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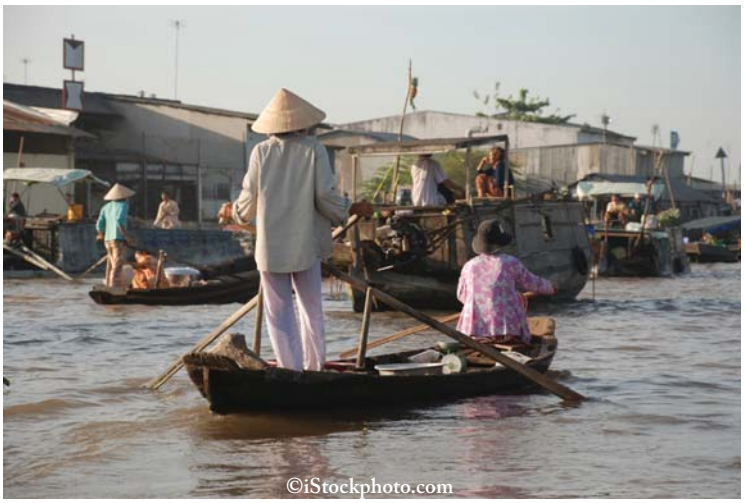
Managing Water Security:
Issues in the Greater Mekong Subregion



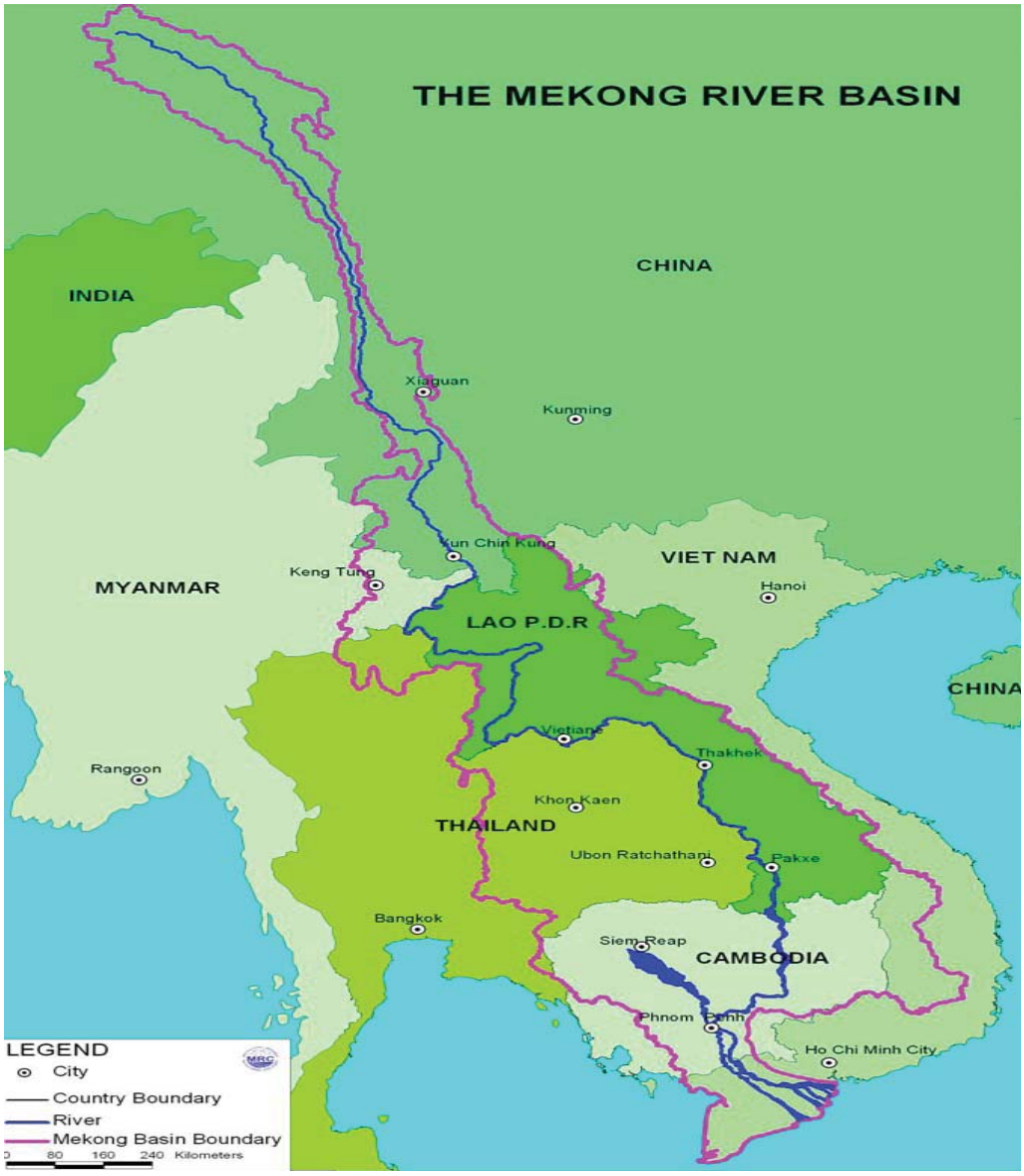
The Greater Mekong Sub-region (GMS) is often characterized as a water surplus region. However current trends suggest that there is an increasing pressure on water availability and accessibility which threatened the well being and livelihood of millions of people living on its basin. Management of water resources has become one of the most important issues in the region today.

by Pau Khan Khup Hangzo

The Mekong River Basin is defined by the land area surrounding all the streams and rivers that flow into the Mekong River. The Mekong River is the longest and the largest river in Southeast Asia and is the eighth largest in the world. It is 4350 km. long. It originates in the Tibetan Plateau and flows southwards through the Chinese provinces of Xinxiang and Yunnan where it was known as Lancang Jiang. This constitute its upper basin and comprises about one half of the river's entire length. It enters its lower basin as it forms a border between Myanmar, Thailand and Laos. It finally traverse through Vietnam to meet the South China Sea. This lower basin has a drainage area of 620,000 sq. kms. and includes nearly all of Laos (207,400 sq. kms.), northern and northeastern regions of Thailand (190,500 sq. kms.), nine-tenths of Cambodia (157,800 sq. kms.) and one-fifth of Vietnam in the central plateau and southern delta (64,300 sq. kms.).

The Mekong River has been supporting societies and civilizations for thousands

of years. Beginning as early as 3500 B.C., societies flourished on its basin by cultivating rice. It is no wonder that the river continues to support modern civilizations for whom the importance of the river goes beyond rice cultivation. The groupings of the four downstream riparian countries of Thailand, Laos, Cambodia and Vietnam is known as the Greater Mekong Sub-region (GMS) and has a combined population of 260 million who directly or indirectly depended on the Mekong river and its tributaries for food (fisheries and agriculture), water (drinking and irrigation), transport (inland water navigation), energy (hydro electricity), recreational and other uses.



Defining the Problem

Terms such as water scarcity, shortage and stress are used interchangeably to describe a situation of water insecurity.

Water shortage or absolute shortage is characterised by a situation where there is low level of water supply relative to minimum levels necessary for basic needs.

Water scarcity on the other hand is an imbalance of supply and demand under prevailing institutional arrangements and/or prices; an excess of demand over available supply.

Water Stress is the symptoms of water scarcity or shortage, growing conflict between users and competition for water, declining standards of reliability and service, harvest failures and food insecurity.

We typically measure well-being in economic terms, in income per person, but water well-being is measured in cubic meters or tons of water per person. A country with an annual supply of 1,700 cubic meters of water per person is well supplied with water, able to comfortably meet agricultural, industrial, and residential needs. Below this level, stresses begin to appear. When water supply drops below 1,000 cubic meters per person, people face scarcity. Below 500 cubic meters, they face acute scarcity. At this level people are suffering from hydrological poverty - living without enough water to produce food or, in some cases, even for basic hygiene.

Water Availability in the GMS

Table 1: Fresh Water Availability in the Greater Mekong Sub-region

Countries	Actual Renewable Water Resources		*Water Poverty Index 2002	Use of an improved water source (percent of Population) 2004	
	Total Cubic Km	Per capita Cubic meter per person		Urban	Rural
Cambodia	476	32,526	46	64	35
Laos	334	53,859	54	79	43
Thailand	410	6280	64	98	100
Vietnam	891	10,310	52	99	80

Table 2: Fresh Water Availability in Selected Countries of Asia

Countries	Actual Renewable Water Resources		*Water Poverty Index 2002	Use of an improved water source (percent of Population) 2004	
	Total Cubic Km	Per capita Cubic meter per person		Urban	Rural
Israel	2	240	54	100	100
Jordan	1	148	46	99	91
China	2829	2125	51	93	67
India	1897	1670	53	95	83

*Water Poverty Index (WPI) measures, for a given country, the impact of water scarcity and water provision on human populations. WPI is a number between 0 and 100, where a low score indicates water poverty and a high score indicates good water provision. The index is composed of five component indices: resources, access, capacity, use, and environment. Source: Modified from World Resources Institute available at http://earthtrends.wri.org/pdf_library/data_tables/food_water_2008.pdf

It is clear that GMS has abundant fresh water resources which representing 15 per cent of the world's total (Asian Development Bank). The region is thus characterized as a water surplus region if total water availability are considered. However this can be misleading. Physical availability of water, no matter how abundant, does not assure well being to its users unless it is accessible to all sections of the people. This situation is compounded by the fact that water distribution is uneven across the region and is highly dependent on climatic variations.

Moreover, ADB noted that water availability per capita has been decreasing steadily in the region and supply could no longer kept up with increasing demand. In fact since 1950, water availability per capita has already decreased by 60 per cent in East Asia and 55 per cent in Southeast Asia. Thus, it is safe to assume that despite having surplus water, GMS is increasingly heading towards water insecurity. The reasons are stated below.

Water Insecurity in the GMS: Core Issues

Water insecurity in the GMS is caused by a combination of both natural and man-made factors. At times it is difficult to sharply delineate the two factors as they tend to overlap one another. For example, the impact of natural processes can be aggravated by human response. The most important causes are described below.

Floods

Countries of the GMS are located in a tropical, monsoonal area and is distinguished by dry and wet seasons. The region receives 85 per cent to 90 per cent of the total rainfall from May to October. On the other hand it also experiences drought because of low precipitation from December untill May or June.

Annual floods, which can last for upto six months, are normally seen as a source of livelihood and sustenance as it rejuvenates wetlands, breeding grounds for aquatic plants, fish, and animals (vital sources of income and food, especially for the poor); enriches soil with river-borne sediments and nutrients beneficial to agriculture; and replenishes reservoirs and groundwater tables as reserves against water shortages in the dry season. But droughts, which may persist for several years, can cause widespread hardship.

Floods become disasters only when they are deeper than average, unexpectedly fast in onset, or unusually prolonged. The annual floods of 2000 - 2002 resulted in 1,300 deaths in Cambodia and Vietnam (80 per cent of them children), caused damage estimated at about USD 600 million, and disrupted the lives of 10 - 12 million people. Tributary floods in 2000 - 2002 in Laos and Thailand took 60 - 80 lives and affected 1 - 2 million others, and caused USD 30 million - 50 million worth of damage.

Droughts

Droughts, which occur as a result of periods of very low river flow accompanied by poor rainfall often caused severe food and water shortages. Its impacts are severe as it lasted longer as compared to floods and makes recovery much more difficult. The 2003 - 2005 droughts had a major socioeconomic impact on three of the four riparian countries. In Vietnam, the yields from more than 10,000 hectares of winter rice in the Cuu Long Delta were affected by saltwater intrusion up the Mekong (at a cost of about USD 60 million); coffee yields in the highlands dropped; and vegetable gardens failed, reducing the avail-

ability of cheap food. In Thailand, drought affected rice production on about 650,000 hectares, farm production costs increased by 40 per cent because of higher water charges and fuel bills, and the water level in the Khorat Plateau reservoirs remained critically low. In Cambodia, the droughts affected some 500,000 hectares of rice paddy and led to food shortages that affected upto 2 million people.

Increasing/Competitive demand for water across sectors

Urbanisation, human settlement and industrial development activities are increasing the water demand in the basin. Ringler (2001) estimated that domestic and industrial water demand would increase more than two-fold from 1.89 billion cubic meter in 1990 to 4.1 billion cubic meter in 2020. The majority of this demand will be met using water from the Mekong River and its major tributaries, with groundwater supplying a smaller proportion. The largest user of water is irrigated agriculture. The link between water and food is strong. It takes 1,000 tons of water to produce one ton of grain. Thus, water withdrawals for irrigated agriculture account for 94 per cent of total withdrawals in Cambodia, 82 per cent in Laos, 91 per cent in Thailand and 86 per cent in Vietnam.

Urban centres and industries depend mainly on the Mekong River and its tributaries for their supply. Total water supply to Phnom Penh in Cambodia and Vientiane in Laos is expected to increase from 155,000 cubic meter per day in 1993 to 272,000 cubic meter per day by 2010. Water withdrawals for industrial and agricultural uses in Yunnan province, Thailand, and Vietnam are close to 20 percent of total annual internally renewable resources. All these development activities have been found to greatly modify the hydrological cycle and the flow volume of the Mekong River and its tributaries.

Falling Water Table

Scores of countries are over pumping aquifers as they struggle to satisfy their growing water needs. In Hebei Province in the heart of the North China Plain, the average level of the deep aquifer was dropping nearly 3 meters (10 feet) per year. Wheat farmers pumped from a depth of 300 meters, or nearly 1,000 feet. Falling water tables, the conversion of cropland to nonfarm uses, and the loss of farm labour in provinces that are rapidly industrializing are combining to shrink China's grain harvest.

The situation in India is more precarious. As water tables fall, well drillers are using modified oil drilling technology to reach water, going as deep as 1,000 meters in some locations. A 2005 World Bank study reports that 15 percent of India's food supply is produced by mining groundwater. 175 million Indians are fed with grain produced with water from irrigation wells that will soon go dry reported the World Bank.

The situation in the GMS is not as dire as it was in China or India. However, over extraction of groundwater for use in the production of high-value crops, such as coffee, has led to a severe drop in groundwater levels in many areas of the Vietnamese highlands. Over the past decade, groundwater has been extensively abstracted for domestic consumption and agricultural use in the Cambodian part of the basin. The rate of extraction has increased from 120,000 cubic meter per day in 1997 to 290,000 cubic meter per day in 2000.

Although total potential capacity of the groundwater resources in the region is high

(60 million cubic meter per day), the intensification of agricultural activities coupled with increasing population, urbanisation and industrialisation may result in the over extraction which is likely to deplete groundwater resources in the future.

Water Pollution

Pollution of normal water supplies effectively destroys part of the water resource. This may happen to water supplies or ground water, and the pollution may be from industrial affluent, agro-chemical run-off from fields or the release of insufficiently treated sewage from municipal works. Achieving high economic growth through rapid industrialisation has been the primary targets of GMS countries.

In their haste to achieve high growth, less attention was paid to the nature and conditions of industries in large urban centres which are highly polluting. Bangkok has had significant implications for the ecology of the region. Water, air, and solid waste pollution have reached extreme levels. The growing 'footprint' of Bangkok has been accompanied by a loss in ground cover, deforestation of uplands around cities, contamination of aquifers, and seepage of seawater into water supply sources.

It was estimated that approximately 1.5 million cubic metres of untreated domestic and industrial pollutants are discharged directly into Bangkok's waterways on a daily basis. Pollution of the city's ubiquitous waterways also results in significant, and underreported, threats to health. Six percent of annual deaths in Bangkok are attributed to such waterborne plagues as typhus, dysentery, and encephalitis.

Managing Water : Two Approaches in Water Management

Supply-side management approach

A supply-side management approach aims at developing and increasing the supply of water through surface water capture and storage, water sharing agreements, long distance conveyance and inter-basin transfer, ground water exploitation, desalination, waste water treatment, desalination, towing icebergs and melting them near water consumers, transport of water by sea tankers etc. Some of these techniques require high technology and the cost of adopting them are prohibitive for less developed countries.

Demand-side management approach

Demand management is defined as a "policy that stresses making better use of existing supplies, rather than developing new ones" and is increasingly proposed as a way of mitigating water-scarcity problems.

This approach starts from the recognition of water as an economic (viz. scarce) resource, and aims to optimise the use of existing supplies. Examples of this approach include water pricing, rationing, limited hours of domestic water supply, or limits on water volumes, flow regulators in plumbing, efficiency requirements for particular industries and technological measures such as stopping leaks in municipal water supply systems or shifting to sprinkler or drip irrigation can also save water. Education, social marketing, and public awareness campaigns are employed as a tool to change behaviour. Such awareness campaign can motivate water conservation, while education can lead to effective changes in water-use practices.

Traditionally, supply-side management has been the dominant approach in addressing water security issue because of the assumption that water is abundant and it only has to be made accessible. But with water resource becoming more scarce focus has shifted towards the management of its demand.

At the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002, the international community acknowledged the importance of the water scarcity challenge by adopting the short-term target of developing "integrated water resources management and water efficiency plans with support to developing countries, through actions at all levels." This declaration resulted in the establishment of a new approach to water resource management known as Integrated Water Resource Management (IWRM) and has become the most dominant approach.

Integrated Water Resources Management (IWRM)

IWRM was defined by the Global Water Partnership as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems". It encompassed the principles put forth in the Johannesburg Plan of Implementation and includes the following:

- The recognition of water as an economic good
- Application at basin-scale or catchment level
- Critical to integrated water and environmental management
- Full participation by all stakeholders including workers and the community
- Attention to the social dimensions
- Full-cost pricing complemented by targeted subsidies
- Central government support through the creation and maintenance of an enabling environment
- Adoption of the best existing technologies and practices
- Reliable and sustained financing
- Equitable allocation of water resources
- Strengthening the role of women in water management.

The above definition of IWRM, and its incorporated set of principles, reflects a paradigm shift in water management as illustrated below.

Table 3: Old and New Paradigms in Water Management

Old paradigm	New paradigm
• Water as an isolated natural resource/a single and independent discipline	• Multi-faceted; incorporates poverty, human rights, ecosystem, health, economic, social, ecological, physical, infrastructural, institutional/ political, cultural, ethnic and gender considerations
• Sectorally fragmented approaches	• Integrated and systematic approaches
• Techno-centric and hierarchical model of management	• Value-loaded process and mechanism/ arguments and judgements are central and integral
• Policy makers versus stakeholders/the public	• 'Bottom up' policy making
• Upstream versus downstream users	• River basin management
• Suppliers/recipients	• Service provider/clients
• National authority versus municipality	• Multi-level government
• Water as a separated natural system	• Integrated different elements of the water resource (land with water, fresh water with coastal zones, surface water with groundwater, water quantity with quality
• Water as a physical good	• Water as a social, economic and environmental good
• Nation versus nation	• Transboundary river basin management

Source: Modified from Global Water Partnership, Technical Advisory Committee (TAC) available at http://www.gwpforum.org/gwp/library/Tacno4.pdf

IWRM and the GMS

MRC member countries are committed to implement IWRM principles in managing the water resources of the Mekong River. IWRM is not an end in itself but a means of achieving three key strategic objectives :

> Efficiency in water resource development and use: maximising the economic and social welfare derived both from the water resources base and from investments in water services;
>
> Equity in the allocation of water resources and services across different economic and social groups, to reduce conflict and promote socially sustainable develop ment;
>
> Environmental protection, as ultimately all attempts at water management reform will fail if the water resources base and associated ecosystems are compromised.

The following benchmarks of "good IWRM" can be defined :

• Institutional and regulatory frameworks with clear pathways of accountability –

establishing the ethic and performance of good governance

• Knowledge-driven planning and management, with open sharing of information

• Community and stakeholder participation – partnerships between government and community for demand-responsive approaches to development

• Integration and coordination of policies and programs across sectors, countries, competing stakeholder interests and levels of government.

IWRM Principles has been applied in the GMS since 2000. However its results are mixed. There still remain some issues which stood in the way of water sector reform in the region.

The Way Forward

Reconciling National Interests

Questions are being asked over how the GMS countries can promote IWRM principles which cut across national boundaries in a context in which national interests tend to predominate in relation to water resource use and management. For example in China, a series of eight dams are proposed on the Lancang River (which constitute Mekong River's upper basin) to meet its energy demands and to divert water to its northern Provinces.

Of these eight, Manwan Dam and Dachaoshan Dam has started operation, and construction of Xiaowan Dam and Jinghong Dams had begun. The decision to construct these dams is outside the scope of the Mekong River Agreement as China is not a full Mekong River Commission (MRC) member. These dams create weird fluctuations in river flow which leads to declining fish catch in the reduced water flow downstream. China is not alone in building huge projects without consulting other riparian countries. Thailand saw the Mekong River as primarily a source for securing energy and water for irrigation and has planned a water-grid project, which could involve water transfers on a massive scale.

The Thai water grid project (officially named the "sustainably holistic water management project") is a 400 billion baht scheme to construct a network of pipes across the country. The overall aim of the project is to transfer water from "wet" areas to parts of Thailand more prone to dry season drought. Relying on a system of natural waterways, dams, constructed canals and pipes, the scheme intends to increase the area of irrigated land by more than four times and to ensure that all in Thailand have access to potable water. Thai national interests have been at the forefront of discussions surrounding the water grid and other riparian countries have raised their objections against it. In order for the IWRM strategy to succeed in the GMS, nations should avoid taking unilateral actions in the interests of achieving the wider objective of basin-wide sustainable development.

The Challenge of Governance

The governance systems are dominated by state actors and implementing

international policies with regional perspective face continuous challenges. Local voices are not sufficiently heard in decision making processes, which suffer from being obscure, non-democratic and non-transparent. There exist worries of the overwhelming

dominance of national interests in policy making as well as lack of true local level involvement in these development plans. Moreover, the differing political, administrative and government systems across the GMS countries add to the constraints in achieving a harmonized and common approach.

This situation is further aggravated by the uneven nature of development of the countries involved viz. Thailand, Cambodia, Laos and Vietnam. Each of these countries has different level of economic development and finding a common agenda appears to be difficult. Inter-governmental dialogue should be enhanced in order to arrive at mutually agreeable solutions.

Sustainability

The entire idea of an IWRM approach required sustained planning, coordination and most importantly, funding. The sustainability of such a complex programmes is always doubtful unless each party to the programme are fully committed towards realising the common objective laid down in the IWRM Principles. Countries need to sacrifice certain aspects of their self interest in order to see through the programmes. In order to achieve sustainability, the MRC should play an active role in all aspects of the projects and funding agency like the ADB should be prepared to provide funds in a timely manner.

Create Capacity at the grassroot level

The principles of stakeholder participation and consultation-emphasized in many policies- still aren't being translated into concrete actions. The entire approach has been institutionalized so much so that grassroot voices have no say in the government's scheme of things. However it is people at the local level who are directly affected by projects. Opening the doors to them will help create a true stakeholder participation upon which the entire notion of IWRM was built.

Adjustment of Policy According to Local Needs

The findings of International Water Management Institute (IWMI) has shown that top-down state policies based on 'blueprints' are widely applied in a one-size-fits-all approach., without taking local realities into account. A good example of a 'blueprint' application of these principles is a draft water law in Cambodia, which involves a system of water-use licenses, water-resources monitoring and fees. This blueprint only creates trouble for rural areas who are primarily dependent on water from lakes and the Mekong for drinking, agriculture and fishing. Small rural farmers could not afford or are not prepared to pay the fees and it creates complications in their livelihood. The best approach would be to adjust policies according to local requirements.

References

Basin Development Plan, Mekong River Commission for Sustainable Development, available at the MRC website http://www.mrcmekong.org/programmes/bdp.htm.

IWRM Challenges in Developing Countries: Lessons from India and elsewhere, International Water Management Institute Policy Brief available at http://www.iwmi.cgiar.org/Publications/Water_Policy_Briefs/PDF/WPB24.pdf

Water governance in the Mekong region: the need for more informed policy-making, International Water Management Institute Policy Brief available at http://www.iwmi.cgiar.org/Publications/Water_Policy_Briefs/PDF/WPB22.pdf

The Mekong River the struggle for Indochina - Water, War and Peace by Nguyen Thi Diu, Praeger Publishers,Connecticut, USA, 1999, pp. 4.

Managing Water Scarcity for Water Security, Prepared for FAO by J.T. Winpenny

"Coping With Water Scarcity: Can Developing Countries in Asia and the Pacific achieve the MDG's?", presentation by Mr. Thanade Dawasuwan, Chief Engineer, Deptt, of water resources, Thailand.

Bankwatch, Official Publication of the NGO Forum on the ADB, Inc. Volume IV Issue 2, August 2005.

Mekong at the Crossroads, Policy Brief July 2007, Helsinki University of Technology, available at http://users.tkk.fi/~mkummu/mekong@crossroads/material/m(at)c_policy_brief.pdf

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