

## ABSTRACT

This paper seeks to identify potential solutions to the challenges of water resource management and sustainability. In particular, it addresses the problem of access to safe drinking water and proposes the following three-pronged approach: (1) raising the level of popular awareness with regards to the value of water; (2) regional collaboration; (3) institutionalizing a more holistic version of the Integrated Water Resource Management System.

## BACKGROUND

There is a major schism at the basic level of awareness between urban and rural areas, due to stark discrepancies in mindset, lifestyle and infrastructure. For instance, the sheer convenience of urban living has led complacent city dwellers to subconsciously devalue, or pollute, water resources.

A second major obstacle relates to the lack of regional cooperation in the sharing of ideas and technology. There are various water technologies with tremendous transformative potential, most notably water recycling and desalination in Singapore. However, despite the existence of multi-national initiatives such as the Asian Development Bank, many advanced nations hold a protectionist and nationalistic mindset that constrains their actions.

## PROBLEM STATEMENT

This paper will consider the following three major obstacles in managing water resources: awareness, access to new technology and poor management.

**Human element:** A lack of awareness leads people to abuse or unknowingly pollute water sources.

**Lack of access to technology:** Certain developing countries cannot afford the advanced technology to obtain clean water by recycling or other means. Technological transfer between advanced and developing countries is not widely practiced.

**Mismanagement which often stems from bureaucracy:** When there are too many agencies involved in the water management process, they fail to effectively handle the issue.

## OBJECTIVE

The objective of this paper is to propose potential solutions to problems related to the quantity and quality of water access in Asia.

## RECOMMENDATIONS

We propose three focuses: (1) raising popular awareness through education in both rural and urban areas; (2) boosting regional cooperation, discussion, and sharing of technology; and (3) tackling the limitations of existing water management strategies.

### Education

As water is still considered a low-value commodity by many, they are not conscious of the need for conservation and are thus resistant to government initiatives which promote better water management.

# CHALLENGES FOR ASIA IN WATER MANAGEMENT AND SUSTAINABILITY ENSURING SUSTAINABILITY AND EQUAL ACCESS TO WATER RESOURCES IN SE ASIA: THE TEMPEST PROGRAM

### Team Members:

Michael Setiawan  
*Indonesia*

Momoko Takai  
*Japan*

Siti Hawa bte. Anurddin  
*Malaysia*

Juan Paolo Fajardo  
*The Philippines*

Huang Hongda  
*Singapore*

Nattakarn Natvarapat  
*Thailand*

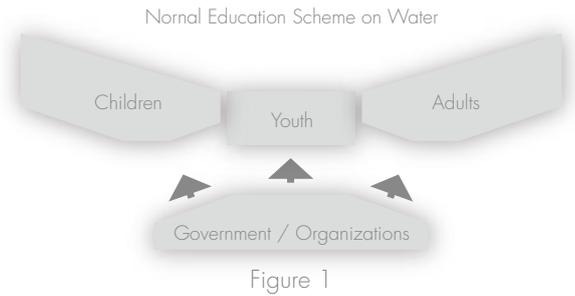
Ha Hong Hanh  
*Vietnam*



**Proposed Model: Integrated Water Management Education Scheme (IWMES)**

Our proposed education model is called the Integrated Water Management Education Scheme (IWMES). All target groups will be educated and subsequently integrated to share their knowledge with each other.

At present, governments or government-appointed organizations are responsible for educating people (Figure 1).



Our proposed model (Figure 2) allows for the more effective education of all parties involved. The teaching will be carried out by related and respected individuals, rather than governments or their related organizations.

**Targeting Groups in Urban Areas**

**Children**

School curricula will be the main medium to educate children on water issues and conservation.

**Youths**

Youths will be mobilized through club and association membership as well as reached through pop culture celebrities.

**Adults**

Negative reinforcement will be used to address adults, primarily through measures such as increasing the cost of water, and conveyed through the mass media.

**Linkage between target groups**

In households, parents will constantly remind their children and teenagers not to waste water due to its cost. Youths will in turn serve as role models to their younger siblings and friends through the volunteer activities, as well as through their adoption of the pop culture message that it is 'cool' to save water. Meanwhile, children are more teachable and will readily adopt the message that environmental resources are worth protecting, and so will be eager champions of environmental causes in their homes and communities.

**Targeting Groups in Rural Areas**

While the objectives and key messages remain the same as in urban areas, dissemination will take place via different mediums due to the social and infrastructural differences in rural areas.

**Children**

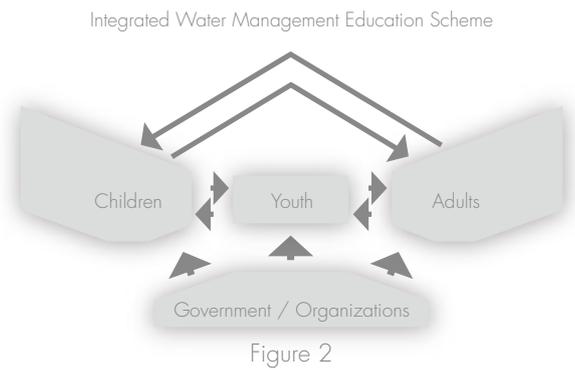
School curricula have limited efficacy because not all children have access to formal education. NGOs and volunteers will be tasked to creatively educate rural children.

**Youths**

An 'Urban/Rural Student Exchange Program' will be implemented to facilitate the exchange of knowledge and ideas between urban and rural youths.

**Adults**

Respected figures such as village leaders and religious leaders will be mobilized by the governments and their related organizations, which will train, educate and give information to those influential figures in order to reach the adults in the rural areas.



**Challenges and Limitations:**

1. Financing
2. Sustainability
3. Enforcement
4. Governmental support

**Technology**

Case studies:

Newater (Singapore), Multi-valve pump (Indonesia), Arsenic treatment device (Vietnam)

In Singapore, the combination of water recycling and desalination processes can eventually attain 100% water recyclability and sustainability. The MVP, on the other hand, is a breakthrough in allowing cheaper and more convenient access to drinking water in rural areas. The Arsenic Treatment Device in Vietnam can remove toxins from contaminated water.

The above-mentioned initiatives began as independent projects that have revolutionised water management. However the development and implementation of new management strategies and technologies are impeded by a lack of funding. The misconception that water is not a profitable business has resulted in apathy from governments and corporate bodies.

**Strategies and Recommendations:**

This paper proposes the creation of a new professional and educational field centered on water.

**1. Research and Development of Water Technology**

We propose promoting the benefits of new technologies among local/rural communities. With proven successes and positive popular acceptance, national governments and/or private corporations will be more likely to accept that there are substantial benefits in further exploring and supporting such R&D initiatives.

Partnerships between developed and developing nations can be established to help balance developmental disparities. Countries with existing technological advantages can share their talent - academics, research facilities, success stories and models - with others.

Water management should also be incorporated into the courses, curricula and projects in related tertiary institutes and R&D organizations.

**2. Technology Sharing**

Regional sharing and cooperation in the field of water resource technology is feasible, regardless of each country's prioritization of its own domestic interests. Such cooperation is projected to generate positive spillover effects in the long term. As different countries often share a common water source, problem-solving will only be effective if there is multi-lateral collaboration.

Our proposed solution is to establish a regional think tank comprising the best minds in academia and research from all the nations in the region.

The think tank's primary purpose will be to formulate new models and policies for water resource management, with specific adjustments to cater for each nation's specific geo-political and economic context.

The secondary purpose will be to prioritize research and to act as a board for the designation and approval of scholarships, as well as for the appraisal and allocation of project funding.

Finally, the think tank will also be a training ground for the best minds and experts on the subject. The think tank will exchange ideas via regular forums and dialogue sessions, and disseminate policy recommendations for member countries in the form of White Papers. It can also facilitate fellowships and internship programs to train future professionals in the field.

### 3. Limitations

1. Proper use and distribution:

One challenge lies in ensuring the equitable distribution of benefits. Regulation is necessary to ensure this, and also to safeguard intellectual property.

2. Politics and national sovereignty

The question of responsibility and accountability will be raised when the source of a water problem occurs upriver in one country but only manifests itself at the downriver site in another country. Any unauthorized cross-border action may be construed as an infringement of national sovereignty.

## 4.2 An Integrated and Incentives-Based Approach to Water Management

### Concept:

The water resource situation in developing nations poses a number of pressing questions with respect to the future of water resource management. Primarily, this paper seeks to explore which water management regime can best accommodate the unique socio-political, cultural, geographical and economic features of various developing states.

### 1. A management structure that will enhance the feasibility of policy enforcement

Effective policy enforcement would comprise four elements:

- a. A procedure for formulating good, relevant and comprehensive policies,
- b. A clear allocation of responsibility and accountability among stakeholders, and
- c. A system of checks and balances that minimizes corruption and collusion among government agencies.

### Proposed Structure:

a. Water districts as units of analysis:

Integrated Water Resource Management is to be applied using the smallest complete hydrological unit of analysis and management, such as a river or a lake, which serves as a major source of water for several communities. Integrated Catchment Management (ICM) would thus become the practical operating approach. Policy-making, planning and implementation must then be defined by the geographical scope of a catchment basin so as to make them reasonable, feasible and ultimately applicable. These will be designated as water regions or districts. (See Appendix for Diagram)

b. Management councils:

Management Councils are to be formed per water district (See Appendix for Water Management Diagram). Each Management Council should consist of representatives who can ensure plurality and are capable of incorporating the interests of all major stakeholders in water resource use.

c. National board:

A governing board is to be formed to centralize water management efforts, and headed by the National Government Agency responsible for the management of environment and natural resources. This is to ensure that a system of planning and coordination is established and a common action plan is formulated for each watershed. The National Board will be comprised of the heads of the Management Council of each Water District.

### Projected effects of proposed structure

- A. Policies will be implemented in a relevant and comprehensive manner.
- B. Each stakeholder will be compelled to consider water management as a priority, and to explore self-regulation and peer-to-peer regulation as cost-effective alternatives.
- C. With the involvement of civil society, non-government organizations and other private stakeholders, there will be watchdogs over corporate and industrial water use, as well as over government function.

- D. Other related government agencies will be compelled to focus their efforts on finding cost effective methods of promoting water management.
- E. Monitoring of water usage will be carried out more effectively. The National Board can now propose ceiling limits for water usage, the excess of which is subject to ratifications or penalties. Furthermore, members of civil society will be empowered by their involvement in the water councils and the National Board, which motivates them in engaging in unilateral enforcement and monitoring efforts.

## Limitations of Integrated Water Resource Management: Inadequate Finances

### 2.1 Socialized water pricing as an incentives approach toward limited finances

Integrated Water Resource Management allows the National Board to formulate a master plan for water distribution and treatment at the district level. Since the Board is responsible for both data gathering and water use charging, it has the competence to develop a more equitable and socialized pricing scheme.

The scope of this proposal's application makes it a practical one. By limiting the measurement of pollution output according to water districts, it would be easier to pinpoint where pollution comes from and to establish clear points of accountability.

### 2.2 Technology development and the implementation of water-friendly practices as pre-conditions to business licensing the grant of user rights on water

Businesses will be required to apply to the National Board for licenses to operate in affected bodies of water. They must submit status reports on the production processes and chemicals handled. The Board can require these corporations to invest in eco-friendly technology or employ environmentally friendly practices.

## CONCLUSION

Solving the water problem of developing states must begin with a change in mindset, where water usage is a privilege rather than a right. Education is a fundamental and necessary tool to catalyze this paradigm shift. It will require a focused campaign to address each demographic and psychographic segment of society.

With such a bottom-up approach, the grassroots will become major players in the enforcement of responsible water usage and management. Ultimately, with this comprehensive integrated approach, sustainability can be realised through the gradual shift of society towards self regulation.

