RETA 6470:

Managing water in Asia's river basins:
Charting progress and facilitating investment

(Financed by the Japan Special Fund)

Working paper 10:

IWRM implementation in Cambodia

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Updates

0 1st draft for internal circulation
0a Small adjustments; Appendix A modified

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About RETA 6470

RETA 6470, *'Managing Water in Asia's River Basins: Charting Progress and Facilitating Investment'* aims to encourage further basin water investments under ADB's Water Financing Program and to demonstrate good IWRM practices in river basins across the region.

The project is executed by ADB in collaboration with Network of Asian River Basin Organizations (NARBO) and is hosted by Center for River Basin Organizations and Management (CRBOM) in Solo, Central Java. It is financed with a grant from the Japan Special Fund made available by the Government of Japan

Pilot activities are conducted in river basins in Cambodia (the 4-Ps area of Prek Preah, Prek Krieng, Prek Kampi, and Prek Te), Indonesia (Bengawan Solo), Orissa (Baitarani), the Philippines (Mananga, Kotkot and Cambado-Lusaran, Central Cebu), and Viet Nam (Vu Gia-Thu Bon).

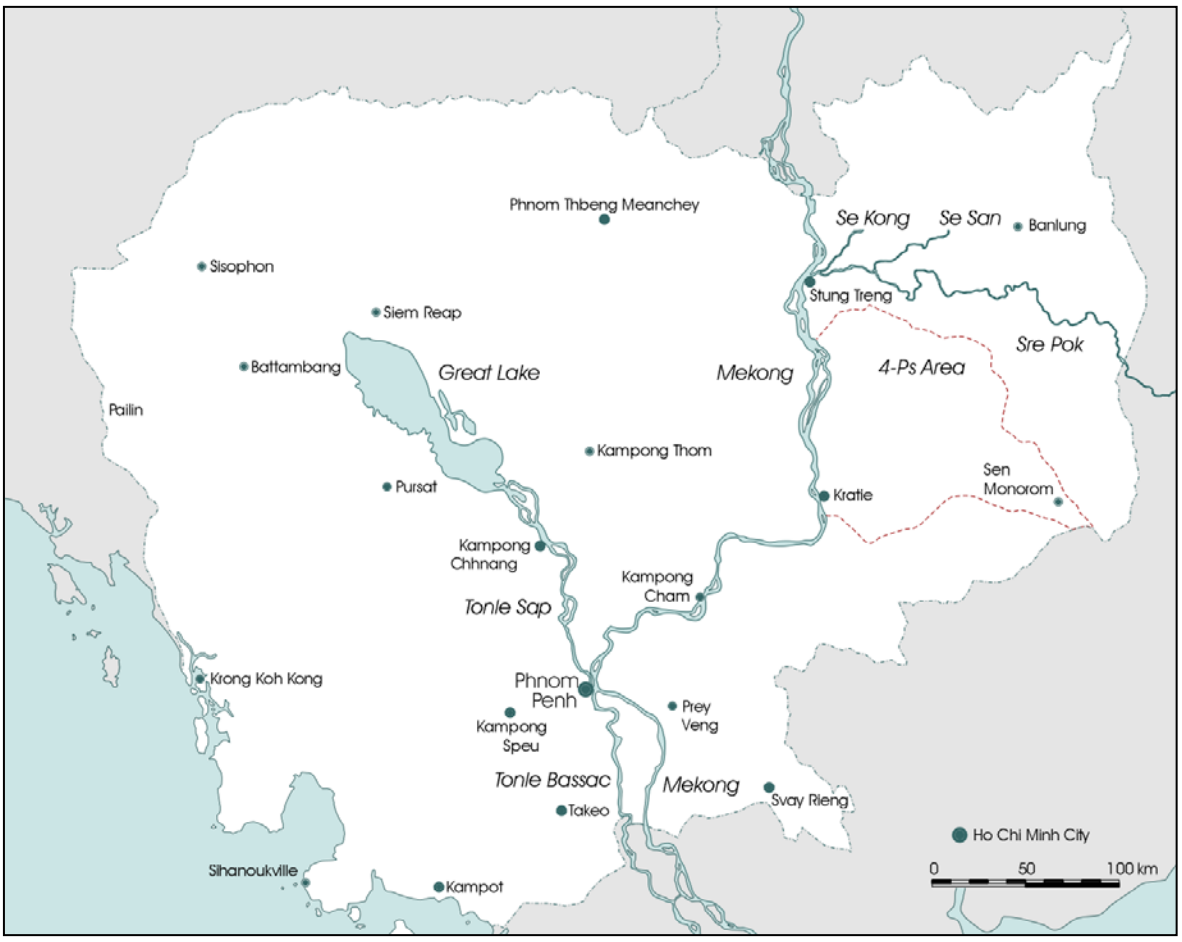
Acronyms and abbreviations

APEC:	Asia-Pacific Economic Cooperation
APWF:	Asia-Pacific Water Forum
CDC:	Council for the Development of Cambodia (headed by the Prime Minister)
CSD:	Council for Social Development
CARDI:	Cambodian Agricultural Research and Development Institute
CNMC:	Cambodia National Mekong Committee
FWUC:	Farmer water user community (formally mandated water user group)
GWP:	Global Water Partnership
IWRM:	Integrated water resources management
MAFF:	Ministry of Agriculture, Forestry and Fisheries
MDG:	Millennium development goal/goals
MOP:	Ministry of Planning
MOWRAM:	Ministry of Water Resources and Meteorology
MRC:	Mekong River Commission
MRD:	Ministry of Rural Development
NARBO:	Network of Asian River Basin Organizations
NCDM:	National Committee for Disaster Management
NGO:	Non-governmental organization
NSDP:	National Strategic Development Plan
PIP:	Public Investment Plan
PPWSA:	Phnom Penh Water Supply Authority
RBO:	River basin organization
SNEC:	Supreme National Economic Council
WSS:	Water supply and sanitation

Summary

This working paper provides an assessment of IWRM implementation in Cambodia. It summarises the national water-related governance framework and development challenges. A set of indicators has been applied for the purpose. The paper includes some suggestions on water-related development initiatives for further consideration.

Map of Cambodia



1 Introduction

This working paper is produced by ADB and CNMC with reference to the approved Board Paper and the RETA 6470 inception report, stating that

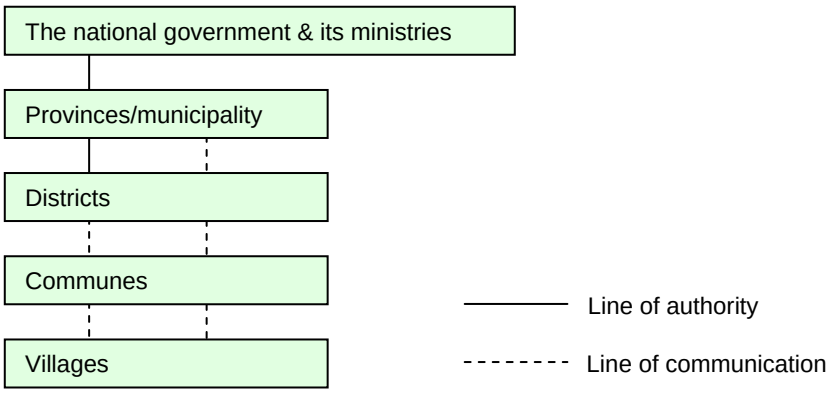
> *'systematic country performance assessments will be conducted to chart the progress of introducing IWRM against operational indicators and to gather experience and lessons learnt from basin projects implemented to date. These assessments will involve national water sector apex bodies, key water agencies, RBOs, and other stakeholders, and will result in specific recommendations for investment programs to address the changing needs in IWRM. Related activities comprise*
>
> *C.1 Prepare draft assessments ... ;*
>
> *C.2 consult stakeholders about preliminary findings .... ; and*
>
> *C.3 publish the results, highlighting the region's overall performance, challenges, lessons learnt, and opportunities for investments'.*

Hereby, the paper covers water-related development needs and opportunities.

2 Institutional landscape

The country is divided into 23 provinces and 1 municipality (Phnom Penh). These are widely involved in operation, maintenance and monitoring. While the provinces are centrally governed, the 1,623 (?) communes are managed by elected councils (and are conducting their own commune-level development planning). Some management tasks are undertaken at the district level and the village level.

Figure 1: Levels of administration



Cambodia's constitution (1993, Article 59) states that

> *The State shall protect the environment and balance of abundant natural resources ...*

A modern water resources framework law was passed in 2007, giving MOWRAM responsibility for resource management and water allocation. MOWRAM is also in charge of irrigation infrastructure. MOWRAM, when formed in 1998, inherited this task from the former Ministry of irrigation, while the new MAFF became responsible for agriculture, forestry and fisheries.

Water supplies and service delivery are shared between many ministries. The same is the case for groundwater management. Management of water quality is shared between MOWRAM, MOE and MOH.

Apart from the basic government system, the following organisations are involved in water resources management:

- Mekong River Commission (MRC), undertaking studies, knowledge-sharing and dialogue between the member countries and dialogue partners
- Cambodia National Mekong Committee, a government agency formed as a network of sector agencies, and in charge of national liaison with MRC. As the only such body, CNMC plays an important role in the inter-ministerial dialogue about water-related development
- Cambodia Water Partnership (CamboWP) is a network of organisations and individuals involved in water resources management, under the umbrella of SE Asia Water partnership and Global Water Partnership (GWP)

MRC and the National Mekong Committees conducted Phase 1 of their Basin Development Plan from 2001 to 2006. For the purpose, the Lower Mekong Basin was divided into sub-areas (or *'water management districts')* that were partly delineated by hydrological boundaries and partly by administrative ones (notably national borders). Cambodia was divided into four such areas, covering the 86 percent of the country that is within the Mekong Basin.

Figure 2: Planning areas of the MRC Basin Development Plan

In each area, a working group with broad participation investigated development needs and options and recommended on water-related development priorities. The working groups spanned across sectors and management levels and performed well. They could have emerged as river basin committees but were never institutionalised.

3 Policy and planning

National

The current 3rd National Strategic Development Plan (NSDP) covers 2006–2010. It is implemented via rolling 3-years Public Investment Plans (PIPs), prepared by each ministry.

Important national water-related sector or multi-sector policies and development planning initiatives are described in the following documents:

- CSD (Dec 02): National Poverty Reduction Strategy 2003 - 2005 (mentioning the word *'water'* 178 times!)

- MOP (Nov 03): Cambodia Millennium Development Goals report 2003;
- MOWRAM (Feb 06): Strategic Development Plan 2006-2010;
- MAFF (Jun 06): National Programme for Household Food Security and Poverty Reduction 2007-2011;
- MAFF and MOWRAM (Feb 07): Joint Strategy for Agriculture and Water 2006-2010; and
- MRD (Oct 09): Policy and strategy study of rural development for Cambodia.

(Some of these policies and plans have been shelved, though).

All management levels play a role in the national development planning. The process allows for suggestions to be raised at lower levels, to be promoted through the system, and - if endorsed - to be implemented decentrally. In principle, it is possible for a paddy farmer to make a suggestion to the village chief, who may forward it to the commune council, which may in turn pass it on to the province and from there further on to the ministry.

> *The framework contains several 'filters'.*[1] *Some of these are 'cost-cutting', with the useful purpose of adjusting the total amount of national development costs and routine operating costs to a level that is acceptable for the national budget. Such adjustments (or priority-making) take place during compilation of the national development plans and PIPs, which establish the framework for the ministerial (sector-wise) PIPs. Cost-cutting (or priority-making) may also take place at the district-level screening of the commune development plans.*
>
> *Another type of filter is the ministerial development plans, which by their nature are sector-oriented.*
>
> *Cross-sector development initiatives (suggested for example at the commune or province level) may, possibly, be split into sector components to ease their way through the planning cycle, because it is difficult for one ministry to promote suggestions that extend beyond its mandate. For example, the promotion of a proposed road on a flood embankment may be much more complex than the separate promotion of a road and a flood embankment. Multi-sector initiatives require a collaboration between the involved ministries, and the decision process becomes more long-winded than for single-sector initiatives.*
>
> *Similarly, the procedures become much more complex for development initiatives that involve more than one province. This is of some significance in connection with water-related development, because in Cambodia, the administrative borders seldom reflect the hydrological (catchment) boundaries.*
>
> *The procedure can be simpler for development initiatives funded (or co-funded) by donors. While such activities must comply with the various national policies, they can from case to case by-pass a priority-making that is necessitated by finite public funds. The way towards implementation of a development project is relatively straight if a ministry and a donor agree that it is useful and desirable (even though it needs a blue stamp from CDC). Also for donor-funded development activities, however, the processing is more complicated if more than one ministry is involved.*

Regional

In 2005, MRC adopted a set of *'strategic directions'* for water-related development at the basin level.

[1] This and the following paragraphs are quoted from CamboWP and CNMC Sep 07)

Strategic IWRM priorities in the Lower Mekong Basin
(MRC Dec 05)

- Economic development and poverty alleviation
- Environment protection
- Social development and equity
- Dealing with climate variability
- Integration through basin planning
- Information based management
- Regional cooperation
- Governance

In 2006, ADB and the World Bank prepared a *Mekong Water Resources Assistance Strategy* (MWRAS), carried forward to the *Mekong Water Resources Partnership Programme* (MWARP). This programme covers cross-border water-related development in particular focus areas, such as (involving Cambodia) the Delta (Cambodia and Viet Nam) and the 3-S area (Se San/ Sre Pok/ Se Kong) (Cambodia, Laos and Viet Nam).

4 Trends

National water resources management is influenced by a number of trends, including the following:

- General technological development of production systems (new technology, improved access to existing technology) in Cambodia and elsewhere, affecting the efficiency of production systems and the related competitive advantages;
- lower trade barriers (as promoted by AFTA, APEC, ASEAN and WTO, not to speak of the Asian *'noodle bowl'* of bilateral trade agreements); *'porous borders';* increased global food prices; and increased weather irregularities - all of which, separately or jointly, will impose new efficiency criteria for primary production systems due to exposure to regional and global competition;
- continuous urbanization and changed lifestyles; higher demand of water and energy; and increased generation of solid waste and wastewater;
- expanding tourism;
- the need of climate proofing and adaptation to climate change;
- large land concessions for industrial farming, expectedly introducing new crops, new production technology, and perhaps competition for land and water;
- gradually expanding hydropower (and storage) capacity, nationally as well as upstream. Added national storage capacity (for example the Kamchay hydropower reservoir, Kampot Province, presently under construction) can provide new opportunities for dry season cultivation. The Yunnan cascade made visibly increase the dry season flows in the Mekong, depending on the extent of upstream withdrawals;
- a (possibly slow) structural change decreasing the significance of primary production in the national economy in the course of time, moderated by a possible long-term global commodity price escalation;
- a gradual consolidation of recent decentralisation/ deconcentration reforms, including commune-level development planning;
- increasing professional dialogue and networking, at the national level (CamboWP), Mekong Basin level (MRC) and the international level (APWF, GWP, and others); and
- the capture fisheries yield being under pressure from habitat degradation, obstruction of migration routes, and over-exploitation.

5 IWRM-related challenges

There are two over-ruling water-related challenges in the national perspective:

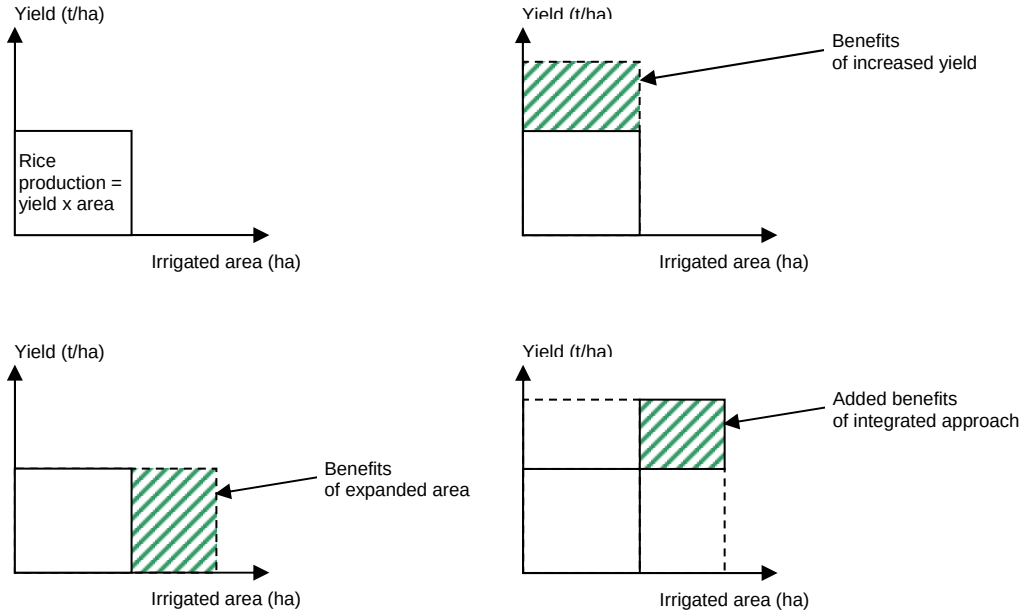
- Wider WSS (and electricity) coverage, including rural areas; and
- better revenue generation in water-dependent (agricultural) production systems and related value chains.

While a governance framework is pretty much in place in support of these challenges, there are some visible constraints to *'development and management of water, land and related resources':* [2]

- Inter-sector streamlining and inter-agency dialogue take place at the bottom (commune) level and the top (national planning) level of public administration, but to a less extent in between.
- There is an open-ended need of human resources development (including, but not limited to the *'end users'* in the FWUCs).
- The knowledge base for decision-making (about states, causes, effects, and management options) is less than ideal in many ways.
- There is a clear scope for strengthened land management of agricultural lands, headwater areas, and aquatic habitats.

The added value of an integrated perspective is illustrated in the figure below. In the best of all worlds, segregated sector-based developments will eventually converge; but this will take time, if left to itself, and the opportunity costs will be substantial - whereas the added costs of an integrated approach can be negligible.

Figure 3: Illustration of the added value of inter-sector streamlining



[2] As stipulated in GWP's definition of IWRM

6 Development agenda and investment needs

Examples of national water-related development needs and opportunities are listed below:

- Access to safe water and electricity;
- support to increased income for traditional small-scale farmers (which will form a large part of the population for years to come), including cultivation technology, crop diversification, access to markets, and development of markets;
- support to sustainable livelihood development in general and rural livelihoods in particular, applying a value chain perspective, for example by development of agricultural extension services and agro-industry processing (possibly export-oriented);
- continued irrigation system rehabilitation and development, and expansion of small-scale and medium-scale water storage capacity;
- improved land use and land management;
- support to water user communities;
- continued hydropower and micro-hydropower development;
- continued tourism development;
- coordinated groundwater management, covering quantity and quality;
- monitoring and licencing of surface water withdrawals, groundwater withdrawals, sewage discharges and sand extraction;
- flood, drought and pest preparedness, warning systems and disaster relief;
- poor soils improvement/management (often a precondition for crop diversification); ;
- management of protected areas, national parks and critical upper watersheds;
- broad human resources development

References and literature

Bridges, Geoff (07): Cambodia. Country chapter in Asian Water Development Outlook 2007. ADB

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

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

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

ADB (03): Water sector roadmap- Cambodia

CamboWP and CNMC (Sep 07): IWRM in Cambodia - where are we, and where do we want to go? Discussion paper prepared by Cambodia Water Partnership and Cambodia National Mekong Committee

Ganesh Pangare et al (Aug 09): Innovations and advances in basin management in Asia. Draft, presented for discussion at ADB's *'Eye on Asia'* event at the World Water Week, Stockholm

MAFF (Jun 06): National Programme for Household Food Security and Poverty Reduction 2007-2011

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

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

MOWRAM (Feb 06): Strategic Development Plan 2006-2010

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

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

Thach Sovanna (Oct 06): Summary report on IWRM strategy and roadmaps in Cambodia. National report prepared for UNEP under the IWRM 2005 Southeast Asia project: *'Support for achieving the IWRM 2005 target'*

Watt Botkosal (Jul 09): Water resources for livelihoods and economic development in Cambodia. CRBOM Small Publications Series no. 2. Center for River basin Organizations and management, Solo, Central Java

The World Bank (Jun 06): Poverty and environment in Cambodia. Chapter in: Poverty environment nexus - sustainable approaches to poverty reduction in Cambodia, Lao PDR and Vietnam

Appendix A: Chronology of national IWRM implementation

Apr 95:	Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin
Dec 96:	Law on Environmental Protection and Natural Resources Management
Oct 98:	MOWRAM was formed, by re-structuring the former Department of Irrigation into today's MOWRAM (in charge of meteorology, water resources management and irrigation) and MAFF (in charge of agriculture, forestry and fisheries)
Apr 01:	Draft sub-decree on Farmer Water User Communities (MOWRAM)
Jul 01:	Land Law
May 02:	1st national IWRM workshop, Siem Reap, held by MRC and CNMC
Dec 02:	National Poverty Reduction Strategy (with comprehensive focus on the water sector) (Council for Social Development)
Apr 03:	ADB's roadmap for national water sector reform
Apr 05:	ADB's Tonle Sap Basin Strategy
Dec 05:	MRCs *'Strategic directions for IWRM in the Lower Mekong Basin'*
Feb 06:	Strategic development plan 2006-2010 (draft) (MOWRAM)
Jun 06:	The Mekong Water Resources Assistance Strategy (MWRAS) (by ADB and The World Bank) (carried forward to the Mekong Water Resources Partnership Programme, MWARP)
Jun 06:	IWRM strategy and roadmap in Cambodia (MOWRAM)
Jun 06:	National Programme for Household Food Security and Poverty Reduction 2007-2011 (MAFF)
Dec 06:	1st CamboWP dialogue meeting (in a series of such meetings), promoting IWRM in general and inter-sector dialogue in particular
Feb 07:	Joint Strategy for Agriculture and Water 2006-2010 (MAFF and MOWRAM)
May 07:	Law on Water Resources Management
Sep 07:	National IWRM review: *'IWRM in Cambodia - where are we, and where do we want to go?'* (CamboWP and CNMC)
Oct 07:	Tonle Sap Basin Authority (replaced in 2009 by today's Tonle Sap Authority)
Apr 10:	Strategy for agriculture and water 2010-13 (MAFF and MOWRAM)
Jul 10:	Policy on promotion of paddy rice production and export of milled rice (Council of Ministers)

Appendix B: Quantitative summary

Key indicators

Access to safe water, percent of households	41	(2005, AWDO 2007) 1)
Access to sanitation, percent of households	17	(2005, AWDO 2007) 1)
Poverty incidence, percent of population:	35	(2004, CSES, WB Jun 06) 1)
Irrigated area, percent of cultivated area, wet season:	20	(2005, ADB COBP Oct 08)
Irrigated area, percent of cultivated area, dry season:	7	(2005, ADB COBP Oct 08)
Average paddy yield, t/ha/year	2.4	(2006/2007, MAFF)
Access to electricity, percent of households:	20	(Unknown year, HDR 2007/08) 1)

1): Big difference between urban and rural areas

IWRM implementation indicators

Resource management instruments	
• Water law, defining water as a public good?	Yes (2007)
• Water allocation mechanisms in place, giving priority to household supplies?	Yes. According to the Water Law, a licence is required for all withdrawals except domestic ones; but not yet implemented for irrigation withdrawals and groundwater withdrawals
• National IWRM strategy/plan available?	Yes (MOWRAM June 06), but not applied
• Cross-border water-sharing mechanisms in place and functional?	Framework provided in the 1995 Mekong Agreement; dialogue and consultations are maintained by MRC, no rules for water sharing
• Poverty alleviation/MDG strategy/plan available?	A national poverty reduction strategy was promulgated in 2002; a MDG report as prepared by MOP in 2003; and a National Programme for Household Food Security and Poverty Reduction was prepared by MAFF in 2006
• Climate change adaptation strategy/plan available?	
• Rural land use regulation in place, covering agricultural land ownership and state of aquatic habitats?	Clear scope for consolidation
• Regulation of dredging, reclamation and sand mining?	Clear scope for consolidation
Institutions and regulation	
• WR management apex body?	No (except CDC)
• Basin-level management bodies in place and functional, with clear mandates and interfaces?	Tonle Sap Authority (2009) (under MOWRAM); otherwise: No
• Inter-sector coordination institutions/ mechanisms/practices in place and functional?	National inter-sector coordination by CDC; MoP; CNMC Province-level coordination bodies functional in some provinces MAFF and MOWRAM share a Joint Strategy for Agriculture and Water 2006-2010, but apparently not implemented Generally, a clear scope for strengthening
• Public participation mechanisms/practices in place and functional?	Many FWUCs, some of which function well, but clear scope for strengthening. Commune level planning is widely participatory. Clear scope for strengthening in connection with national and province-level development
• Disaster management coordination body?	Yes: National Committee for Disaster Management (NCDM)

Supplies and services	
• WSS availability	PPWSA performs very well by international standard Access to safe water: 76 percent (urban areas), 42 percent (rural areas) Access to sanitation: 53 percent (urban areas)
• Electricity availability	National demand exceeds supply and is rapidly escalating Incomplete coverage of rural areas
• Risk management services availability	Floods: Yes (forecasting provided by MRC) Drought: To some extent Pollution events: No
Water-dependent production systems	
• Water-dependent production systems	Typical cultivation: One rainfed crop of rice per year Cultivated area: Around 3.7 mio ha, some 7 percent of which has an additional dry season crop Paddy yield: 2.3 t/ha (wet season) and 3.5 t/ha (dry season) Average farm size: 1 ha Many FWUCs in need of strengthening
• Agricultural extension services	CARDI (1999) and its network work well Demand of extension services highly exceeds the supply Scope for better coordination between extension services and development of irrigation infrastructure
• Rural (water-dependent) livelihoods	Rural poverty incidence is 39 percent; 80 percent of the population is rural Farmers' incomes extremely low in many areas Agriculture represents 29 percent of GDP and 75 percent of employment Inland fisheries resources rich, but threatened by habitat loss and over-exploitation
Aquatic environment	
• National water quality standards available?	Yes
• Surface water quality	Quite fair but under threat; little knowledge about pesticide residues
• State of aquatic habitats and biodiversity	Quite fair but under threat from rapid development of land use and infrastructure
Knowledge-base	
• Routine monitoring	Water demand and availability: No systematic monitoring, but substantial data have been produced under specific development projects Meteorology and hydrology: Functional, with scope for strengthening Groundwater quantity and quality: Few and fragmented data Surface water quality: Fragmented Morphology: No monitoring Agrochemicals: No data
• Access to data and information	Generally poor
• Sector inventories and development plans in place: Agriculture, navigation, hydropower, tourism, ...	Yes, prepared on ad hoc basis by ministries and by CNMC

Appendix C: ADB country partnership strategy

Extracted from ADB (Jan 05), highlighting water-related aspects. Operational updates are published by ADB (Aug 07) and (Oct 08)

Background

Although important economic and social gains have been made over the past decade, the development agenda remains daunting. Poverty remains widespread and intense - with 35% - 40% of the population remaining below the poverty line - and inequality appears to be increasing. Recent relatively robust growth has not led to a significant reduction in poverty, and achieving many of Cambodia's Millennium Development Goals (MDGs) will be difficult. The challenge of reducing poverty will become more daunting with the expected sharp downturn in the economy ... [3]

The Rectangular Strategy [from 2004], which sets out the Government's reform agenda as a series of interlocking rectangles, has governance at its core. The other rectangles focus on the desired environment to implement the strategy, and on promoting economic growth through agriculture, infrastructure, private sector growth and employment, and human resource development.

Cambodia must resolve several structural constraints to economic growth. The existing sources of growth are narrowly based on garments and tourism. New sources of growth must be tapped to achieve the national growth target and find employment for the estimated 250,000 persons entering the labor market each year. With 90% of the poor living in rural areas, promoting agriculture is the best way of to accelerate growth, absorb a large part of the growing labor force, and address poverty more directly. Agricultural production remains far below its potential because of low productivity and limited access to arable land and markets.

Summary of development challenges

ADB's overarching goal in Cambodia is sustainable poverty reduction. The constraints to poverty reduction remain numerous. Development challenges include: increasing opportunities for economic advancement, improving livelihoods and reducing vulnerability, and facilitating participatory governance at all levels.

ADB's country partnership focuses on

- broad-based, private-sector-led, pro-poor economic growth
- inclusive social development (including rural water supply and sanitation); and
- good governance (including de-centralization).

Agriculture and water resources management

While a significant proportion of Cambodia's economic production comes from agriculture, the sector has lagged in growth. With 90% of the poor living in rural areas, the low growth rates in agriculture have been a major impediment to poverty reduction. Boosting agriculture productivity, diversification, and competitiveness would enhance economic growth, employment, equity, and social justice. ADB's strategy, built around its past and ongoing agriculture sector projects, will focus on

(i) improving farmers' ability to raise productivity, diversify towards higher-value products, and connect to markets;

(ii) enhancing the market environment for private agriculture-based enterprise growth; and

(iii) strengthening institutional capacity for competitive agriculture commercialization.

This will include strengthening extension support to farmers' groups, advisory support and export promotion for agriculture-based enterprises, quality and safety standards for agriculture produce, price information, and implementation of land concessions.

Prudent and sustainable water management, including irrigation and drainage, is critical for stabilizing and increasing total rice production. It will reduce farmers' exposure to droughts and floods and encourage agricultural diversification and the move into higher value added products.

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[3] Note that this paragraph is from early 2005 - the economic downturn referred to is related to the phasing out of the Multi-Fiber Agreement at the end of 2004 - which, as in happened, did not have any major socio-economic consequences. Today, the gloomy perspective has a new significance in connection with the ongoing global economic crisis (2008/09)

An integrated water resources management (IWRM) approach in a river basin context is best suited to this purpose and will ensure the greatest net social benefit. It should take into account water availability and the growing competition among water users - urban areas, hydropower (though this is still limited in Cambodia), and irrigation - and the residual stream flow required to maintain ecosystems and fisheries in the Tonle Sap and Mekong River systems. Cambodia's water sector's legal and policy framework supports such an approach. The challenge lies in its implementation.

ADB's support for irrigation development will be integral to its support for agriculture and will emphasize improved water management for high and stable crop yields and incomes.

ADB will promote an integrated basin-oriented approach to irrigation design, and encourage water-using farming communities to manage small and medium-sized irrigation schemes in a sustainable way. One of the perspectives is that irrigation development will be routinely integrated in a basin-oriented approach to water resource management.

Inclusive social development

This includes enhancing livelihoods and reducing vulnerability through increasing access of the poor to assets (both physical and natural) and human capital. Specific support will be on education, empowering vulnerable groups such as women and ethnic minorities, control of communicable diseases, the provision of rural water supply and sanitation facilities.

About 45% of rural households are landless and landlessness is increasing by 2% annually. While the Land Law of 2001 ensures joint ownership of land by couples of land, customary practices and enforcement regimes do not fully recognize these rights and women's land rights may in practice be denied.

Health is a major concern, since the poor are quite vulnerable to health shocks, which can lead to a major decline in income and can force the sale of productive assets, such as livestock or land.

Environmental sustainability

The key environmental issues affecting Cambodia are (i) an inadequate legislative framework, (ii) uncoordinated institutions, (iii) unsustainable extraction of fishery and forestry resources, (iv) weak land and water resource management, (v) severe pressure on the Tonle Sap ecosystem, and (vi) unplanned urban and industrial development.

Cambodia's economy depends heavily on agriculture, fisheries, and natural resources and its unique ecosystem, centered on the Tonle Sap basin. Environmental management is weak and the legal framework does not meet the country's needs. Information and guidelines are lacking on crucial aspects such as allowable forestry cuts, fish yields, and groundwater resources, which constrains informed management. Poor stakeholder awareness and participation also weakens community-based management. Sector guidelines still need to be promulgated, and the roles and responsibilities of the environmental agencies at various levels clarified. Management capacities at the provincial level are particularly weak, forcing crucial environmental management to be concentrated at the national level.

While decentralization is necessary, it is not feasible because of weak capacity. More and better trained environmental management staff are needed. There are increasing pressures on water resources for expanded irrigation, increasing water supply requirements for domestic and industrial uses, and hydropower. There is no plan to conserve and manage groundwater. Such weaknesses in management result in irrational water resource use which further depletes water resources for maintaining ecological systems.

Support for environment and natural resource management aims at promoting rural livelihoods and enhancing rural incomes, with an emphasis on sustainable development of natural resources. Community-based management systems and capacity building of local institutions will be promoted. Although the focus will be on the Tonle Sap basin, environmental sustainability will be addressed, as required, in all sector projects.

Appendix D: Suggestions on water-related development initiatives

FWUC strengthening

Education; streamlining of bylaws; networking between FWUCs; dissemination of successful FWUC achievements.

Possibly implemented jointly by MAFF and MOWRAM, in collaboration with partners involved in related activities.

Groundwater management framework and knowledge base

Compilation of data and information; streamlining of reporting routines and licencing; development of monitoring and data flow modalities.

Expectedly implemented by MOWRAM, in collaboration with MIME, MOE, MRD, and others.

National asset management plan

Inventory and management planning of water-related assets, such as waterfalls, wetlands, lakes and reservoirs, in support of conservation and livelihoods development.

Possibly implemented jointly by MOE, MOWRAM and Ministry of Tourism.

Water resources monitoring

Systematic monitoring and reporting of demands and actual uses, involving the province departments, and some pilot surveys; can be combined with a streamlining of monitoring modalities and practices.

Expectedly implemented by MOWRAM, in consultation with CNMC.

IWRM-based water resources management education (BSc, MSC, MBA)

Curriculum development, courseware, training of teachers, pilot implementation.

Can be implemented by one or several universities, perhaps collaboration with CARDI and MOWRAM.