyoto by the delegations from both regions, and a Memorandum of Understanding was signed by the respective lead regional agencies for each region (SOPAC and CEHI).

The JPfA takes an Integrated Water Resources Management approach to addressing water and climate issues in SIDS, as demonstrated by Integrated Watershed and Coastal Area Management (IWCAM) in the Caribbean and Island Systems Management (ISM) in the Pacific. The JPfA promotes the transfer of knowledge, expertise, positional statements and personnel between the two regions to the benefit of the 34 countries involved. The JPfA was used to strengthen the SIDS position at the 3<sup>rd</sup> World Water Forum, the 2004 WMO Congress and the 2005 UN SIDS Barbados Programme Of Action review meeting (BPOA+10) held in Mauritius.

The global SIDS sessions at the 3WWF followed a thematic structure of: Water Resources & Climate; Water Utilities; and Water Governance & Awareness. The outcomes from Kyoto included agreed positions, ministerial interventions and a submission to the Portfolio of Water

Actions, and a 3WWF priority list of actions. The global SIDS agreed to six priority actions, referred to as the **Small Island Countries Portfolio of Water Actions** namely:

- i) **Water resources management using the HYCOS model**
- ii) **Water demand management programme**
- iii) **(Drinking) water quality monitoring and capacity building**
- iv) **Improving water governance**
- v) **Regional Type II Water Partnership support (using the Pacific Type II model)**
- vi) **Inter-regional SIDS water partnership support (using the JPfA model)**

**Table 1 Overview of Recent Strategic Regional Water and Sanitation Milestones**

<b>Event</b>	<b>Venue, Year</b>	<b>Organisers</b>	<b>Major Outcomes</b>
Pacific Wastewater Consultation	Majuro, 2001	SOPAC/SPREP/PWA/GPA	Policy and Framework for Action
From Vision to Action: Towards Sustainable Water Management in the Pacific	Sigatoka, 2002	SOPAC/ADB	Pacific RAP
World Summit on Sustainable Development	Johannesburg, 2002	United Nations	Pacific Partnership
Water in Small Island Countries 3 <sup>rd</sup> World Water Forum	Kyoto, 2003	ADB/DWC/SOPAC	Portfolio of Water Actions & Joint Programme of Action on Water and Climate
Drinking Water Quality & Health	Nadi, 2005	WHO	Framework for Action
BPOA+10	Mauritius, 2005	United Nations	Mauritius POI
3WWF Review	Apia, 2005	SOPAC/JWP/PWA	4WWF Position Paper

## **Action Implementation**

The Pacific Partnership mechanism set up as a main outcome of the World Summit on Sustainable Development aims to facilitate the implementation of all listed actions in the Pacific RAP on a national, regional and international level. The Pacific paper for the 4WWF is focused on reviewing the implementation and identifying future needs and perspectives based on progress and continuing challenges.

Since its development, this coordinated approach has already proved successful in implementing projects or providing technical assistance to Pacific Island Countries. Many of those partnership activities have also resulted in increased donor collaboration and harmonization on in-country action plans and strategies.

The level of intervention by the partnership through regional programmes is largely restricted to capacity building, advocacy and awareness targeted at the key counterpart government departments in Pacific Island Countries. This not only impacts on the macro level of water re-

sources management but creates the enabling environment for the implementation of water and sanitation actions at the national, local and community levels.

The success of the Pacific RAP, and its sister action plans on Wastewater and Drinking Water Quality and Health, ultimately results in longer-term changes in the health of Pacific Island people and the environment.

The review of action implementation for the purposes of this document is divided over the six thematic areas of the Pacific RAP, in each case with a re-statement of the key messages, followed by the regional intervention programmes; and national strategies and actions.

Within this framework it can also be seen that progress is being made on the six global SIDS agreed priority actions which are in various stages of development and implementation (Water resources management using HYCOS, Water demand management, Water quality monitoring, Water governance, Regional and Inter-regional Partnership).

The Pacific Partnership coordination unit has developed a detailed matrix of actions under each Theme of the Pacific RAP. The matrix provides the status of the action and the partners involved and is attached in Annex 1.

## **THEME 1: WATER RESOURCES MANAGEMENT**

**Key Message 1: Strengthen the capacity of small island countries to conduct water resources assessment and monitoring as a key component of sustainable water resources management.**

**Key Message 2: Implement strategies to utilise appropriate methods and technologies for water supply and sanitation systems and approaches for rural and peri-urban communities in small islands.**

**Key Message 3: Implement strategies to improve the management of water resources, and surface and groundwater catchments (watersheds) for the benefit of all sectors including local communities, development interests and the environment.**

### Regional Programmes – Water Resources

Since the 3WWF a number of water resources management regional programmes have been developed. In most cases implementation is in the early stages. The focus of these programmes is building local capacity, and providing the knowledge and tools to key practitioners to better manage water resources.

<b>Intervention Area</b>	<b>Partners</b>	<b>Strategic Donor</b>	<b>Indicative Budget*</b>
Hydrological Training - 3 year (2004-2006) programme to train PIC hydrology technicians in data acquisition, analysis and interpretation to improve water resources, catchment management and IWRM.	WMO SOPAC NIWA UNESCO	NZAID	480K
Water Safety Plans – 2 year (2006-2007) programme to develop and implement a ‘catchment to consumer’ risk-management approach to safe drinking water.	WHO IAS SOPAC	AusAID	600K

Virtual Water Learning Centre - USP, on behalf of UNU, deliver a postgraduate level pilot course in IWRM to improve training and education in the water sector.	USP UNU SOPAC	UNDES A	140K
Rainwater Harvesting – Pilot project completed in Tonga with results published, disseminated and being promoted region-wide.	UNEP SOPAC TCDT	SIDA	
Sanitation and Hygiene – Technical advice and assistance	GPA SOPAC	Taiwan/ ROC	150K
Water Quality Monitoring (concept approved) – Project to improve national and regional capacity to assess and monitor water quality, identify contamination sources and minimise the associated health and environmental impacts.	WHO IAS SOPAC	NZAID	700K

\* Unless otherwise stated amounts in FJD for multi-year programme

### National Action Implementation – Water Resources

IWRM provides the framework to ensure environmental, social, technical and economic factors are taken into account in managing water resources in the present and for the future. Effective water resources management requires an understanding of the interrelated components of the physical influences on quality and quantity of the resource, the multiple needs of those who wish to use the physical resource, and the political and social contexts that influence people's actions. Widespread adoption and implementation of IWRM in countries throughout the Pacific has not yet occurred. Some countries are making good progress on some of the components.

National interventions in the management of water resources include the use of GIS in the **Cook Islands** to map the catchment and infrastructure, and a programme in **Niue** to understand the groundwater resource for protection of from agricultural impacts. In **Vanuatu** in addition to carrying water quality and quantity assessments there has been the development of water legislation. Progress towards implementing IWRM has taken place in **Samoa**, **Vanuatu** and at a local level in **Fiji**. The USP has developed a virtual IWRM learning centre. In many countries many of the usual problems associated with legislation, skills and the serious lack of capacity still exist. Land ownership issues and the particular matter of dealing with community ownership and customary land still pose a major challenge.

#### **THEME 2: ISLAND VULNERABILITY**

**Key Message 1: There is a need for capacity development to enhance the application of climate information to cope with climate variability and change.**

**Key Message 2: Change the paradigm for dealing with Island Vulnerability from disaster response to hazard assessment and risk management, particularly in Integrated Water Resource Management.**

### Regional Programmes – Island Vulnerability

The impacts of climate variability and climate change have continued to be a critical issue for the international and regional agenda. This is reflected in the funding that has been made available for programmes aimed at collection and application dissemination of climate information.

Intervention Area	Partners	Strategic Donor	Indicative Budget*
Island Climate Update - A multi-disciplinary, multi-national project providing three months regional climate forecasts.	NIWA SOPAC SPREP	NZAID	290K
Pacific Island Climate Prediction Programme - The project aims to develop the seasonal prediction capacity in Pacific Island Countries.	BOM NMS	AusAID	2M
Capacity Building to Enable Adaptation Measures in Pacific Countries (CBDAMPIC) - The broad aim is to increase the ability to cope with impacts from a changing climate.	SPREP MOE	CIDA	

Resource Centre on Water and Climate – Aims to promote and support work on Water and Climate and the implementation of theme 2 of the Pacific RAP.	CPWC SOPAC	ADB	100K
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\* Unless otherwise stated amounts in FJD for multi-year programme

### National Action Implementation – Island Vulnerability

In small island nations the influence of climate, and extreme weather events on the hydrological cycle are particularly critical to water resource management. A number of countries are developing closer linkages between water resource managers and meteorological services who in turn have started providing climate products. Some countries have the capacity to assess risks posed by extreme climate events. However, in general, suitable long term data sets do not exist in most countries. Saline intrusion into the aquifer as well as managing extreme events such as droughts, floods and hurricanes continues to be a challenge confronting water resource managers dealing with a range of environments from basin scale to entire islands.

#### **THEME 3: AWARENESS**

**Key Message 1: A high quality participatory framework should be adopted at the National level to allow for open participation of communities in sustainable water and wastewater management.**

**Key Message 2: Access to, and availability of information on sustainable water and wastewater management should be provided to all levels of society.**

**Key Message 3: Water and sanitation education should be mainstreamed into the formal education system.**

**Key Message 4: Improve communication and coordination of all stakeholders in sustainable water and wastewater including government, civil society and the private sector.**

#### Regional Programmes – Awareness

It is imperative that water and sanitation education and awareness reach all levels of society. Regional programmes such as the World Water Day campaign and community participation continue to be supported and provide materials to several countries in the region. However improvement in this area requires national and local action. An example of a regional programme to initiate local action is provided by the International Waters Programme (IWP) implemented by SPREP in collaboration with UNDP under Global Environment Facility funding. IWP designed a programme that fosters an improved awareness among communities of the root causes of environmental problems and to develop low-cost self-help solutions. These community-based solutions and management plans can in turn facilitate: strengthened management of water and sanitation issues at the national level.

Intervention Area	Partners	Strategic Donor	Indicative Budget*
Promotion of Community Participation and Gender Equity – Dissemination of materials, advice and assistance	WSSCC GWA SOPAC	Taiwan/ ROC	150K
World Water Day – Development of awareness and education materials & annual event for schools & public	LLEE SOPAC	Taiwan/ ROC	105K

International Waters Programme (IWP) - Designed to help communities to understand the root causes of environmental problems and develop local solutions	SPREP UNDP	GEF	15M 8.7M USD
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\* Unless otherwise stated amounts in FJD for multi-year programme

### National Action Implementation - Awareness

At the national level many countries have instituted public awareness campaigns on water and environmental issues. Efforts include development of education tools for communities and schools, media campaigns, water conservation education campaigns, consumer confidence reporting by water providers and promotional activities such as art competitions, youth forums and awareness raising days.

Some country examples are:

- **Guam, American Samoa and CNMI** are requiring public water suppliers to submit a consumer confidence report on the quality of their water to all consumers on an annual basis.
- In **Fiji** as part of an ADB funded infrastructure project, a public information programme has been established to consult with consumers and develop information and education materials based on their identified needs. The project aims to establish a permanent customer relations section within the Water and Sewerage Department.
- In **Fiji and Tonga** WHO and LLEE have been developing a Community Water Monitoring Toolkit aimed to increase awareness and action towards public health protection at the community level.
- In the **Solomon Islands, PNG and Fiji** LLEE also develop and implement programmes for schools and communities in water governance and teacher education.
- **Samoa's** rural water supply project includes a component to promote responsible management and use of water, the importance of conservation and proper water meter maintenance.
- **American Samoa** has an initiative to promote water conservation and improved sanitation in rural areas
- In **Vanuatu**, the Department of Environment collaborated with the private sector to support a sanitation and water-supply workshop which was conducted for 35 indigenous owners of small scale eco-resorts, providing them with technical skills to construct appropriate on-site systems that would improve tourism, enhance family and village livelihood, and protect the local environment.
- In **Fiji** a partnership was established with the Ministry of Health, WHO, and the Fiji School of Medicine to design and construct "Sanitation Park", an interactive training and information centre for environmental health students from the region, and local communities.

Funding continues to be a challenge for all PICs as environmental awareness campaigns are rarely given high priority by government. The region has limited funding resources therefore the problem of funding environmental outreach becomes even more intensified.

Within many countries there is a diverse language and culture base making materials that are developed effective in reaching only a limited population. This also restricts the sharing of materials within and among countries. Translation of materials adds a time and cost burden to awareness campaigns.

Although there has been progress in targeted areas, broader awareness at all levels is critical to achieve ongoing community participation and awareness. More than 80% of the population of PICs use on-site water supply and sanitation systems, therefore management of water resources and pollution control is largely in the hands of local families and communities.

There is a need to build capacity and produce teaching and learning tools to mainstream water and sanitation education into the formal education systems at all levels as well as the establishment of a mechanism for fostering information exchange and sharing on a regional level. In addition in order to foster information exchange, maximize scarce resources and realise mutual benefits to environmental and water awareness campaigns organizations (government, NGOs, CBOs) must form a partnership network within countries. Additionally, there must be more practical training of local organizations and communities on appropriate and practical approaches to water treatment and wastewater management such as composting toilets, grey-water reuse, rainwater harvesting and slow sand filtration. Technology transfer should also encourage local innovation.

**THEME 4: TECHNOLOGY**

**Key Message 1:** Utility collaboration and regional partnership to reduce unaccounted for water will significantly improve the sustainability of utilities and reduce the need for developing new water resources.

**Key Message 2:** Appropriate institutions, infrastructure and information will support sustainable water and wastewater management.

**Key Message 3:** Island specific regional training programmes should be developed, resulting in sustainable levels of skilled and knowledgeable people and communities within the water and wastewater sector.

**Regional Programmes – Technology**

Some utilities in the region have started or increased efforts to reduce unaccounted for water in the past few years. To support these efforts progress has been made in developing a regional water demand management programme. 2005 has also seen the start of the implementation of the Global Programme of Action for the protection of the Marine Environment from Land-Based Sources of Pollution (GPA) through the development of a Pacific wastewater management training programme which aims to provide those working in the wastewater field with the tools to select and manage appropriate infrastructure.

Intervention Area	Partners	Strategic Donor	Indicative Budget*
Wastewater Management	GPA, IAS, UNESCO-IHE SOPAC	USAID	150K
Water Demand Management (concept approved)	PWA SOPAC	NZAID	600K

\* Unless otherwise stated amounts in FJD for multi-year programme

**National Action Implementation - Technology**

**Progress towards the reduction of unaccounted for water is evident in Fiji, PNG and Samoa through the conduct of leak detection activities. However, results appear to reflect that considerable work is still needed in this area. Some efforts towards metering all customers has been realized, but considerable progress is still necessary in this area. The challenge that remains in implementing metered water is the need to improve the infrastructure such as pipelines and treatment facilities to ensure better water quality. Also, to ensure billing accuracy and effective monitoring, meter calibration bench(es) and equipment must be installed.**

**Most, if not all, of the member countries must establish clear benchmarking requirements as it is a critical step to improving their performance in the water sector. There**

are only a few countries that are benefiting from proper sewerage system and sanitation facilities. Samoa, however, is now addressing this major issue through a 4 year project concentrating only around the urban area.

The challenges and constraints that remain for sustainable water management technology are insufficient funds to purchase essential equipment for activities such as metering, accuracy testing, river flow gauging, leak detection and water quality and quantity monitoring. There are also limitations with respect to the proper use and implementation of updated technologies. Several countries lack the technical capacity to fully understand the appropriate use and benefits of advanced equipment, such as GIS. Varying standards being adopted by the different Pacific Island Countries (i.e. some are using WHO guidelines while others are using New Zealand, Australian or United States EPA standards) makes it difficult for countries to exchange information regarding type of equipment and standards.

Over the next 3 – 5 years, there are a number of required actions that must be implemented throughout the region in the area of improvement of sustainable water management technology. Asset management plans must be developed in order to ensure the integrity and sustainability of the water infrastructure. Furthermore, a priority plan to resolve technology related issues over the short and long term is also critical. A mechanism for capacity building on the proper use and maintenance of new technologies must be developed and implemented. A “train the trainers” component is essential to ensure sustainability. In particular it has been identified that GIS/Database training is a priority area. There needs to be training on both the use and maintenance of equipment. Consistent with the ongoing training needs, there should be a means by which trained staff can be retained, such as appropriate compensation/rewards system etc.

## **THEME 5: INSTITUTIONAL ARRANGEMENTS**

**Key Message 1:** Work together through a comprehensive consultative process, encompassing good governance, to develop a shared National vision for managing water resources in a sustainable manner.

**Key Message 2:** Develop national instruments including National visions, policies, plans and legislation appropriate to each island country taking into account the particular social, economic, environmental and cultural needs of the citizens of each country.

**Key Message 3:** Promote and establish appropriate institutional arrangements resourced sufficiently to enable effective management of water resources and the provision of appropriate water services.

**Key Message 4:** Recognise and share the water resource management knowledge and skills of all stakeholders at a National and regional level in the process of developing and implementing the National Vision.

**Key Message 5:** National and regional leadership in water resource management should be recognised and encouraged.

## Regional Programmes – Institutional Arrangements

Recognising the importance of an institutional framework that enables effective water resource management and service provision, funding has been secured at the regional level to pilot projects in 3 countries to assist in improving water governance.

Intervention Area	Partners	Strategic Donor	Indicative Budget*
Pacific Programme for Water Governance – 18 month (2005 –2006) in Fiji, Solomon Islands & Kiribati	NWP SOPAC	EU	330K

\* Unless otherwise stated amounts in FJD for multi-year programme

## National Action Implementation – Institutional Arrangements

Progress in the area of water governance has been apparent through more transparent mechanisms being implemented at some national levels such as developing water policies through consultative processes. **Fiji** has created an interim National Water Committee and drafted a cross-sectoral water policy; **Papua New Guinea** have held national consultations on developing a multi-sectoral water policy and national action plan and established a National Water Association; **Tuvalu** has reviewed their national water plan that includes more integrated management approaches; **Samoa** has developed two national water policies (services and resources) one of which is pending Cabinet approval, following comprehensive consultation with all key stakeholders. A draft water sector plan is also awaiting finalisation and provides a synthesis of the goals and strategies reflected in all of the other relevant national policies; **Kiribati** has completed a national water sector review and developed a sectoral strategy and action programme on national water management policies and practices.

There is also increasing activity in addressing urban water management issues utilizing a more cross-sectoral approach. Wastewater and storm water management are being tackled as inter-departmental issues now in **Port Vila, Vanuatu** and **Apia, Samoa**. In Apia, this has gone as far as institutional restructuring to create a municipal agency including representatives and links to all relevant government departments.

Sustainable water management is what every Pacific Island Country is aspiring to. However, it has been identified that there are challenges and constraints that continue to hinder this move to progress. For example, in Samoa, the presence of independent water schemes in operation around the island present major challenges, particularly because they are managed by village committees, and are not governed by proper regulation. In many countries policy framework stipulating water management responsibilities or guides coordination do not exist. Different languages and variations in terminology within countries and the region also create obstacles in developing and communicating policies related to water and wastewater.

Water rights are often a contentious issue. Negotiating an equitable balance between the competing interests of landowners, farmers, developers, water providers and communities is complex and often reaches a point of impasse.

There is a need to establish sectoral integration to improve water management at the national and regional level as well as increasing transparency and accountability in water governance. National governments need to clearly apportion management and operational responsibilities within the water and wastewater sector.

Improvement in water sector regulation is needed. In some countries this means developing and implementing regulations while in others, regulations exist but are either impractical or not enforced because a lack of political will.

Where national and regional action plans exist there needs to be a mechanism established for ongoing monitoring, review and evaluation of their effectiveness and currency.

[BOX 1: Samoa's Water for Life Consultation](#)

Over the past two years, Samoa has been developing a solid foundation to enable water resource development and management to be tackled on a sector-wide basis. The Government and other key stakeholders are convinced that drawing together combined interests and expertise is the best way to achieve national goals and to deliver benefits to its communities in a more effective and sustainable manner.

As part of this process a major 3-day *Water for Life* meeting was held in April 2005. The meeting provided an opportunity to raise awareness of sector-wide approaches, to get feedback on the ***Water for Life: Sector Plan and Framework for Action***, and to strengthen strategies and actions to meet identified priority needs.

The meeting brought together over twenty national, regional and international organisations representing a variety of stakeholder interests to discuss factors essential for successful sector-wide approaches. Means to address identified gaps and weaknesses were proposed including measures related to sector policy and strategy, sector and donor coordination, performance monitoring, medium-term expenditure frameworks and institutional capacity. The outcomes of the meeting included recommendations for immediate action and a commitment to support the continuing process of change.

The European Union (EU) provided support to help facilitate the *Water for Life* process and they will also be a major partner during programme implementation following approval for a 5-year **Water Sector Support Programme (WaSSP)** valued at €19.09 million (~SAT\$ 65 million).

## **THEME 6: FINANCE**

**Key Message 1: Create a better and sustainable environment for investment by both the public and private sector, by developing and implementing National, sector and strategic plans that identify the economic, environmental and social costs of different services and develop pricing policies, which ensure the proper allocation of resources for the water sector.**

**Key Message 2: Establish financially viable enterprises for water and sanitation that result in improved performance by developing appropriate financial and cost recovery policies, tariffs, billing and collection systems, financial and operating systems.**

**Key Message 3: Reduce costs through improved operational efficiency, using benchmarking, development of leak detection programmes and improved work practices.**

**Key Message 4: Ensure access for the poor to water and sanitation services by developing pro poor policies that include tariffs with lifeline blocks and transparent and targeted subsidies.**

**Key Message 5: Achieve sustainable rural water and sanitation services at a community level through developing strategies that incorporate mechanisms for appropriate financing and capacity building.**

## Regional Programmes – Finance

Development banks such as ADB and the World Bank are undertaking efforts to address the financing of water and sanitation services through a regional review of infrastructure development as well as advancing benchmarking for utilities.

## National Action Implementation – Finance

To ensure increased investment into regional water sectors, countries including **Samoa**, **American Samoa** and **Fiji** have made improvements in water governance through the development and implementation of effective regulation and policies covering services and the allocation of resources.

In general, the issue of cost recovery continues to be a major concern due to the high incidence of unaccounted for water and the slow progress in metering. **American Samoa** however indicated that they have put in place a very successful and effective monitoring system, resulting in a 23 % reduction in water loss.

The support provided by some Governments through enforcing Community Service Obligation (CSO) on water utilities is helping to ensure that all citizens receive water. **Samoa**, for example, has implemented a pro-poor tariff which allows domestic customers to receive 500 liters of water per customer per day at no cost to the consumer. Costs associated with amounts used in excess of 500 liters are the responsibility of the customers. The Government is committed to meet that free amount, payable to the state owned Samoa Water Authority.

Notwithstanding the ongoing difficulties in collecting water rates from the rural areas, there has been some improvement in the attitudes of customers towards paying their bills, particularly with the visible improvement in water facilities. The collection of wastewater fees on the other hand remains a struggle.

Some of the financial challenges and constraints that remain in the Pacific region include the strict terms and conditions imposed by financial institutions. Difficulty in complying with such terms limits the ability to procure sufficient funds. Hence, without the availability of funds, affordability a significant stumbling block in purchasing essential equipment.

Another challenge is the need to ensure that effective natural disaster management is implemented given the huge impact that the wide range of natural disasters can have on the already strained budgets of water works.

The often inconsistent or policy deviating decisions on the part of governments is a major constraint as it can cause a dramatic shift in priorities/commitment already made towards specific water-related projects.

Efforts over the next 3 -5 years should focus in the following key areas:

- Establish clear and realistic government policies for financing water projects and ensure strong political will to support such policies once in place;
- Introduce and implement appropriate “User Pays” tariffs to encourage efficient water use and ensure sufficient water availability in the future;
- Develop and enforce financing mechanisms for resource allocation, especially to commercial entities. By saying that, there is also a need to impose effective monitoring of all utilities and water operators in efficient water utilisation;
- Lobby government support and gain their commitment towards meeting social obligations for safe and reliable water;
- Implement and strengthen billing collection procedures and systems for the overall improvement in water recovery costs;
- Include provisions for Operation & Maintenance into donor agencies financed development projects.

### **Over-arching Regional Programmes**

#### Pacific Partnership Initiative and Partnership Coordination Unit

The Pacific Regional Action Plan on Sustainable Water Management has been incorporated in a partnership arrangement titled “Type II initiatives” submitted by the Pacific Island Countries to the Commission for Sustainable Development (CSD) in Johannesburg during the World Summit for Sustainable Development (WSSD) in August 2002. Pacific Forum Leaders also endorsed this umbrella Type II water initiative amongst 13 others at the WSSD.

The main objective of the Partnership Initiative is to achieve sustainable water and wastewater management in Pacific Island Countries through:

- The establishment of a regional water network of persons and organisations, inclusive of country governments, development agencies, professional associations and donors, that represent a variety of interests in water resources management and service delivery within the region, to improve regional coordination and collaboration;
- Implementation of the “Pacific Regional Action Plan for Sustainable Water Management”;
- Implementation of the “Pacific Wastewater Policy Statement” and “Pacific Wastewater Framework for Action”;
- Implementation of the “Pacific Drinking Water Quality and Health Framework for Action”.

The Partnership has a Facilitator (based at SOPAC) responsible for implementing the core functions of the partnership. The Facilitator’s key responsibilities include: liaising between the regional stakeholder groups and their sub-networks; researching and receiving stakeholder information on on-going and planned water activities; tracking donor and development

agency programmes; identifying areas requiring implementation; and coordinating proposal submissions and project implementation. The Facilitator is also responsible for high-level advocacy of the strategic approach. SOPAC is assisted in this task by a deputy facilitator based at USP.

A Partnership Coordination Unit has also recently been established as an attachment to SOPAC with financial support by the ADB. ADB recognises that advocacy, coordination, networking, implementation monitoring and partnership of the Pacific RAP requires a significant and dedicated effort, to ensure they are continued and maintained. Exchange of information and facilitation of the coordination of projects, will ultimately improve and accelerate progress towards achieving sustainable water management in the Pacific region.

A quarterly newsletter on Partnership activities is being produced and is distributed to over 750 members that have joined this network. Hardcopies of the Regional Action Plan have been distributed to all attendees of Sigatoka and Kyoto. Pacific Water E-mail Focal Groups have been established and a specific website has been developed for the partnership accessible through:

<http://www.sopac.org/tiki/tiki-index.php?page=CLP+Pacific+Partnership>

**Programmes in Integrated Water Resources Management**

The development and subsequent endorsement of a proposal to the Global Environment Facility (GEF) for a Programme on Sustainable Integrated Water Resources Management in Pacific Island Countries will see the implementation of a project that will encompass all priority actions of the Pacific RAP by SOPAC in association with UNDP and UNEP.

The European Union’s African Caribbean Pacific (ACP) Water Facility aimed at reducing poverty and at promoting sustainable development through the achievement of the water related MDGs and WSSD water and sanitation targets in ACP countries. This effort also provides an excellent opportunity to assist Pacific Island Countries in the implementation of the RAP. On behalf of the Pacific ACP countries, the Pacific Hydrological Cycle Observation System (HYCOS) project as well as a programme on Integrated Water Resources Management and Water Use Efficiency have been submitted by SOPAC to the ACP-EU Water Facility for their consideration. These proposed actions will complement the support currently being provided to the region by the European Union through their Programme on Water Governance developed under the EU Water Initiative.

Collaboration between the two facilities (GEF and ACP-EU WF) would provide an unprecedented opportunity to allow the harmonisation two global funding mechanisms.

<b>Intervention Area</b>	<b>Partners</b>	<b>Strategic Donor</b>	<b>Indicative Budget*</b>
Pacific Partnership Coordination Unit - improving involvement, information exchange and collaboration between stakeholders.	PWP	ADB	110K
SOPAC/EU EDF8/9 Reducing Vulnerability of Pacific ACP States	Various	EU	7M EURO
IWRM GEF/UNDP (concept approved)	PWP	GEF	700k USD
Pacific HYCOS (proposal submitted) - Aims to improve the ability to manage water resources, and increase resilience to climatic extremes resulting in droughts and flooding.	WMO	ACP-EU WF	2.225M Euro

IWRM ACP-EU WI (proposal submitted)	PWP	ACP-EU WF	2.824M Euro
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\* Unless otherwise stated amounts in FJD for multi-year programme

## Future Needs and Perspectives

The Pacific Island Countries and territories whilst recording significant progress since the 3WWF acknowledge there are critical areas and issues which continue to impede and often stifle progress in the implementation of the Pacific RAP. By reviewing progress over the past two years and through a process of consultation various perspectives have been recorded and identification of future needs has been made. The record of this process provides a yardstick against which the Pacific might gauge progress whilst at the same time identify at all levels areas for action and opportunities for further intervention.

An overriding universal concern is the selective implementation and adherence to the principles of IWRM in countries throughout the Pacific. The reasons for this are numerous and include amongst others the lack of political will, legal instruments, financial resources and human capacity to make the change. A great many of the needs of the Pacific can be addressed through the implementation of IWRM and will only be achieved through a concerted effort by nations, partners, regional and multilateral agencies.

Many of the small island economies of the Pacific continue to be dependent on external assistance for the survival of the water sector. To effect change, ensure improvements and promote sustainability then true partnership by all parties must prevail. Incentives must be established to ensure the promotion of IWRM, sustainable development plans and implementation strategies. Assistance with establishing appropriate institutions and their enabling instruments of governance must be pursued.

## Regional Focus:

One of the ways of dealing with the limitations of small states is via regional agencies which are both responsive to and driven by the needs of its members. Through this process some of the constraints imposed by isolation, size and limited capacity might be addressed. Significant funding resources have flowed since 3WWF to the Pacific region and with time and effective implementation improvements will be seen at the national and local community levels. Regional organizations must develop the capacity to fulfil their role in the delivery of the RAP activities and likewise the Pacific governments and institutions must help to develop the absorptive capacity to fully utilise such assistance.

A particular regional concern is the ongoing problem of retention of skills, knowledge and capacity. Institutions, utilities and services are often dependent on just one or two individuals and entire services are vulnerable as a result of the loss of an individual often through emigration. One way to alleviate this is for support for a continuing programme of HR development rather than the often ad hoc and one-off training events. Donor agencies, governments and Institutes within the region (e.g. University of Guam, PNG, USP, FIT) have to commit to establish permanent and appropriate training programmes.

Practical ways must be developed to address the issue of economies of scale. The reality of size makes it difficult for investment in capital equipment. Countries need assistance in dealing with operation costs that are higher than can be expected in denser markets, with efficiencies that are hard to realize, and where the cost of doing business is more expensive because of the isolation and distances between individual island and nations. Innovative ways of doing business should be explored and could include the sharing of expensive capital equipment between nations. Another key initiative is the need to revive the regional benchmarking programme as a toll to measure and improve performance.

Monitoring of water borne diseases and disease surveillance in particular is an emerging need and priority throughout the region. It is unwise to select and implement interventions if the disease type, burden and origin are unknown. The PICs have recently developed and endorsed a Pacific Drinking Water Quality and Health Framework for Action. However, new resources and institutions need to be identified to implement the Framework.

Another framework which needs implementation is the Global Programme of Action for the protection of the Marine Environment from Land-Based Sources of Pollution. In a truly holistic approach the inter-relationship between land and the sea is a central theme in any sustainable development strategy for small islands.

The achievements of the water-related MDGs have become a key target for countries in the region (i.e. reduce by half the proportion of people without access to safe drinking water and basic sanitation before 2015 and develop National Integrated Water Resources Management Plans). The successful implementation of the targets set by the three major Frameworks for Action will move the region in a positive direction towards achieving the MDGs. Monitoring of progress towards the MDG targets is being jointly undertaken by the CROP agencies facilitated by SPC and the 2004 Pacific Islands Regional MDG Report is available at [http://www.spc.org.nc/mdgs/MDGReport/Reg\\_report.htm](http://www.spc.org.nc/mdgs/MDGReport/Reg_report.htm). Monitoring programmes contained in the Pacific RAP, need to be developed and implemented in order to adequately indicate success in achieving the MDG targets and should be linked to national census data acquisition and analysis.

## National Focus:

With the regional support programmes being well established and funded, there is now an increased need to focus on even greater implementation at the micro-level through a two-

pronged approach. First, further improvements in national strategy and planning through the development of national IWRM plans. The second step being an increased focus on water and sanitation improvements in the national sustainable development strategies. Prioritisation of water and sanitation in the national political agendas as well as harmonization of donor agency programmes are in this respect key to maximize the impact of actions.

Unless and until countries make the required policy and institutional changes the inefficiencies and problems of the past will persist. There is a need to find a way to implement IWRM in all Pacific Island Countries and territories. The lack of political will and leadership are often claimed to be the major hurdle. It is suggested that there is a need for a single coordinator/facilitator within government to bring departments together. Locating such a person in the office of the Prime Minister or Head of Government could champion cross-department policy development and promote an integrated approach. A change in the way of doing business is essential and it must therefore be accompanied by the implementation of the required policies, establishment of regulatory instruments and development of appropriate institutions.

A particular concern and a priority is the availability or absence of skills for preventative maintenance and the knowledge and finance for doing it. National action, with some donor assistance is required to find more innovative and sustainable mechanisms to fund operation and maintenance. However, some utilities have been slow in implementing already existing recommendations particularly in regard to running a water utility as a business. An increasing threat to the cost of doing business in the region is the ever escalating cost of imported fuel. Not only assistance but also innovation is required to help countries and particularly the water utilities address the projected high energy costs.

Acceptable unaccounted for water levels are more the exception rather than the rule in most Pacific Island Countries. Certain countries appear to be fighting a losing battle against leak detection and prevention. A few however provide good examples of how unaccounted for water can be reduced to an economic sustainable level. There is a need to set and measure a realistic goal for reducing unaccounted for water and resource activities. It is suggested that assistance be provided to help effect a 25% improvement within 3 years.

Small islands and catchments with pristine water sources is a misconception. The need for monitoring, maintenance and improvement of drinking water quality is a critical need. Protecting communities from water-borne disease is not just monitoring the quantum of the problem but also the degree of success and appropriateness of treatment. Access to qualified water quality testing laboratories is extremely limited in all but a handful of countries. The issue of piggeries and their location is of mounting concern in the generation water resource contamination and degradation. Special attention is required on highly permeable limestone and young volcanic islands as they are particularly vulnerable groundwater contamination. Assistance with improving disease surveillance is a priority need.

The Pacific is a region of the world that is impacted by climate variability and the result of extreme events have a disproportional impact on small economies, infrastructure and livelihoods. Water resources on islands with limited storage are likewise affected and controlled by climatic influences. Better climate and weather forecasting and information also lead to better water management. Particular problem in small islands is limited storage. There is a need for integration of meteorological and hydrological services with water management so that the appropriate products are produced and delivered for better informed decision making and planning.

Salinisation of water lenses is an inherent problem with small islands. Particular assistance is needed to monitor groundwater lenses and provide data for the use of better predictive models to enable sustainable use of these fragile water resources.

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## LIST OF ACRONYMS

3WWF	Third World Water Forum
ACP-EU WF	African Caribbean Pacific - European Union Water Facility
ADB	Asian Development Bank
AusAID	Australian Agency for International Development
BOM	Bureau of Meteorology (Australia)
CPWC	Collaborative Programme on Water and Climate
CROP	Council of Regional Organisations in the Pacific
CSD	UN Commission for Sustainable Development
DWC	Dialogue on Water and Climate
EU	European Union
GEF	Global Environment Facility
GPA	Global Programme of Action for the Protection of the Marine Environment from Land-based Sources of Pollution (UNEP)
GWA	Gender and Water Alliance
HYCOS	Hydrological Cycle Observing System
IAS	Institute of Applied Sciences (USP)
ISM	Island Systems Management
IWCAM	Integrated Watershed and Coastal Area Management
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
JPFA	Joint Caribbean-Pacific Programme for Action on Water & Climate
JWF	Japan Water Forum
LLEE	Live & Learn Environmental Education
MDG	Millennium Development Goal
NIWA	National Institute for Water and Atmospheric Research (New Zealand)
NWP	National Water Partnership
NZAID	New Zealand Agency for International Development
PWA	Pacific Water Association
RAP	Regional Action Plan on Sustainable Water Management
ROC	Republic of China (Taiwan)
SAT	Samoan Tala (currency of Samoa)
SIDS	Small Island Developing States
SOPAC	South Pacific Applied Geoscience Commission
STAR	Science Technology and Resources Network
UNDESA	United Nations Department of Economic and Social Affairs
UNESCO	United Nations Education Scientific and Cultural Organisation
UNU	United Nations University
USP	University of the South Pacific
WaSSP	Water Sector Support Programme
WHO	World Health Organization
WMO	World Meteorological Organisation
WSSCC	Water Supply and Sanitation Collaborative Council
WSSD	World Summit on Sustainable Development
IWP	International Waters Project
SPREP	South Pacific Regional Environment Programme
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
CEHI	Caribbean Environmental Health Institute
NMS	Caribbean Environmental Health Institute
EPA	Environmental Protection Agency
NGOs	Non-governmental Organizations
SIDA	Swedish International Development Agency
TCDT	Tonga Community Development Trust
NWP	National Water Partnership
CSO	Community Service Obligation
GIS	Geographical Information Systems
BPOA+10	Barbados Programme of Action +10
CIDA	Canadian International Development Agency
USAID	United States Agency for International Development
4WWF	Fourth World Water Forum

## ANNEX 1 Pacific Partnership Matrix of Actions

Theme Key Mes- sage Action	Pacific RAP Identification	Action	Implementing Agencies	Location	Start Date	Finish Date	Funding Status	Donor(s)
<b>Theme 1: Water Resources Management</b>								
1.1.1	Strengthen National Capacity	Pacific HYCOS	SOPAC, WMO	Regional	2004	2008	Proposal	ACP-EU WF
1.1.2	Hydrological Training	WMO/UNESCO/SOPAC/NIWA regional training proposal	SOPAC, NIWA, WMO, UNESCO	Regional	2003	2006	On-going Project	NZAID
1.1.3	Research	Catchment & Communities	DGMWR, UNESCO, SOPAC	Vanuatu	2002	2005	Completed	UNESCO
1.1.3	Research	Hydrology for Life, Environment and Policy (HELP)	DGMWR, UNESCO, SOPAC	Vanuatu and Re- gional	2005	2007	On-going Project	UNESCO
1.1.3	Research	Groundwater Recharge & Agricultural pollution	CRES-ANU, CIRAD, SOPAC, PUB, MEW, MLSNR	Kiribati, Tonga	2003	2005	On-going Project	ACIAR
1.1.3	Research	Rainwater Harvesting	SOPAC, TCDT, WHO, MLSNR, MoH	Tonga	2002	2004	Completed	UNEP
1.1.3	Research	CROPPro Surface Water Pollution from Agricultural activities	USP (Samoa), EU Universities, Min of Agriculture	Fiji, Samoa, Tonga	2001	2004	Completed	EU
1.1.5	Community Water Quality	Catchment & Communities	DGMWR, UNESCO, SOPAC	Vanuatu	2002	2005	Completed	UNESCO
1.1.5	Community Water Quality	River Care	Live & Learn	Fiji	2002	2004	Completed	NZAID
1.1.5	Community Water Quality	International Waters Project (Freshwater Component)	SPREP, UNDP	Samoa, Cook Islands	2000	2006	On-going Project	UNDP/GEF
1.1.6	Water Quality Capacity Building	Water Quality Monitoring Capacity Building Programme for Pacific Island Countries	SOPAC, USP, WHO	Regional	2006	2008	Concept ap- proved	NZAID
1.1.7	Communication Exchange NMS/NHS	Dialogue on Water & Climate	SOPAC	Regional	2002	2003	On-going Project	ISDWC

<b>Theme Key Mes- sage Action</b>	<b>Pacific RAP Identification</b>	<b>Action</b>	<b>Implementing Agencies</b>	<b>Location</b>	<b>Start Date</b>	<b>Finish Date</b>	<b>Funding Status</b>	<b>Donor(s)</b>
1.1.7	Communication Exchange NMS/NHS/ WQ	Pacific HYCOS	SOPAC, WMO	Regional	2004	2008	Proposal	?
1.1.8	Career development & enhanced education	Scholarships/training workshops, staff twin- ning/interchange						
1.2.1	WRM Planning	Pacific Programme for Water Governance	SOPAC	Solomon Islands, Fiji, Kiribati	2005	2006	On-going Project	EU PfWG
1.2.1	WRM Planning	Regional & National Water Strategy Development Project	SOPAC	Regional	2001	2004	Completed	DFID
1.2.1	WRM Planning	Strategic Planning Management of Water Resources	ESCAP, SOPAC	Regional	2002	2004	Completed	UNESCAP
1.2.1	WRM Planning	Integrated River Basin Management (Nadi Basin Pilot)	ESCAP, MRD Fiji	Fiji	2003	2004	??	UNESCAP
1.2.1	WRM Planning	WRA Outer Islands	MOID	Cook Islands	2003	2006	On-going Project	AusAID
1.2.1	WRM Planning	Leadership Seminar Water and Wastewater Managers	East West Centre	Regional	2004	2004	Completed	EW Centre USDOI
1.2.2	Water Supply & Sanitation Technology Infor- mation Dissemination	Freshwater Augmentation (Rainwater Tanks, Surface Water Intakes, Infiltration Galleries)	UNEP, IETC, ACTEW, SOPAC	Regional	1998	2000	Completed	UNEP, IETC
1.2.2	Water Supply & Sanitation Technology Infor- mation Dissemination	Solid & Liquid Waste Disposal Directory	UNEP, IETC, OPUS, SOPAC, PWA	Regional	1999	2003	Completed	UNEP, IETC
1.2.2	Water Supply & Sanitation Technology Infor- mation Dissemination	Sanitation Park Demonstration Facility	SOPAC, WHO, FSchM, MoH Fiji	Regional	2003	2004	Completed	NZAID WHO
1.2.3	Rainwater Harvesting Programmes	Rainwater Harvesting Best Practice & Research	SOPAC, TCDT, WHO, MLSNR, MoH	Tonga	2002	2004	On-going Project	UNEP
1.2.4	Abstraction Pilot Studies (SW, GW, Solar)	Scavenger Wells	MWSC	Marshall Islands	2002	2003?	On-going Project?	UNDESA
1.2.4	Abstraction Pilot Studies (SW, GW, Solar)	Gallery designs	WEU	Kiribati	2004	2004	Completed	WEU
1.2.5	Renewable energy (solar pumping)	SPC/SOPAC Regional Renewable Energy Projects	SPC, SOPAC, SPREP?	Regional	?	2003	Completed Project	?
1.2.7	Demand Management & Conservation	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept ap- proved	NZAID

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1.2.7	Demand Management & Conservation	Regional Awareness & Education Programmes – World Water Day	SOPAC, SPREP, Live & Learn,	Regional	Annual	Annual	On-going Project	Taiwan ROC
1.2.8	National guidelines for drinking water quality	Programme for Water Safety Plans in Pacific Island Countries	WHO, SOPAC	Regional	2005	2007	Concept approved	AUSAID
1.2.8	National guidelines for drinking water quality	Water Quality Monitoring Capacity Building Programme for Pacific Island Countries	SOPAC, USP, WHO	Regional	2006	2008	Concept approved	NZAID
1.2.9	WQ Monitoring & Mitigation Standards	Water Quality Monitoring Capacity Building Programme for Pacific Island Countries	SOPAC, USP, WHO	Regional	2006	2008	Concept approved	NZAID
1.2.10	Pollution prevention through better sanitation	Sanitation Park Demonstration Facility	SOPAC, WHO, FSchM, MoH Fiji	Regional	2003	2004	Completed	NZAID WHO
1.2.10	Pollution prevention through better sanitation	Groundwater protection zones	?	?	?	?	?	?
1.2.10	Pollution prevention through better sanitation	International Waters Programme (Coastal Component)	SPREP	Tuvalu, Kiribati, Fiji	2000	2006	On-going Project	GEF/UNDP
1.2.11	Water Sector Community participation	Healthy Islands Programme	WHO	Regional	?	?	On-going Project	WHO
1.2.11	Water Sector Community participation	Rural Sanitation Demonstration Facility & Community Participation Project	SOPAC, WHO, FSchM, MoH Fiji	Regional	2003	2004	Completed	NZAID WHO
1.2.11	Water Sector Community participation	Regional Awareness & Education Programmes – World Water Day	SOPAC, SPREP, Live & Learn,	Regional	Annual	Annual	On-going Project	NZHC, BHC, DFID
1.3.1	Implement IWRM principles & practices	Strategic Planning Management of Water Resources	ESCAP, SOPAC	Regional	2002	2005	On-going Project	UNESCAP
1.3.1	Implement IWRM principles & practices	Island Systems Management programme	SOPAC	Regional	2002	2007	On-going Project	EU EDF 8 & 9
1.3.1	Implement IWRM principles & practices	Sustainable Integrated Water Resources Management in Pacific Island Countries	Pacific Partnership	Regional	2004	2005	Completed	GEF PDF-A UNDP/UNEP
1.3.1	Implement IWRM principles & practices	Sustainable Integrated Water Resources Management in Pacific Island Countries	Pacific Partnership	Regional	2005	2006	Funding approved	GEF PDF-B UNDP/UNEP
1.3.1	Implement IWRM principles & practices	Sustainable Integrated Water Resources Management in Pacific Island Countries	Pacific Partnership	Regional	2007	2012	Pipeline entry in 2005	GEF Full Project UNDP/UNEP
1.3.1	Implement IWRM principles & practices	Integrated Water Resources Management and Water Use Efficiency in Pacific Island Countries	Pacific Partnership	Regional	2004	2005	Proposal	ACP-EU WF

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1.3.1	Implement IWRM principles & practices	Pacific Programme for Water Governance	SOPAC	Regional	2005	2006	On-going Project	EU PFWG
1.3.1	Implement IWRM principles & practices	Virtual Water Learning Centre for IWRM	SOPAC, USP, UNU, UNDESA	Regional	2005	2006	On-going Project	UNDESA
1.3.2	Appropriate national legislation & planning	Strategic Planning Management of Water Resources	ESCAP, SOPAC	Regional	2002	2005	Completed	UNESCAP
1.3.2	Appropriate national legislation & planning	Pacific Programme for Water Governance	SOPAC	Solomon Islands, Fiji, Kiribati	2003	2005	On-going Project	EU PFWG
1.3.2	Appropriate national legislation & planning	Regional & National Water Strategy Development Project	SOPAC	Regional	2001	2004	Completed	DFID
1.3.2	Appropriate national legislation & planning	IWRM Overview	SOPAC	Regional	2004	2004	Completed	GWP
1.3.3	Implement catchment management practices	Hydrology for Life, Environment and Policy (HELP) Symposium	UNESCO, SOPAC, LandCare, NIWA	Regional	2005	2005	On-going Project	UNESCO
1.3.3	Implement catchment management practices	Water Governance Programme	SOPAC	Regional	2005	2006	On-going Project	EU PFWG
1.3.3	Implement catchment management practices	Catchment & Communities	DGMWR, UNESCO, SOPAC	Vanuatu	2002	2004	Completed	UNESCO
1.3.3	Implement catchment management practices	Hydrology for Life, Environment and Policy (HELP)	DGMWR, UNESCO, SOPAC	Vanuatu	2005	2006	On-going Project	UNESCO
1.3.3	Implement catchment management practices	Pohnpei Forestry Conservation Project	?	FSM	2005	2006	On-going Project	JFIT UNESCO
1.3.3	Implement catchment management practices	CROPPRO Surface Water Pollution from Agricultural activities	USP (Samoa), EU Universities, Min of Agriculture	Fiji, Samoa, Tonga	2001	2005	On-going Project	EU

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<b>Theme 2: Island Vulnerability</b>								
2.1.1	Enhanced application of climate information	Pacific HYCOS	SOPAC, WMO	Regional	2005	2008	Proposal	ACP-EU WF
2.1.1	Enhanced application of climate information	WMO/UNESCO/SOPAC/NIWA regional training proposal	SOPAC, NIWA	Regional	2003	2006	On-going Project	NZAID
2.1.1	Enhanced application of climate information	Pacific Island Climate Prediction Programme	BOM NMS	Regional	2004	2006	On-going Project	AUSAID
2.1.2	Drought Prediction Schemes	Pacific HYCOS	SOPAC, WMO	Regional	2004	2008	Proposal	ACP-EU WF
2.1.2	Drought Prediction Schemes	Pacific regional hydrological training programme	SOPAC, WMO, UNESCO	Regional	2003	2006	On-going Project	NZAID
2.1.3	Climate Information & Prediction Water Sector Applications	PI Training Institute for Climate Extremes	NIWA, NOAA, PEAC, USP - PACE	Regional	2003	2006	On-going Project	NOAA
2.1.3	Climate Information & Prediction Water Sector Applications	Pacific Island Climate Prediction Programme	BOM NMS	Regional, Solomon Islands, Kiribati	2004	2006	On-going Project	AUSAID
2.1.3	Climate Information & Prediction Water Sector Applications	US-NZ Climate Accord Partnership Programme	NIWA, BOM, NOAA, PEAC, NWS	Regional	2003	2006	On-going Project	NOAA
2.2.1	Increased Hazard & Risk Management	Comprehensive Hazard And Risk Management (CHARM) Project	SOPAC, NDMOs	Regional	2000	2005	On-going Project	AusAID
2.2.2	Increased Hazard & Risk Management	EW Centre Leadership Seminar Disaster Preparedness for Water Managers	SOPAC	Sub-regional	2004	2005	On-going Project	USDOI NZAID
2.2.3	Increased Hazard & Risk Management	Island Systems Management programme	SOPAC	Regional	2002	2007	On-going Project	EU EDF 8 & 9
2.2.3	Climate Analysis (Risk of climatic extremes)	Pacific Island Climate Prediction Programme	BOM NMS	Regional	2004	2006	On-going Project	AUSAID
2.2.4	Standards for Vulnerability assessments	EVI?	SOPAC	Regional	?	?	Completed	?
2.2.5	Climate forecasting based risk reduction	Pacific Island Climate Prediction Programme	BOM NMS	Regional	2004	2006	On-going Project	AUSAID
2.2.5	Climate forecasting based risk reduction	Pacific HYCOS	SOPAC, WMO	Regional	2004	2008	Proposal	ACP-EU WF

<b>Theme Key Mes- sage Action</b>	<b>Pacific RAP Identification</b>	<b>Action</b>	<b>Implementing Agencies</b>	<b>Location</b>	<b>Start Date</b>	<b>Finish Date</b>	<b>Funding Status</b>	<b>Donor(s)</b>
2.2.5	Climate forecasting based risk reduction	Pacific regional hydrological training programme	SOPAC, WMO, UNESCO	Regional	2003	2006	On-going Project	NZAID
2.2.5	Climate forecasting based risk reduction	Dialogue on Water & Climate	SOPAC	Regional	2002	2003	On-going Project	ISDWC
2.2.5	Climate forecasting based risk reduction	US-NZ Climate Accord Partnership Programme	NIWA, BOM, NOAA, PEAC, NWS	Regional	2003	2006	Proposals in Development	NOAA
2.2.5	Climate forecasting based risk reduction	Climate Prediction Tools	NIWA, SPREP	Regional	2005	2007	Proposals in Development	NZAID

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<b>Theme 3: Awareness</b>								
3.1.3	Ensure quality Community Participation	Guidelines for Community Participation in Water Supply and Sanitation: "Tapping the Connections between Water and People"	SOPAC	Regional	2003	2004	Completed	DFID
3.1.3	Ensure quality Community Participation	Guidelines for Community Participation in Rainwater Harvesting: "Harvesting the Heavens"	SOPAC, TCDT	Regional	2001	2005	Completed	UNEP SIDA
3.1.4	Improved W&S for squatter and rural dwellers	Wailela Squatter Settlement Project - IWP and DOE	IWP-FIJI, DOE	Fiji	2005	2006	On-going Project	DOE
3.2.1	Toolboxes for water education for all society	Sanitation Park facility for training EHO's on rural sanitation CP	SOPAC, Fiji School of Medicine, WHO, Fiji MoH	Regional	2003	2004	On-going Project	NZAID (NZPIE)
3.2.1	Toolboxes for water education for all society	Water Education Toolkit	SPREP, SOPAC	Regional	2002	2003	Completed	??
3.2.1	Toolboxes for water education for all society	River Care Pilot Project for watershed community management	Live & Learn	Fiji, Vanuatu Solomons	2002	2004	On-going Project	NZAID (NZPIE)
3.2.1	Support Theatre and Media Groups use	Water and Youth Water Awareness Programme	Live & Learn, SOPAC	Regional	2003	2004	Concept approved	DFID
3.2.2	Increased capacity for information dissemination (govn, NGO, CBO)	Regional NGO workshops on Theme 3 Awareness Implementation	WWF, L&L, ANU, national NGOs, AusAID, Wateraid	Regional	2003	2003	On-going Project	AusAID, DFID
3.2.3	Strengthen capacity in water and wastewater management	ADB Technical Assistance Community Education and Awareness Program (CEAP)	ADB Technical Assistance Team, WSD	Suva-Nausori	2005		On-going Project	ADB
3.3.1	Water Education in the national curriculum	World Water Day Campaigns	SOPAC, Live & Learn	Regional	2002	2004	On-going Project	DFID, BHC, NZHC
3.3.2	Curriculum developers and teachers trained	World Water Day Campaigns	SOPAC, Live & Learn	Regional	2002	2004	On-going Project	DFID, BHC, NZHC
3.3.2	Curriculum developers and teachers trained	Pacific Freshwater Education and Awareness Kit	SOPAC, SPREP	Regional	2001	2003	Completed	DFID, NZHC, UNESCO
3.4.1 3.4.2	National stakeholder consultation	PNG Roll-Out of the Pacific RAP	PNG Govn, PNG WB	Papua New Guinea	2003	2004	On-going Project	PNG, DFID SOPAC

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3.4.1 3.4.2	National stakeholder consultation	Samoa Water for Life Consultation	Samoa Govn, SWA	Samoa	2002	2005	On-going Project	EU
3.4.1 3.4.2	National stakeholder consultation	Fiji National High level water strategy consultations	Fiji Govn, MRD	Fiji	2002	2004	On-going Project	ESCAP
3.4.1 3.4.2	National stakeholder consultation	Fiji Water Governance Programme	Live & Learn, Fiji Provincial Councils	Fiji	2003	2005	On-going Project	EU
3.4.1 3.4.2	National stakeholder consultation	Tuvalu Water Master Plan Review	Tuvalu Govn,	Tuvalu	2003	2003	On-going Project	Tuvalu
3.4.3	Improved community policy & legislation awareness	Education for Sustainable River and Water Conserva- tion	Live & Learn	Vanuatu	2003	2005	Concept ap- proved	ADB
3.4.3	Improved community policy & legislation awareness	Community Participation components of Kiribati National Water Resources Assessment	Kiribati Govn, Consultants,	Kiribati	2003	2004	On-going Project	ADB

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<b>Theme 4: Technologies</b>								
4.1.3	Asset management capacity building/planning	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept approved	NZAID
4.1.3	Asset Management Wise Practice	Pacific Utilities Benchmarking	PWA, ADB, SOPAC	Regional	2001	2005	Project	ADB
4.1.4 4.2.1	Appropriate Technology Selection	Source Book for Freshwater Augmentation	SOPAC, UNEP, IETC	Regional	1996	1998	Completed	UNEP
4.1.4 4.2.1	Appropriate Technology Selection	Rainwater Harvesting Guidelines: "Harvesting the Heavens"	SOPAC, TCDT	Regional	2001	2005	Completed	UNEP
4.1.4 4.2.1	Appropriate Technology Selection	Directory of Environmentally Sound Technologies for Wastewater Management	SPREP, SOPAC, UNEP	Regional	1998	2002	Completed	UNEP
4.1.5	Monitoring of Water Resources	Hydrological Training Programme	SOPAC, NIWA, WMO, UNESCO	Regional	2003	2004	On-going Project	NZAID
4.1.5	Monitoring of Water Resources	Hydrological Support Programme	SOPAC, NIWA	Regional	2005	2007	Proposal in development	NZAID
4.1.6	Disaster preparedness for W&S assets	Disaster preparedness Guidelines for Water Utilities	SOPAC	Regional	2001	2002	Completed	WSSCC
4.1.6	Disaster preparedness for W&S assets	Leadership Seminar Disaster Preparedness for Water Managers	EW Centre, SOPAC, PWA	Regional	2004	2005	Ongoing	USDOI NZAID
4.2.1	Reduce Unaccounted for Water	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept approved	NZAID
4.2.2 4.3.4	Training Programmes for UFW	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept approved	NZAID
4.2.4	Water conservation devices, awareness etc	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept approved	NZAID
4.2.4	Water conservation devices, awareness etc	Water and Youth Water Conservation Project	Live & Learn, SOPAC	Vanuatu, Solomons	2003	2004	Completed	DFID
4.2.4	Water conservation devices, awareness etc	World Water Day 2000/01/02/03 Regional Awareness Campaigns	SOPAC, Live & Learn	Regional	2001	2004	Completed	Various
4.2.4	Water conservation devices, awareness etc	Pacific Freshwater Education & Awareness Kit	SOPAC, SPREP	Regional	2001	2003	Completed	NZAID, UNESCO

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4.3.1	Human resources development planning.	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept ap- proved	NZAID
4.3.2	Training Needs Analyses	Wastewater Training in the Pacific region	UNEP/GPA, SOPAC/IAS	Regional	2005	2007	Ongoing	UNEP/GPA
4.3.2	Training Needs Analyses	See paper Skeet A PWA	PWA Skeet Arasmith?	Northern Pacific	2003	2005	Ongoing	USDOI
4.3.2	Training Needs Analyses	<a href="#">Regional Water Demand Management Programme</a>	<a href="#">PWA, SOPAC</a>	<a href="#">Regional</a>	<a href="#">2005</a>	<a href="#">2007</a>	<a href="#">Concept ap- proved</a>	<a href="#">NZAID</a>

Theme Key Message Action	Pacific RAP Identification	Action	Implementing Agencies	Location	Start Date	Finish Date	Funding Status	Donor(s)
<b>Theme 5: Institutional Arrangements</b>								
5.1	National sustainable water vision development	Papua New Guinea 3WWF follow-up national water consultations	PNG, SOPAC	Papua New Guinea	2003	2004	On-going Project	PNG, DFID
5.1	<a href="#">National sustainable water vision development</a>	Pacific Programme for Water Governance	SOPAC	Solomon Islands, Fiji, Kiribati	2005	2006	On-going Project	EU PFWG
5.1	National sustainable water vision development	Fiji Water Strategy Development	Fiji, ESCAP, SOPAC	Fiji	2002	2004	On-going Project	ESCAP
5.1	National sustainable water vision development	PNG National Water Consultations	PNG, SOPAC	PNG	2003	2004	On-going Project	DFID
5.1	National sustainable water vision development	Samoa EDF9 National Water Resource Management Strategy	Samoa, EU	Samoa	2002	2005	On-going Project	EU
5.1	National sustainable water vision development	Tuvalu Water & Sanitation Master Plan Review	Tuvalu	Tuvalu	2003	2004	On-going Project	Tuvalu
5.2.1	National water legislation review	Kiribati National Water Resources Assessment and Management	GOK, ADB, SOPAC,	Kiribati	2003	2004	On-going Project	ADB
5.2.2	National water planning review	Kiribati National Water Resources Assessment and Management	GOK, ADB, SOPAC,	Kiribati	2003	2004	On-going Project	ADB
5.2.2	National water planning review	Pacific Programme for Water Governance	SOPAC	Solomon Islands, Fiji, Kiribati	2005	2006	On-going Project	EU PFWG
5.2.2	National water planning review	Fiji Water Strategy Development	Fiji, ESCAP, SOPAC	Fiji	2002	2004	On-going Project	ESCAP
5.2.2	National water planning review	Samoa EDF9 National Water Resource Management Strategy	Samoa, EU	Samoa	2002	2005	On-going Project	EU
5.2.2	National water planning review	Tuvalu Water & Sanitation Master Plan Review	Tuvalu	Tuvalu	2003	2004	On-going Project	Tuvalu
5.2.2	<a href="#">National water planning review</a>	<a href="#">Marshalls Water Master Plan Review</a>	Marshalls	Marshalls	2002	2002	Completed	Marshalls
5.2.2	National water planning review	Leadership Seminar Disaster Preparedness for Water Managers	EW Centre, SOPAC, PWA	Regional	2004	2005	On-going Project	USDOI NZAID
5.3.1	Appropriate institutional arrangements & reform	ADB Technical Assistance Community Education and Awareness Program (CEAP)	ADB Technical Assistance Team, WSD	Suva-Nausori	2005		On-going	ADB

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5.3.1	Appropriate institutional arrangements & reform	Pacific Programme for Water Governance	SOPAC	Solomon Islands, Fiji, Kiribati	2005	2006	On-going Project	EU PFWG
5.3.1	Appropriate institutional arrangements & reform	Apia Wastewater Restructuring	ADB	Samoa	2002	2004	Project	ADB
5.4.1	National awareness campaigns	World Water Day 2000/01/02/03 Regional Awareness Campaigns	SOPAC, Live & Learn	Regional	2001	2004	Annual campaigns	Various
5.4.5	Establish multi-stakeholder consultation mechanisms	Papua New Guinea 3WWF follow-up national water consultations	PNG, SOPAC	Papua New Guinea	2003	2004	On-going Project	PNG, DFID
5.4.5	Establish multi-stakeholder consultation mechanisms	Samoa EDF9 National Water Resource Management Strategy	Samoa, EU	Samoa	2002	2005	On-going Project	
5.4.5	Establish multi-stakeholder consultation mechanisms	Fiji Water Strategy Development	Fiji, ESCAP, SOPAC	Fiji	2002	2004	On-going Project	ESCAP
5.4.5	Establish multi-stakeholder consultation mechanisms	Pacific Programme for Water Governance	SOPAC	Solomon Islands, Fiji, Kiribati	2005	2006	On-going Project	EU PFWG
5.4.5	Establish multi-stakeholder consultation mechanisms	Apia Wastewater Restructuring	ADB	Samoa	2002	2004	Project	ADB
5.4.7	Promotion of participatory rural management	Guidelines for Community Participation in Water Supply and Sanitation: "Tapping the Connections between Water and People"	SOPAC	Regional	2003	2004	Completed	DFID
5.4.8	Promote Gender assessments	Guidelines for Community Participation in Water Supply and Sanitation: "Tapping the Connections between Water and People"	SOPAC	Regional	2003	2004	Completed	DFID
5.5.1	Needs assessments for institutional strengthening	Strategic Planning Management of Water Resources	ESCAP, SOPAC	Regional	2002	2005	On-going Project	UNESCO
5.5.2	Develop training programme on good water governance	Strategic Planning Management of Water Resources	ESCAP, SOPAC	Regional	2002	2005	On-going Project	UNESCO
5.5.5	Improve regional partnerships	Pacific Partnership Initiative on Sustainable Water Management	Pacific Partnership facilitated by SOPAC and USP	Regional	2002	2006	On-going Partnership	ADB

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<b>Theme 6: Finance</b>								
6.1.1	Improve regulatory water governance	Strategic Planning Management of Water Resources	ESCAP, SOPAC	Regional	2002	2005	On-going Project	UNESCAP
6.1.2	Include financing & cost recovery requirements in master plans	Strategic Planning Management of Water Resources	ESCAP, SOPAC	Regional	2002	2005	On-going Project	UNESCAP
6.1.4	Promote separate uses of potable and non-potable water	Freshwater Augmentation Sourcebook (eg multiple source water uses, Salt water sewerage systems)	UNEP, IETC, ACTEW, SOPAC	Regional	1998	2000	Completed Project	UNEP, IETC
6.1.9	Improve demand management	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept approved	NZAID
6.2.1	Develop business plans	Strategic Planning Management of Water Resources	ESCAP, SOPAC	Regional	2002	2005	On-going Project	UNESCAP
6.2.2	Improve billing & collection procedures	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept approved	NZAID
6.2.4	Establish sound asset management	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept approved	NZAID
6.2.9	Increase public awareness of need for cost recovery.	World Water Day 2000/01/02/03 Regional Awareness Campaigns	SOPAC, Live & Learn	Regional	2001	2004	Completed	Various
6.3.3	Introduce benchmarking	Pacific Region Water Utilities Benchmarking Project	PWA, ADB	Regional	2000	2004	First Phase completed	ADB
6.3.3	Introduce benchmarking	Regional Water Demand Management Programme	PWA, SOPAC	Regional	2005	2007	Concept approved	NZAID
6.5.1	Formulate policy for rural W&S provision	Kiribati National Water Resources Assessment and Management	GOK, ADB, SOPAC,	Kiribati	2003	2004	On-going Project	ADB
6.5.3	Strengthen rural water committee O&M self-financing	Guidelines for Community Participation in Water Supply and Sanitation: "Tapping the Connections between Water and People"	SOPAC	Regional	2003	2004	Completed	DFID