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Sustainable Water Management in Asia:
Challenges and Opportunities

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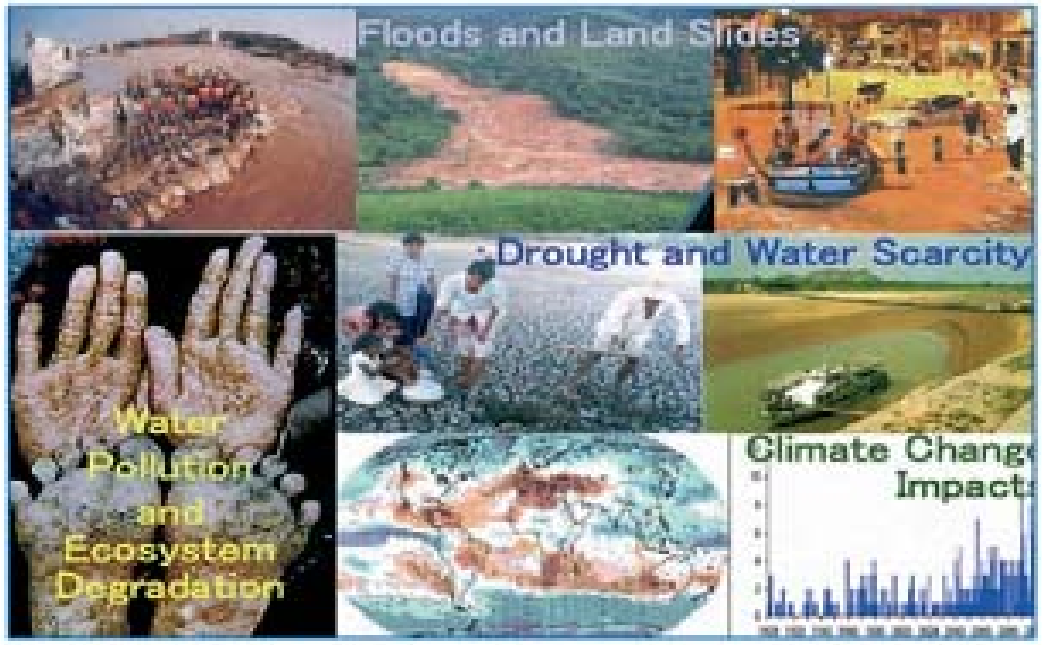
Water is

- Socio-economic Development
- Quality of Life
- Poverty Alleviation

Common Issues on Water Cycle in Asia

- Floods, Cyclones and Tsunami
- Drought
- Water Scarcity
- Water Pollution
- Ecosystem degradation
- Climate Change Impact



Common Issues on Water Cycle in Asia

Photo Source – Asia Water Cycle

Lack of Access to Safe Drinking Water & Sanitation

Food Security

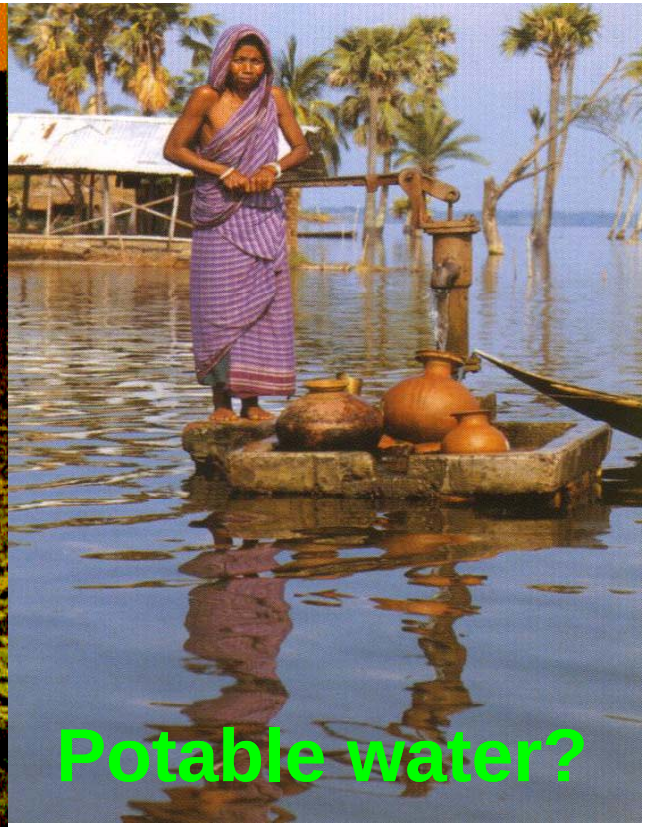
Photo source- http://www.est-direct.com

Impact of Energy Security

OR

Biofuel Crops?

Too Little Water, Too Much Water



Asian Rivers Dry Out

Five rivers in Asia serving over 870 million people are among the top ten, most threatened in the world, as dams, water extraction and climate change all take their toll (WWF, World Water Day 2007)

- **The Yangtze**
- **Salween-Nu**
- **Indus,**
- **Ganges**
- **Mekong-Lancang**

Yangtze Dolphin

Photo source - http://news.bbc.co.uk/2/hi/asia-pacific/4367135.stm

Our Challenges

Asia's Growth

2006 Regional GDP grew at 8.3%, the fastest since 1995.

Rapid expansion in 2007 with GDP growth seen at 7.6%. (Source: ADB data)

2008 global financial crisis

Natural climate + financial climate change ?

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Increased Competition for Scarce Water

Growth + Population growth

+ Climate Change Impact

Increasing:
- demand for water
- pollution loads

Decreasing Resource

Increased competition for scarce water resources

Conflicts - local, national & regional levels

Pollution

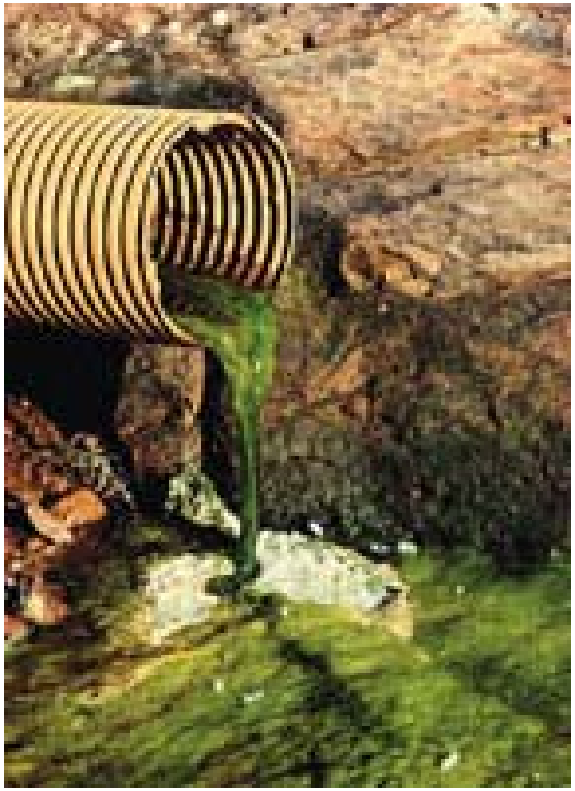
When water is unfit for its intended use, it is then considered polluted. Water pollution occurs when a body of water is adversely affected due to the addition of large amounts of materials (natural or unnatural) to the water.

There are 2 types of pollution:

Point Source Pollution:
pollutants discharged from an identifiable point (pipes, ditches, channels, sewers, tunnels and containers)

Non Point Source Pollution:
wide-spread overland runoff containing pollutants. Does not originate from one specific location and pollution discharges over a wide area.
(acid rain, agricultural runoff)

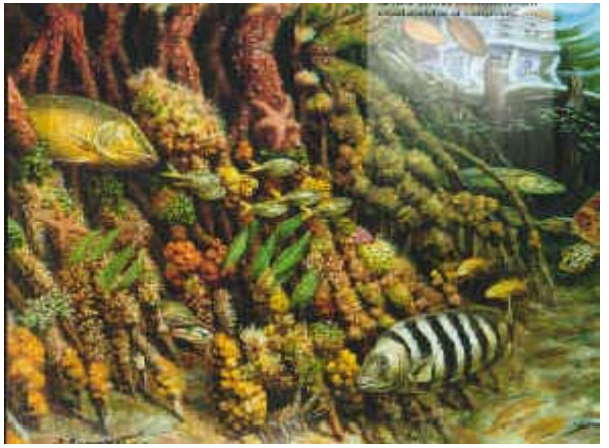
Non-point source pollution is the most difficult to identify and manage.



Source: www.groundwater.org; www.zephryrys.demon.co.uk\water pollution.htm - Water pollution and Society. Krantz D & Kifferstein B.

- Biosphere

- Aquatic environment



- Spiritual and Ethical Values

Addressing Water Scarcity

Requires:

- an intersectoral and multidisciplinary approach to manage water resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems

- integration across sectors!

Integration across sectors

This integration needs to take into account:

Development

Supply

Use

Demand

AND . . to place the emphasis on PEOPLE!

To place the emphasis on people also implies to their livelihood and the ecosystem that sustain them.

On demand side

- Enhancing water productivity is paramount to sustainable water management
- Water use awareness at individual and household level is most important to keep the demand low

On supply side

- Efficient water resources developments that include all kinds of water storage method
- Water purification
- Desalination, water reuse and recycling
- Sustainable Ground Water Use

Numbers

- Around 1.2 billion people = 1/5 of the world's population face physical water scarcity - 500 million more . . .
- Another 1.6 billion people = 1/4 of the world's population face economic water shortage
- Asia's total population is more than 50% of the world's population

The complexity

- The appropriate scale for understanding water scarcity is at the local or regional level

- Financing mechanism is largely managed at the global level

Water scarcity symptoms

- Severe environmental degradation
- River desiccation and pollution
- Declining Ground Water levels
- Increasing problems of water allocation where some groups win at the expense of others

Three kinds of water scarcity

- Physical water scarcity
- Economic water shortage (lack of necessary infrastructure to take water from rivers and aquifers)
- Mismanagement caused water shortage (lack of good water governance)

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In the context of MDGs. .

The Millennium Development Goals

GOAL 1 ERADICATE EXTREME POVERTY AND HUNGER

GOAL 2 ACHIEVE UNIVERSAL PRIMARY EDUCATION

GOAL 3 PROMOTE GENDER EQUALITY AND EMPOWER WOMEN

GOAL 4 REDUCE CHILD MORTALITY

GOAL 5 IMPROVE MATERNAL HEALTH

GOAL 6 COMBAT HIV/AIDS, MALARIA, AND OTHER DISEASES

GOAL 7 ENSURE ENVIRONMENTAL SUSTAINABILITY

GOAL 8 DEVELOP A GLOBAL PARTNERSHIP FOR DEVELOPMENT

Water related MDGs

GOAL 1 – Water related

GOAL 2 – Water related

GOAL 4 – Water related

GOAL 5 – Water related

GOAL 6 – Water related

GOAL 7 – Water related

GOAL 8 – Water related

All MDGs are water related in one way or the other!

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Water and Poverty: an issue of Life and Livelihood

- Poverty makes poor poorer
- Developing countries pay 5 to 10 times more per unit of water than those with piped water (UNDP data)
- Poor people have to use unclean water
- Poor people lack sanitation facilities

Water and Poverty contd.: an issue of Life and Livelihood

- For poor people, water scarcity is not only drought and rivers running dry
- It is about guaranteeing the fair and safe access they need to sustain their lives and secure their livelihood!
- . . . . ..an issue of life and their livelihood . .
- It is about how institutions function and how transparency and equity are guaranteed in decisions affecting their lives . .
- It is about the choices on infrastructure development and the way they are managed – hence the quality of governance!

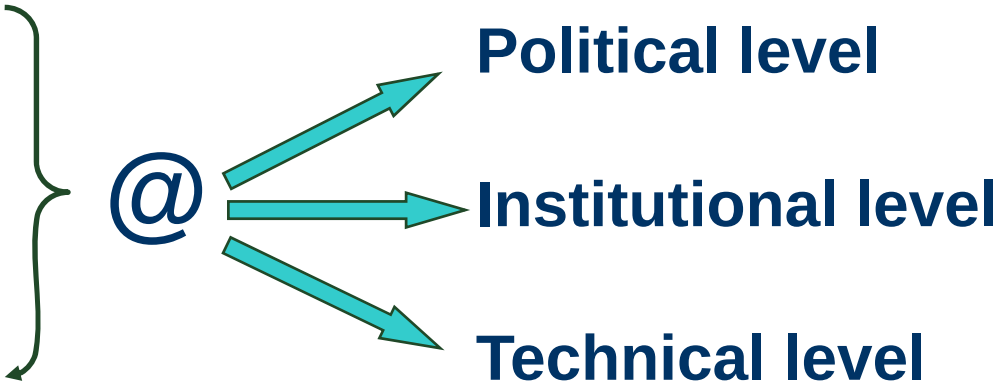
Our Opportunities

Opportunities:

Introducing sustainable water management

Effective and equitable management practices requires:

- **Knowledge**
- **Expertise**
- **Investment**



Opportunities to work on capacity development, adaptation to climate change, risk management, resilience, financing, investment, private sector involvement, CSR, and Peace!

Water investment needs by Asia

From 2005 to 2030

Asia and Oceania	– 9.0 (trillions of dollars)
South/Latin America	– 5.0 (trillions of dollars)
Europe	– 4.5 (trillions of dollars)
US/Canada	– 3.6 (trillions of dollars)
Africa	– 0.2 (trillions of dollars)
Middle East	– 0.2 (trillions of dollars)

Data source: Peter Roger, Scientific American August 2008

Opportunities to do

Key 1: Improving investment in water to reach the Millennium Development Goals (MDGs)

Key 2: Improving health through better access to water

Key 3: Producing more with less water (crop, cloth, furniture..)

Key 4: Intensively promote Integrated Water Resources Management (IWRM) concept

Key 5: Managing uncertainty for the benefit of the poor

Key 6: Valuing social and environmental services

Key 7: Making water everybody's business

Opportunities to do contd.

Key 8: Conserve Irrigation water, ship “virtual water”

Key 9: Promote appropriate technologies: eg. Desalination as pure technological approach and hydroinformatics as socio-technological approach, etc.)

Key 10: Disseminate basic-water-use-knowledge to everyone on Earth (Rainbow of Water: white water, green water, blue water, deepblue water, brown/black water, grey water)

Key 11: Adopt low-water sanitation

Key 12: Immediate and continuous adaptation to climate change

Key 13: Immediate and constant action of climate change mitigation

Opportunities to do contd.

Urban dwellers in Asia mega cities face greatest problem of water scarcity on a day-to-day basis. Many rural households produce their own food. 800-1000m^3/person to secure annual food production locally on their fields.

There are massive opportunities to improve the ability of poor people to lift themselves out of poverty under conditions of greater water security and sustainability.

To make sure that adequate and reliable supplies of water are available for agricultural activities – for food production at household level and a small surplus for other needs – livestock and horticulture.

References and useful websites

UN-Water: www.unwater.org

Asian Development Bank: www.adb.org

FAO: www.fao.org

UNDP: Human development report, www.undp.org

IFAD: International Fund for Agricultural Development, www.ifad.org

UNESCO: World Water Development Report

www.unesco.org/wwap/

Asian Institute of Technology (AIT): www.ait.ac.th

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AIT's Contribution to Asian Water Sector

- Nearly half a century of service to Asian water sector
- When AIT was established in 1959, water engineering was the first and foremost field of study– it is 49 years old now
- Golden Jubilee Celebrations in 2009 a major event, "Spiritual transformation for sustainable development: a forum of world spiritual leaders (S9)", will be held on 6-8 September 2009 in AIT and in Bangkok -- fresh water resources and carbon emission are top priorities at the S9 conference
- It is AIT's Golden Jubilee Gift to the region and the world

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Mission

To develop highly qualified and committed professionals who will play a leading role in the sustainable development of the region and its integration into the global economy

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Characteristics

- **Postgraduate institute with strong research emphasis**
- **Internationality with an Asian orientation**
- **Interdisciplinary, agile academics**
- **Relevance**
- **Capacity building for sustainable development**
- **Profession orientation**

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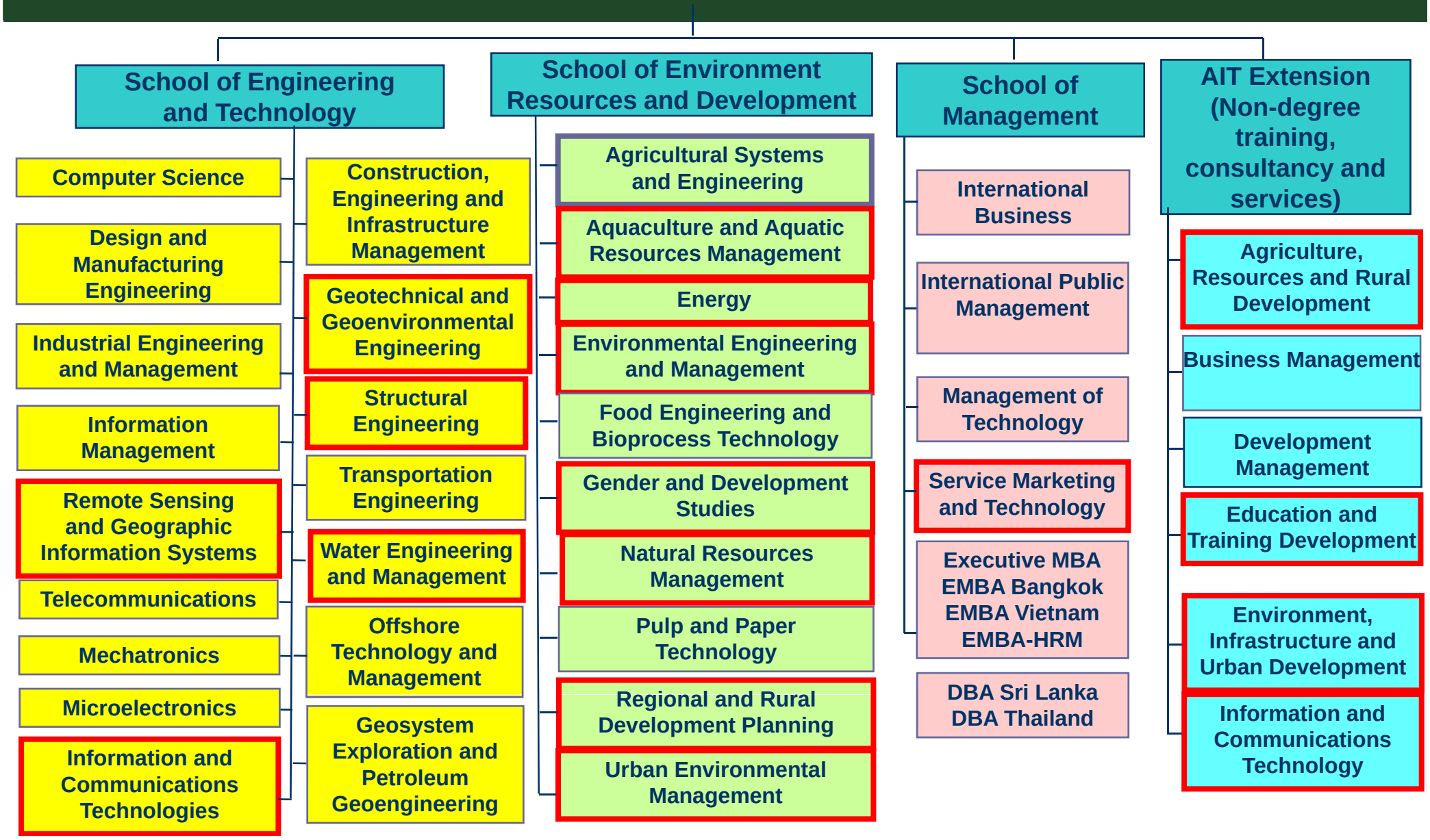
Multicultural Environment

- 1,918 Students from 45 countries / territories
- 14,769 Alumni from 79 countries / territories
- 22,738 Short-term Trainees from 71 countries / territories
- 120 Faculty from 26 Countries
- 851 Research and Support Staff from 27 Countries
  - (555 administrative/research support staff)
- 217 Sponsored Research Projects
- 29 Board of Trustee members from 21 Countries
- AIT Centers: Vietnam and Indonesia - plans to open centers in Pakistan, Sri Lanka and possibly China and India

AIT Academic Structure
Schools and Extension



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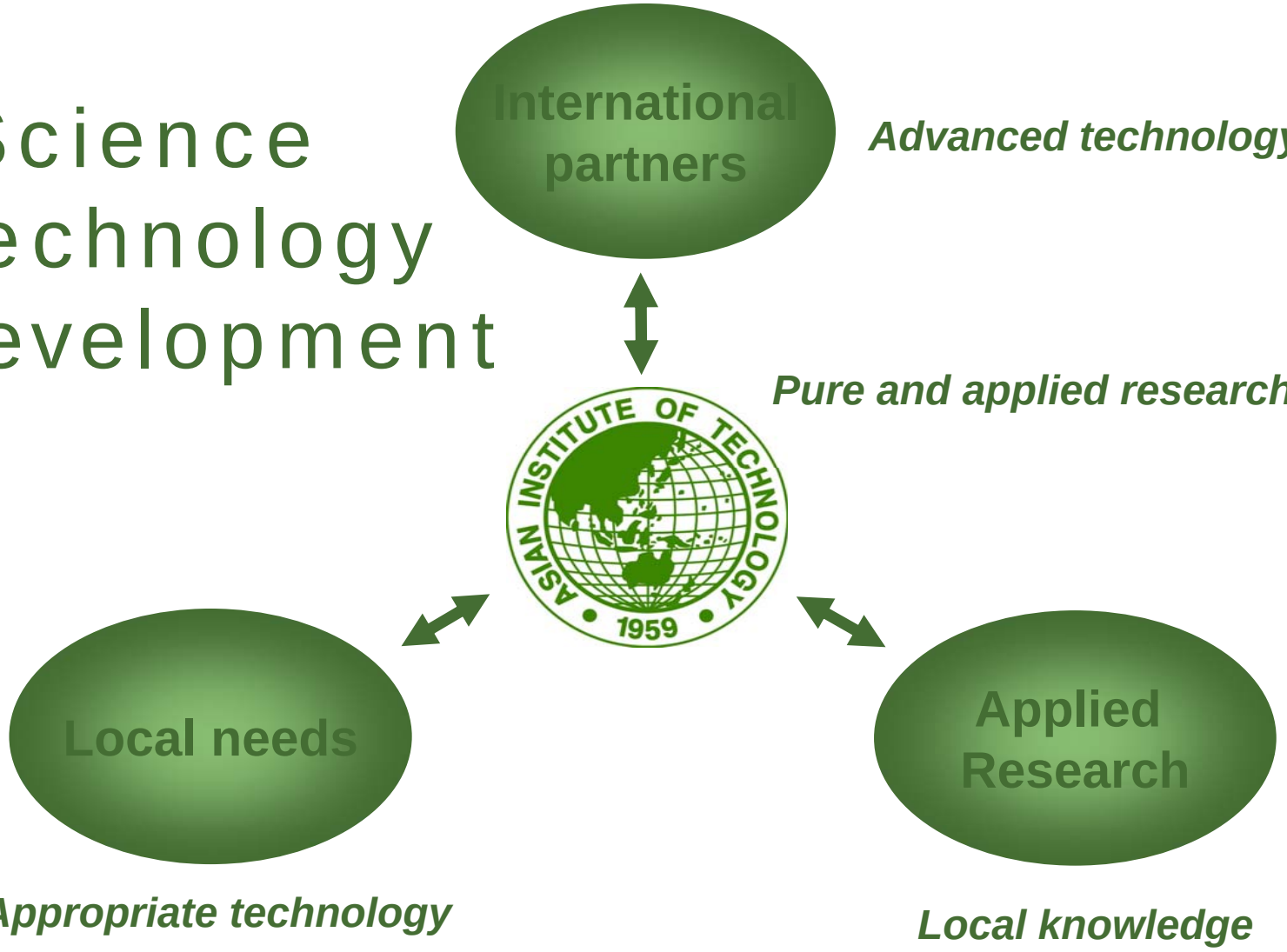
Science & technology for development



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WEM Services at AIT

- Diploma, Master & Doctoral degree courses
- Training of trainers
- Consulting
- Outreach activities for Capacity Building and Life Long Learning
- Create linkages between interdisciplinary players
- Cross fertilization between different stakeholders
- Forum for spiritual transformation for sustainable development

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HYDROINFORMATICS FOR ASIA PROGRAMME

AIT in many dimensions responding to the Region's Needs

- A PROGRAMME TO CONTRIBUTE TO SUSTAINABLE ASIA
- INITIAL 3 YEARS (FUNDING PROPOSAL SUBMITTED)
- PARTNERS
- BUSINESS PLAN

Myanmar Cyclone Nargis: permanent AIT-Myanmar Fund

China Earth Quake: Technical and Intellectual assistance

What is Hydroinformatics?

(1) "Hydroinformatics" is a sociotechnology that utilizes the most advanced technologies to solve water problems in the systematic, holistic, ethical and people-centered way. It uses information and communication technology as a main vehicle together with mathematical models that include hydraulic-, hydrological, sediment transport-, predictions of ungaged basins and well-documented basins-, computer-based data and scenarios simulations-, decision-support systems-, artificial intelligence- and internet-based computing-models.

- **water is an essential part of the ecosystem and human and natural environment**

- **issues of climate change, gender mainstreaming, and 'Man and Biosphere approach' are part of the HI framework.**

What is Hydroinformatics?

(2) "Hydroinformatics" is a means whereby the number myth strengthens the convenant between the Creator and His Creature in the realm of the arteries and the veins of the biosphere.

In simple term, the first definition described about the use of social and natural sciences coupled with advanced technological means to solve water problems in people-centered way – towards sustainable development.

The second definition then added the ethical and spiritual dimensions towards spiritual transformation – i.e. to achieve poverty alleviation.

HI4A: MISSION AND STRATEGY

Mission

Development and application of HI tools and implementation mechanisms in order to ensure advancement in sustainable water and land developments as related to **Asian Values and cultures.**

Strategy

Engagement of key international and national experts and institutions in meeting the HI4A objectives of realizing sustainable development and poverty alleviation especially through active stakeholder participation.

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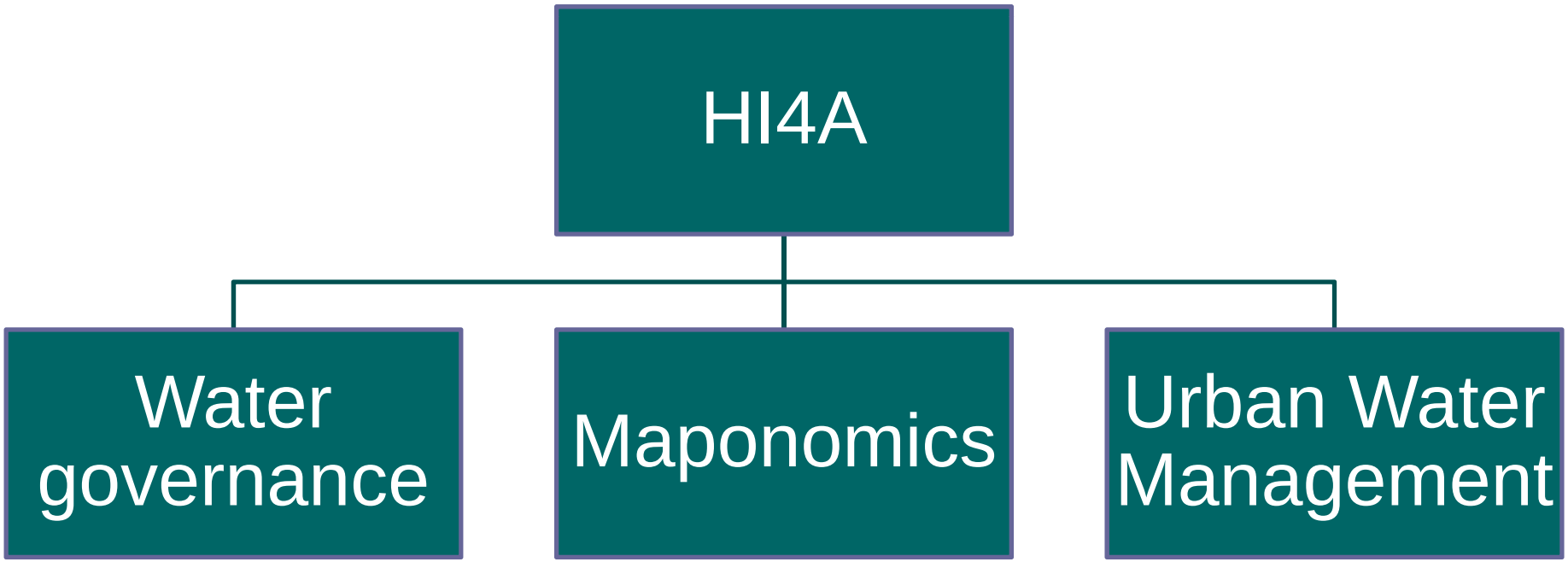
Management and operational structure



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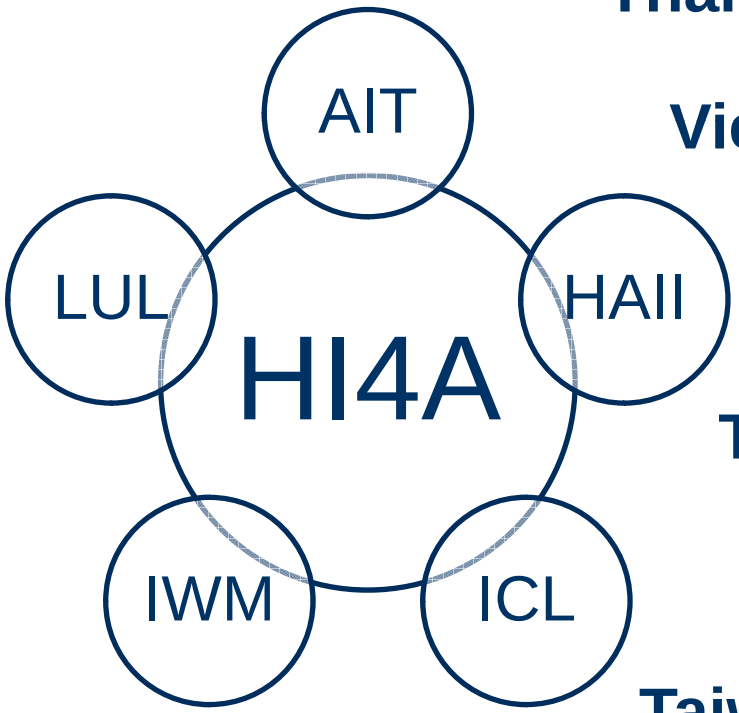
HI4A Consortium



Thailand

Afghanistan

Bangladesh

Vietnam

Cambodia

Lao P.D.R.

China

India

Iran

The Philippines

Indonesia

Malaysia

Myanmar

Taiwan

Nepal

Singapore

Pakistan

Emphasis on Interdisciplinary Approach

- Scale Modeling
- Mathematical Modeling
- Integrated Water Resources Management
- Sustainable Hydropower
- Ethical and Social dimensions of water

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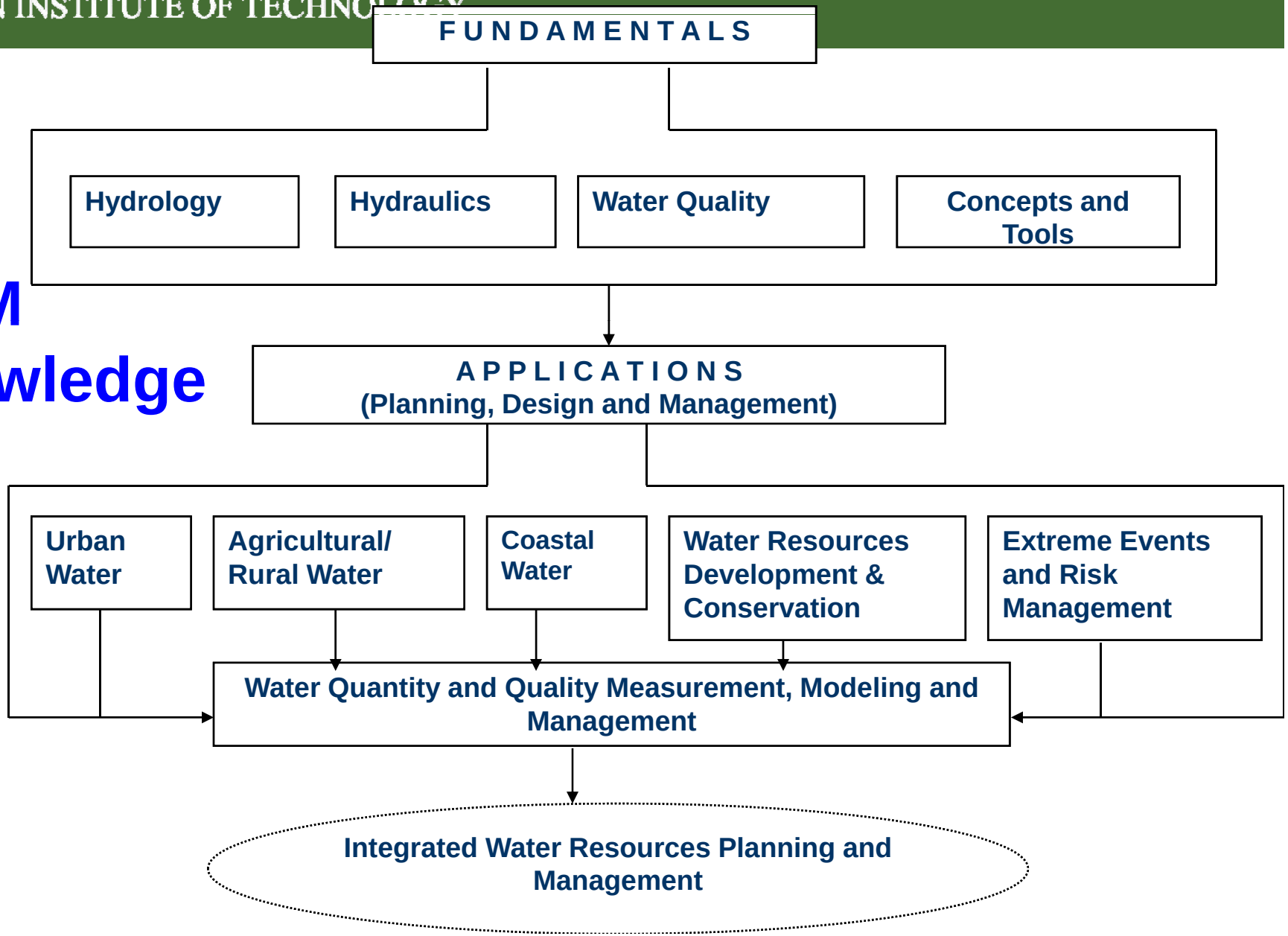
WEM Knowledge Map



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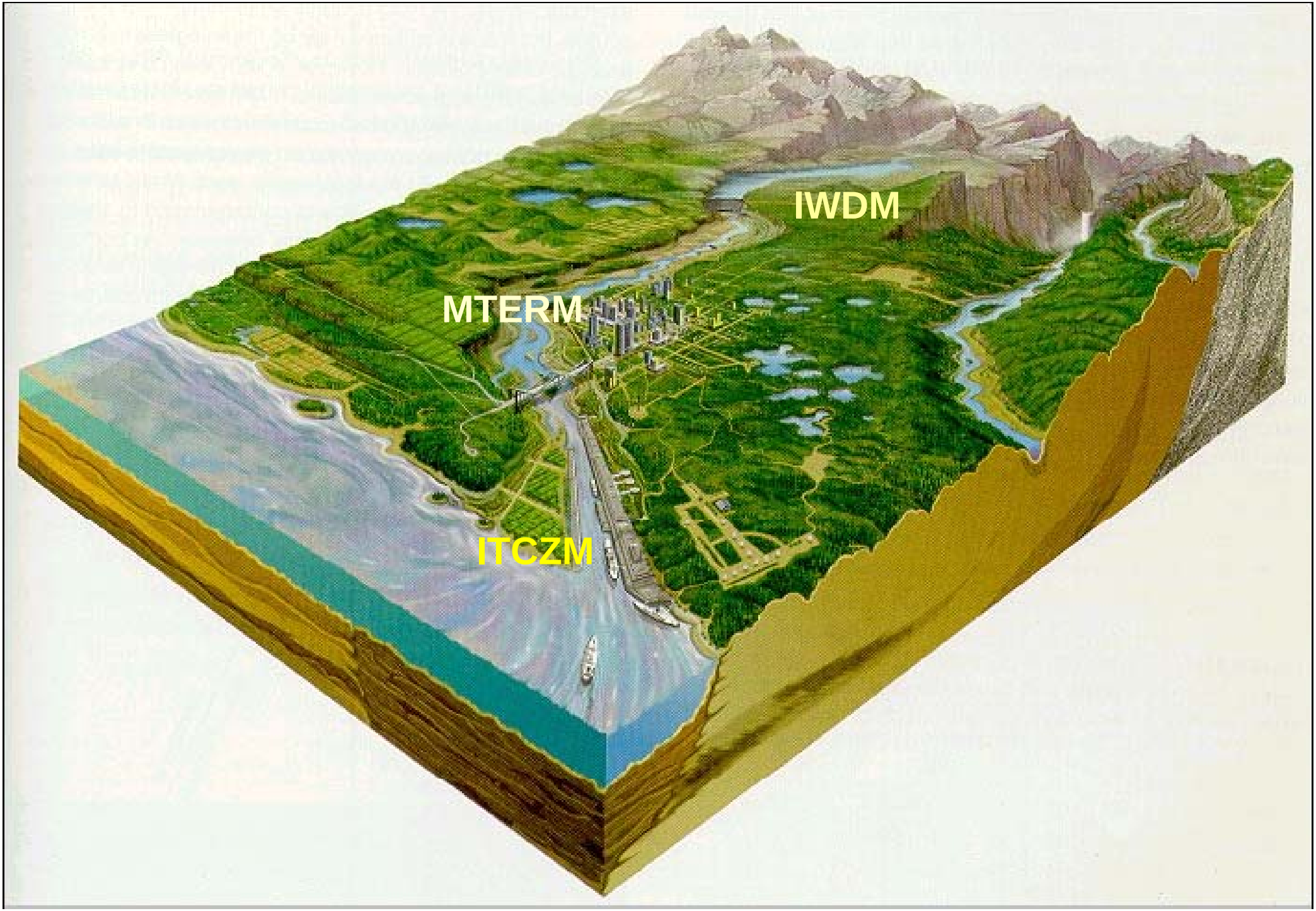
Water Engineering and Management

Focal Areas

- Urban Water
- Agricultural/Rural Water
- Coastal Water
- Water Resources Development and Conservation
- Extreme Events and Risk Management

Major Challenges for Water Professionals

- Securing water for PEOPLE
- Securing water for FOOD production
- Protecting vital ECOSYSTEMS
- Ensuring COLLABORATION across sectors and boundaries
- Dealing with VARIABILITY of water in time and space
- Creating popular AWARENESS and understanding
- Forging POLITICAL WILL to act
- Developing good GOVERNANCE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MTERM
ITCZM

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Demo Net

IP Star Satellite

DUMBO

IP Star Uplink

IP Star Gateway

Terrestrial Internet

Simulated Head Command Center: *Interlab, AIT*

Field Satellite Access

MANET OLSR

PDA

Simulated Disaster Area 1: *Kinnari Elephant Camp, Phuket*

Field Satellite Access

MANET OLSR

PDA

Simulated Disaster Area 2: *Phuket Elephant Ride, Phuket*

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http://www.ait.ac.th