

# CHALLENGES FOR ASIA IN WATER MANAGEMENT AND SUSTAINABILITY MANAGING WATER SUPPLY DEMAND: AN INTEGRATED EFFORT IN EDUCATION FORESTRY AND TECHNOLOGY

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## ABSTRACT

This paper aims to present recommendations that address the issue of long-term clean water availability in ASEAN and Japan. For this purpose, the paper will propose the advancement of demand-side as well as supply-side management policies. Demand-side policies are directed toward inculcating among stakeholders an understanding of the true value of water, as well as the solutions available for water conservation. These solutions include: a formal education programme, product and equipment labeling system, a multi-band water tariff rate system and water exercises. Supply-side policies focus on maximizing water catchments. This paper also proposes programmes for the development and sharing of technology across the region.

## REGIONAL SITUATION

Asia is a water-rich region but water resources can not be easily collected, allocated and shared. According to the 2005 ASEAN Strategic Plan of Action on Water Resources Management, seasonal scarcity, rapid economic growth and an ever growing population will contribute to an estimated one-third growth in overall water demand in 20 years (ASEAN 2005: 5).

Reports from around the region reach the same conclusions:

- An article published on December 13, 2004 by Sun Star Davao announced an impending water crisis in the Philippines with eight documented water-critical areas, including the two largest metropolitan areas of Manila and Cebu.
- In Kupang, East Nusa Tenggara, Indonesia, tens of thousands of water paddies have dried up as available irrigation water continues to drop, reports The Jakarta Post (November 4, 2006), while neighboring Malaysia's 500 lpd water usage rate far exceeds the 200 lpd recommended rate by the United Nations, causing forecast shortfalls for 2007 and 2008.
- Japan faces an increasing water supply risk (Japan's Ministry of Land, Infrastructure and Transport 2004) amidst a decrease in precipitation, global warming and rising urbanization. This situation is mirrored in Singapore, whose water contracts with Malaysia, the city-state's main source of water, will end in 2011 and 2061.
- Some parts of North Vietnam face a unique water problem, as their water sources are laced with arsenic levels significantly higher than World Health Organization standards.
- In northeastern Thailand, heavy deforestation has caused the Kutkhakeem watershed to collapse (The Research for Local Communities 2005: 5-8).

## PROBLEM STATEMENT

As long as a fully sustainable water supply continues to elude the ASEAN nations and Japan, there will be the looming threat of water shortage. This paper identifies balancing water use with water availability as the key to addressing this issue in both the short-term and long-term.

Water demand and water supply management strategies present unique

challenges. These include education about the value of water, and both preserving and increasing water supply. Water supply-demand balance can only be achieved through an integrated approach, with emphasis on the opportunities available through regional cooperation. This paper will focus on and consider the above points in outlining our recommendations.

### STATEMENT OF OBJECTIVE:

This paper presents recommendations that aim to address the issue of long-term clean water availability in Asia.

### RECOMMENDATIONS

This paper proposes a holistic national educational programme, the increase and preservation of water catchments, and programmes for the development of water technology for each country in the "ASEAN plus Japan" region.

The primary programme aims to reduce water demand to a reasonable standard of water use per capita, while the second aims to increase and preserve water supply. The final recommendation focuses on increasing water supply and managing water usage as illustrated in Figure 1.

Finally, the paper will explore opportunities for cooperation within Asia.

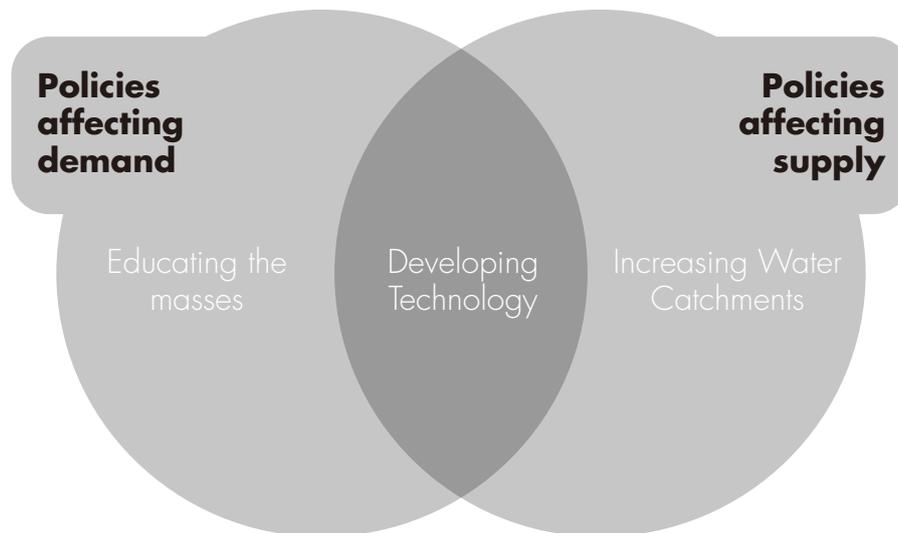


Figure 1  
Supply-Demand Management Strategy Venn Diagram

### Operational Framework

The Integrated Water Resource Management System (IWRM) is a "participatory planning and implementation process based on sound science that brings stakeholders together to determine how to meet society's long-term needs for water and coastal resources while maintaining essential ecological services and economic benefits" (USAID 2007). One of the key components of this framework is the implementation of an inter-sectoral approach to decision-making, usually involving five key stakeholders, namely: the government, industry or private firms, non-governmental organizations, academia, and communities and people.

### Specific Actions: Education

In order to successfully reduce water use, it is necessary to reeducate various communities and sectors on the true value of water. Economic incentives may be established to manage water demand, but they must have a continuing presence to have a lasting effect. This stands in contrast with the self-sustaining and often bottom-up cascading impetus provided by water value reformation. This corollary objective can be accomplished through a holistic national educational programme as defined below.

**Formal Education**

Water-related issues should be integrated into primary and secondary school curricula across countries in the region, targeting students from age three to fifteen.

These water issues would be fused into class discussions, activities and examinations. Out-of-class activities would also be held, such as exposure trips to water treatment plants, polluted rivers, water catchments, etc., in cooperation with relevant governmental or private organizations.

Each government should take responsibility for implementing its country's curriculum, including the project's mandate, the training of teachers, the erection of the necessary infrastructure, as well as regulation (see Figure 3).

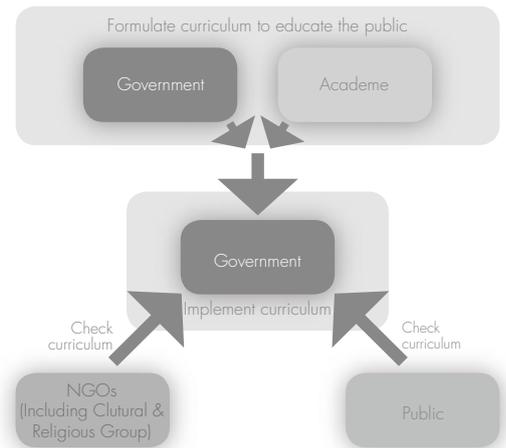


Figure 3  
Formal Education Relationship Chart

**Informal Education: Product Labeling System**

Government-mandated embedded water labels should be attached to all products of a certain class, by producers and/or sellers on a class-by-class basis over a reasonable timeframe. Governments would cooperate with academia and industry in developing a mutually acceptable embedded water estimation process as well as labeling standards (see Figure 4).

**Informal Education: Equipment Labeling System**

Government-mandated water usage labels should be attached to all water consumption-heavy equipment, as explicitly designated, by producers, importers and/or sellers. A reasonable transition period would be allowed for the implementation. The exhaustive list of water consumption-heavy equipment, the labeling or coding scheme, and a reasonable transition period would be determined by governments in consultation with industry.

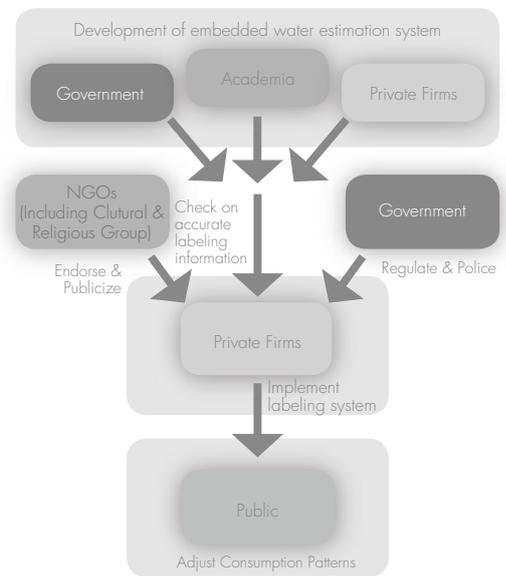


Figure 4  
Product Labeling System Relationship Chart

**Informal Education: Multi-band Pricing System**

The single-band water pricing scheme currently in place among most Asian states should be gradually transformed into a multi-band pricing system: a level of free piped water based on the least possible amount determined for household subsistence, a second band pegged at a discount from the economic value of water, a third band pegged at the economic value of water, and a fourth band pegged at the economic value of water plus an excessive consumption tax.

**Informal Education: Water Exercise**

Water exercises could take on various forms, including the premeditated and publicized cutting-off of piped water supply from selected households or classes of such households, with the aim of inculcating an awareness of the intrinsic value of water.

**The Roles of Non-government, Religious and Cultural Organizations**

In order to secure the success of the above national educational programme, it is necessary for governments to gain the support of non-government, religious and cultural organizations.

It is equally essential, however, for these organizations to act as a check to governments on the implementation and regulation of the relevant project or policy. Governmental prudence and proper civil society control is necessary to obtain public endorsement and support from these organizations. The following diagram explains the implementation flow.

### **Specific Actions: Catchments**

Direct efforts at increasing water supply to match water demand need to be made, by increasing water catchments through the preservation of forests and reforestation. As the united effect of forest preservation and reforestation is long-term in nature, it merits a place in this project for sustainable water availability.

For this purpose, governments must mandate forest preservation by designating forest reserves and protecting them with proper policing, surveillance and reprimand. Academia and relevant non-government organizations will serve as consultants to governments in defining forest preservation strategies. Non-government, religious and cultural organizations may also exercise their influence over communities.

Reforestation should also be a predominantly government-driven effort. However, private firms and non-government organizations play a key role as organizers within communities and lobbyists for government action. While self-motivated action would be essential, and must be driven in many cases as a prerequisite to success, governments must reinforce positive action by giving tax deductions against reforestation project costs, arranging government green awards, establishing official preferential state partner lists, and allowing the inclusion of green firms into these lists.

### **Specific Actions: Technology**

At present, technology transfer is being promoted as a means of alleviating country-specific water shortages. However technology transfer is not a sustainable solution without an internal mechanism for developing water technology solutions. Thus, technology development becomes a key issue in addressing long-term water availability.

#### *Water Technology Design Competition*

Water problems at the community level remain unaddressed across Asia. As a result, decentralized or mixed centralized-decentralized water management systems have been adopted by various countries. However, decentralization has not been universally effective.

This project aims to catalyze the community-level development of water technology, which will be capable of addressing community-specific water problems through competitive funding. Provincial or state-level competitions could be held to reward solutions that are applicable on a wider scale. The following criteria would be used to judge water projects and prototypes: cost effectiveness, operability, technological innovativeness and commercial potential.

#### *Water Technology Research Scholarships*

Governments, in partnership with colleges and universities, should create scholarships for researchers in the field of water management and technology, to promote the development of water technology solutions.

Industry partners would also be instrumental in identifying key research areas and providing project funding, while non-government organizations will play a key role in publicity and government control.

### **Opportunities for Regional Cooperation**

While most of the aforementioned recommendations are for intra-country application, the existence of common water problems within the Asia region gives rise to opportunities for regional cooperation.

One such key area is technology. Motivated by the prospect of meeting economies of scale, countries should establish a communal water solution sharing system, and a combined water market and water management facilities. This proposal is not without precedent. For example, the International Hydrological Programme (IHP) was established as a platform for the sharing of ideas among water resource management specialists on the issue of groundwater management. This collaboration can occur at the state level through an ASEAN water resource management committee, at the university level through the ASEAN University Network (AUN), or at the industry level through regional associations of water technology vendors, who could establish a structure that empowers and encourages quick action.

## CONCLUSION

The implementation of an integrated effort on water value reeducation, increased forestry, and the development of technology would eventually achieve gradual decreases in water demand alongside gradual increases in water supply.

To achieve the long-term goal of full renewal over consumed water, however, a continual monitoring process must be established, diligently implemented and constantly reinforced by all relevant sectors.

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