EMERGING ECOHYDROLOGY APPROACHES IN MALAYSIA AND FUTURE CHALLENGES

Building Resilience to Climate Change Risk and Vulnerability to Meet Water Security Challenges Workshop on 10-11 July 2017, Langkawi, Malaysia

UNESCO

HTC KL

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PRESENTATION OUTLINE

1. Water and Ecosystems
2. The Principles of Ecohydrology
3. Transforming The Water Sector
4. Ecohydrology for IWRM
5. Emerging Ecohydrology in Malaysia at River Basin Level
6. Conclusion, Recommendation and Future Challenges
WATER IS FOR

PEOPLE
Portable Water
Livestock
Recreation
& Tourism

8%

NATURE AND ENVIRONMENT
Wetlands
Ecology
Biodiversity
Environmental Flow

Transportation

FOOD
Agriculture
Aquaculture

74%

INDUSTRY
Power Generation Development

18%

THE INTERACTIONS BETWEEN WATER AND ECOSYSTEM

GEO-Wadi satellite precipitation calibration
- IHP Secretariat, Anil Mishra

Value of water due to CC-water footprint & tangible and intangible impacts
- UTM- Dr Zainura
UNESCO FRAMEWORKS

• Paris Agreement
• Transforming our world: the 2030 Agenda for Sustainable Development
• Addis Ababa Action Agenda
• Sendai Framework
• S.A.M.O.A. Pathway
• Future We Want
• Agenda 21

• Framework Convention on Climate Change [FCCC]
• Transforming our world: the 2030 Agenda for Sustainable Development
• A global framework for financing development post 2015
• Disaster Risk Reduction 2015–2030
• Small Island Developing States Accelerated Modalities of Action
• renew the commitment to sustainable development and to ensuring the promotion of an economically, socially and environmentally
• the Rio Declaration on Environment and Development, and the Statement of principles for the Sustainable Management of Forests
The Principles of Ecohydrology for IWRM

3 sequential components:

1. **Hydrological**
   - The quantification of the hydrological cycle of a basin, should be a template for functional integration of hydrological and biological processes.

2. **Ecological**
   - The integrated processes at river basin scale can be steered in such a way as to enhance the basin’s carrying capacity and its ecosystem services.

3. **Ecological engineering**
   - The regulation of hydrological and ecological processes, based on an integrative system approach, is thus a new tool for Integrated River Basin Management.
By 2030, achieve universal and equitable access to safe and affordable drinking water for all

By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

By 2030, substantially increase water use efficiency across all sectors and ensure sustainable withdrawals and supplies of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

By 2030, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

By 2020, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

Support and strengthen the participation of local communities in improving water and sanitation management

(source: ASM, 2016)
Goal 6. Ensure availability and sustainable management of water and sanitation for all.
ECOHYDROLOGY FOR IWRM

Function of

vegetation

ECOHYDROLOGY

supports living on planet

water

- water security as the ultimate objective
- related to the integration of water ecology and engineering
- improve water resources from further degradation
- provide ecosystem services to societies

How: need to develop new understanding of that interdependency in a systematic way. The programme must also pay more attention to the role of culture and social factors in harmonising the biosphere's potential with the humanity.
Emerging ecohydrology at river basin level

- River restoration
- River rehabilitation

(DID, 2015)
EMERGING ECOHYDROLOGY IN MALAYSIA

ECOHYDROLOGY PROJECTS

RIVER OF LIFE (RoL)

MSMA ISME STORMWATER MANAGEMENT

KELANA LAKES

PUTRAJAYA LAKE & WETLANDS

MELAKA RIVER BEAUTIFICATION/TRANSFORMATION
KELANA LAKES

Ex-mining pond

Prior to 1996

1. WQ Degraded

public park in 1996 for fishing and recreation

rapid surrounding development & its for flood mitigation

1. added wastewater, solid waste, and storm water overflow to the main lake in the area

2. the loss of wetland plants and animal life

3. The ecomposition of the sludge generated in the lake had eventually caused bad odour.

local residents formed a stakeholder forum, comprising 400 Friends of Kelana Jaya Park, and led by a 15-member steering committee including Petaling Jaya City Council in 2007
MELAKA RIVER BEAUTIFICATION

• To restore Melaka River to its original and clean condition
• state and federal governments since 2001
• flood mitigation, cleaning, beautification, upgrading river facilities for the Melaka river mouth.
• ecohydrology as a 'garden-city' concept in integrating upgraded sewage treatment plants along the river with physical features such as landforms, vegetation, and ensure that all the domestic and industrial wastewater water bodies to produce the green scenery of the city entering the river was treated.

13.5 km
570,000 cubic meter contaminated sediment
Putrajaya, the administrative capital of the federal government of Malaysia, is located in the Klang Valley region, south of Kuala Lumpur.

The catchment’s areas lie within three (3) different municipalities:
- Sepang Municipal Council
- Subang Jaya Municipal Council
- Putrajaya Corporation

Stakeholders of different entities consist of:
- UPM & UNITEN (university and hostel),
- MARDI (agriculture R&D agency),
- IOI (commercial),
- TNB (power plant),
- Cyberjaya (another municipality),
- Sungai Merab area (sub-urban area)

30% of the Putrajaya Lake Catchment is lies in Selangor; the other state in Malaysia.
PUTRAJAYA LAKE AND WETLANDS

PUTRAJAYA WETLAND
- completed: August 1998
- construction duration: 17.5 month
- depth: 0.5 to 3 m
- surface area: 200 ha

Main objective:
- surface run-off filtration system for Putrajaya Lake

PUTRAJAYA LAKE
- completed: May 2002
- construction duration: 62 month
- depth: 2 to 13 m
- surface area: 400 ha

Main objective:
- centre for water sports, recreation and tourism

The Lake Vision
"To manage the lake in order to ensure its aesthetic viability, sustain good water quality, and allow for different recreational uses, including primary and secondary contact activities"
PUTRAJAYA LAKE AND WETLANDS

Ecohydrology Demonstration Sites of UNESCO-IHP Ecohydrology Programme (EHP)

• 49 sq km which was previously covered by vegetation, that is, rubber and oil palm plantation. Putrajaya is characterised by the 'garden-city' concept, physical features such as landforms, scenery of the city.

• Putrajaya Lake catchment is 51 sq km.

• A portion of it lies in the state of Selangor, while around 70 percent is in Putrajaya.

• The Putrajaya Lake was created by inundating the lower part of the valleys of Chua River and Bisa River. The lake contains Putrajaya Wetlands, the largest constructed wetland system in the tropics consisting of 24 cells. The wetlands act as a natural treatment system that filters out most of the pollutants from the river water before it enters the Putrajaya Lake.
RIVER OF LIFE

2015-2020

- clean up the rivers and rehabilitate their banks into vibrant and liveable waterfront areas with high economic value.
- Set to be completed by 2020, is in tune with the government's overall aspiration of turning Greater Kuala Lumpur into a metropolis in Asia that simultaneously achieves top-20 economic growth and becomes one of the global top 20 most-liveable cities by 2020.
- 3 components: river cleaning, river beautification, and land development.
- spans across three municipals and eight rivers, covering a total 110-km stretch of rivers and their banks that need to be rehabilitated and restored.
- The project has both ecological and hydrological objectives. It aims to improve and sustain the water quality of the Klang River and its tributaries to the Class IIB
• Public Outreach Program (PoP)
• Upgrading the existing sewerage facilities and installing wastewater treatment plants at wet markets, as well as social interventions such as relocation of squatters to reduce sewage, sullage and rubbish in the Klang River.
• Installed and maintained 375 GPT in sewerages.
• RoL initiative mooted by the Department of Irrigation and Drainage (DID), Malaysia.
• The % different for the annual gross pollutant load between upper Klang River and Kerayong River catchment is around 57 percent (36 kg/ha and 360 kg/ha annual gross pollutant wet load in kg/ha/yr/GPT by upper Klang River catchment with PoP versus Kerayong River catchment without PoP was 145 kg/ha/yr/GPT and 338 kg/ha/yr/GPT respectively.
MSMA INTEGRATED STORMWATER MANAGEMENT ECOHYDROLOGY
VISIT BY DIRECTOR UNESCO JAKARTA & REPRESENTATIVE OF UNESCO DHAKA

MAY 5, 2017

Ms Beatrice Khaldun

Fish Feeding

MAY 8, 2017

Prof Shabaz Khan

Fish Feeding
FUTURE CHALLENGES

1. Enabling Environment
   - Policies
   - Legislation

2. Institutional Framework
   - Central – Local
   - River Basin
   - Public – Private

3. Management Instruments
   - Assessment
   - Information
   - Allocation
   - Instruments

EQUITY

Balance ‘water for livelihood’ and ‘water as a resource’
The conclusion: National initiatives in forest and wetlands protection for river basin management, which is less costly than building dams and more sustainable non-structural activities in the long run is in parallel with ecohydrology concept focussed locally will be shared regionally and globally.

The recommendation: River Basin Management Committee

Challenges: combined and continued efforts

The future we want 2030


