MINISTRY OF ENVIRONMENT AND WATER

NATIONAL HYDRAULIC RESEARCH INSTITUTE OF MALAYSIA

Integrated Lake Basin Management (ILBM) initiatives towards transforming the Malaysian Water Sector

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  - National Lake Water Quality Standards
  - Guideline for Integrated Lake Basin Management Plan
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IMPORTANCE OF LAKES

- First few national studies/program on lakes by NAHRIM and ASM
  - Inventory of major lakes: 90 major lakes
  - Eutrophication status: >60% were categorized as eutrophic
- These waterbodies are functioning as
  - Water supply
  - Hydropower
  - Flood mitigation
  - Recreation & tourism
  - Habitat

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INVENTORY & CLASSIFICATION OF LAKES

- Ongoing studies documented more than 1500 inland waterbodies (including bunded storage, off-river storage reservoir, Hybrid off-river augmentation system, detention ponds)
- Classification (i.e. ≥1 ha) -> ~430 lakes





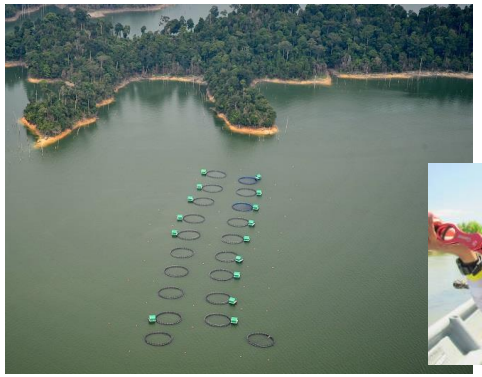

VALUE OF LAKE AND RESERVOIR RESOURCES IN MALAYSIA

- **Water supply**
  - **Domestic and industrial water supply:** > 60 reservoirs supply 98% of the total national water use; numerous ponds as alternative source of water supply
  - **Irrigation:** ~10 reservoirs i.e. Bukit Merah, Muda, Pedu and Ahning Reservoir

- **Hydroelectric**
  - 16 reservoirs i.e. Kenyir, Bakun & Chenderoh Dam; contribute 5% of national electricity demand

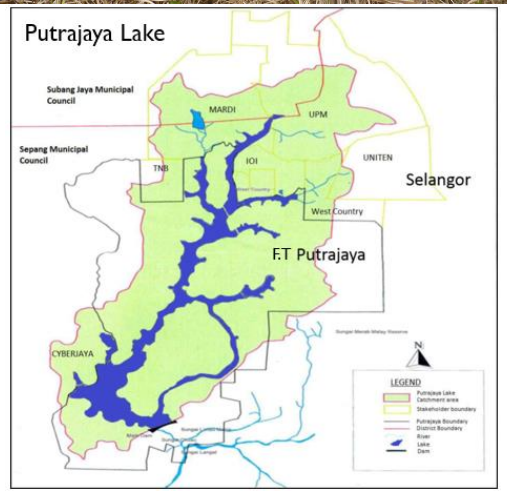
- **Flood mitigation**
  - 16 reservoirs i.e. Timah Tasoh, Batu Dam, Semberong Dam, Bekok Dam & Machap Dam - reduced flooding risk
  - >1500 flood detention ponds in urban areas

VALUE OF LAKE AND RESERVOIR RESOURCES IN MALAYSIA



- **Fishing and aquaculture**
  - Kenyir, Batang Ai & Temenggor Reservoir - Freshwater cage culture
  - Chenderoh & Beris Reservoir – Sport fishing
- **Biodiversity**
  - Bera and Bukit Merah Reservoir: arowana
  - Numerous species of freshwater fish, plankton and flora
- **Recreation and tourism**
  - Amenity to urban populations: Putrajaya, Titiwangsa & Taiping Lake Garden
  - Tourism: Kenyir, Batang Ai, Temenggor
- **Heritage and patrimony**
  - Older lakes support community and cultural values; Dayang Bunting and Chini Lake

Major Challenges

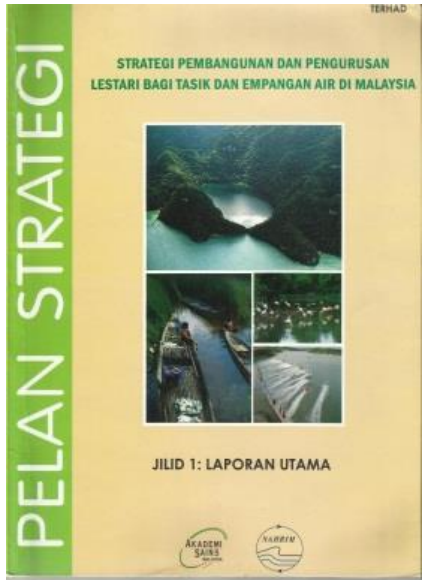


- Deterioration of lakes due to eutrophication, sedimentation and pollution (point sources and non-point sources)
- Unplanned / unsustainable catchment development was the most pervasive issue facing Malaysian lakes
- Fragmentation of governance mechanisms
- No ILBM based management plan for majority of lakes
- Most lakes did not have a central management authority that extend throughout the whole lake basins

ILBM Initiatives

Strategic Plan for Sustainable Lake and Reservoir Development and Management

National Water Resources Council approved in 2012:



National Vision for Malaysian Lakes.

"*The **sustainable use of lakes** for their **ecosystem services** and **economic values***"

Policy Framework Statement

*"Lakes and reservoirs will be sustained, restored and protected through the adoption of an **Integrated Lake Basin Management (ILBM)** approach".*

ILBM Initiatives

Strategic Plan for Sustainable Lake and Reservoir Development and Management

I. Identify and Empower a **Lead Ministry/Agency**

II. Establish a **central management committee** at the Federal Level – headed by NRE

III. NAHRIM as a **Centre for Lake Research and Resources**

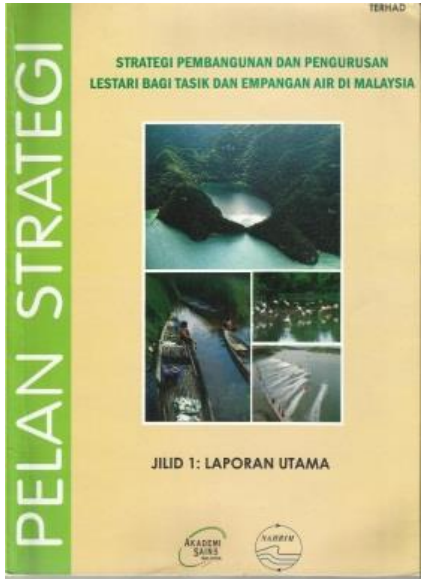
IV. Establish **Lake Management Committees at State level**

V. Development of a **Detailed Action Plan**

VI. Strengthen **regulatory** framework

VII. Support the **role of Local Communities** in Lake Management

VIII. Enhance **networking** and strengthen international strategic alliances



ILBM Initiatives

LAKE BRIEF PROGRESS – 4 series (38 lakes)

- Series 1 (2010) Bukit Merah reservoir, Tasik Kenyir, Logan Bunut, Tasik Pedu & Muda, Tasik Putrajaya and Wetlands, Tasik Chini, Tasik Terip and Tasik Timah Tasoh
- Series 2 (2011) Bera Lake, Paya Indah Wetlands, Beris Dam, Sembrong Dam, Ringlet Lake, Chenderoh Dam, Klang Gate Dam and Sg Selangor Dam
- Series 3 (2012) Batang Ai Lake, Bukit Kwong Dam, Durian Tunggal Dam, Taiping Lake Garden, FRIM's Lake and Wetlands, Jor Lake, Pergau Lake, Babagon Dam, Tasik Subang and Langat Dam

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- Series 4 (2019) Temenggor Lake, Malut Dam, Sg Tinggi Dam, Semenyih Dam, Ahning Dam, Upper Layang Dam, Lebam Dam, Mengkuang Dam, Telok Bahang Dam, Air Hitam Dam, Berombak & Jambu Bongkok lakes

ILBM Initiatives

BLUEPRINT FOR LAKE AND RESERVOIR RESEARCH AND DEVELOPMENT IN MALAYSIA, 2014

- Provide disciplinary focus / list of research areas needed on lakes in Malaysia
- Provide spatial focus / prioritise lakes needing ILBM plan

LAKE RESEARCH THEMES

1. Governance
2. Ecosystem services and socio-economic
3. Pollution and water quality
4. Eco-hydrology and basin management
5. Biodiversity and natural products
6. Physical limnology and hydrodynamics
7. Sustainable technology

Integrated research → Conservation and development Plan → Enable stakeholders to pursue appropriate strategies

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NATIONAL LAKE WATER QUALITY CRITERIA & STANDARDS

NLWQS 2015

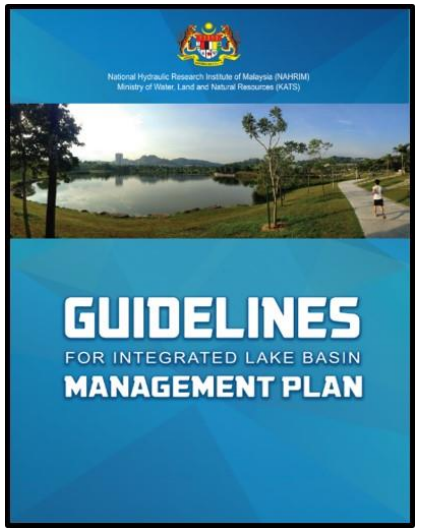
Approved (2017)

National Water Resources Council

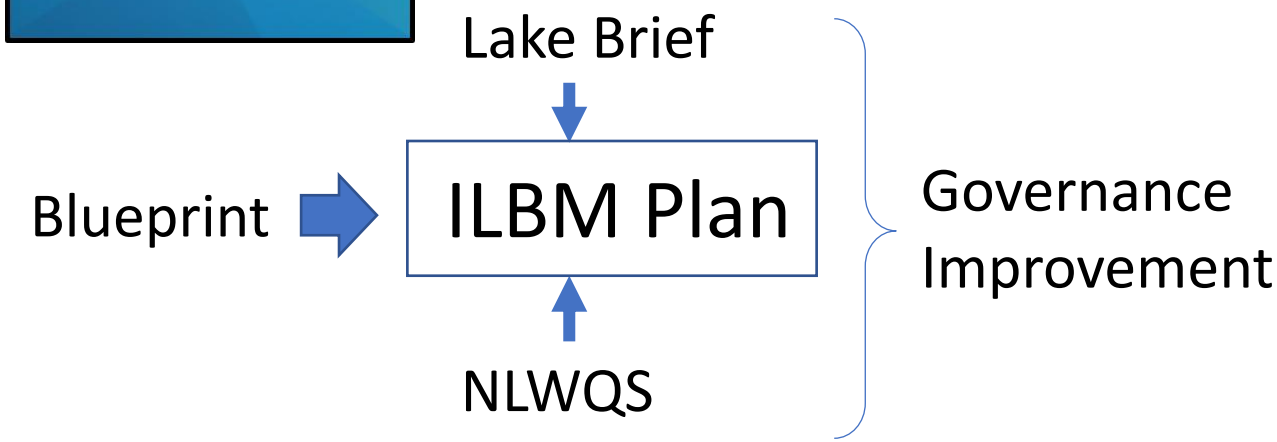
Roadshow to all states & agencies

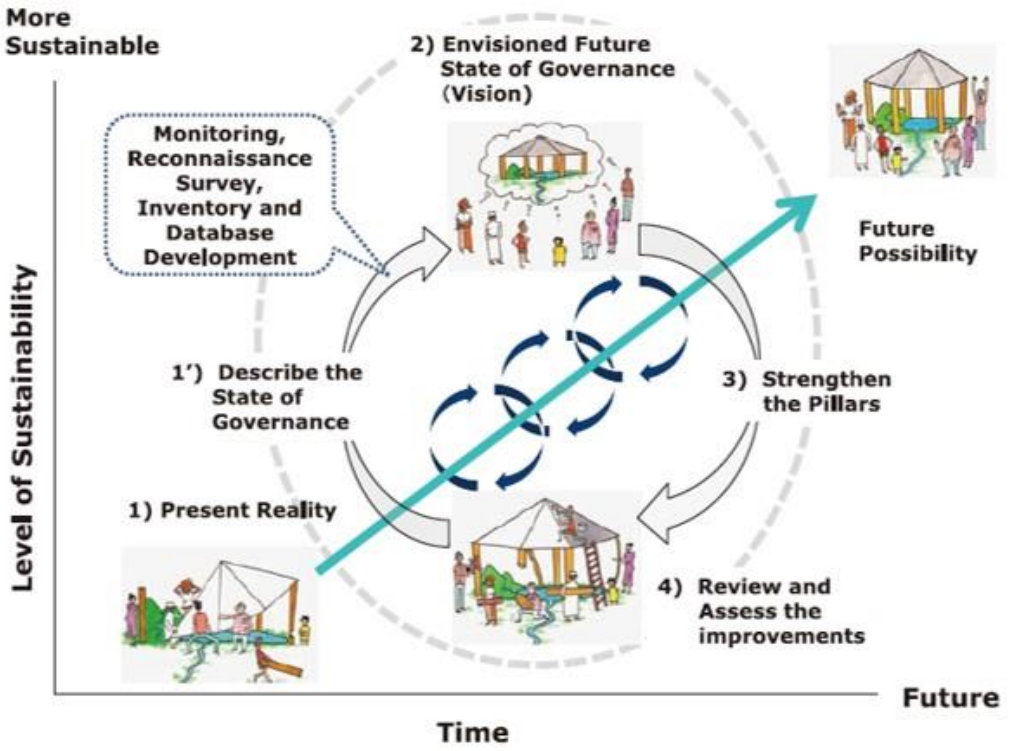
- Standard for ambient monitoring of lake water quality
- To support decision making and management
- Aims: protecting human health and ecosystem health

GUIDELINE FOR DEVELOPING LAKE BASIN MANAGEMENT PLAN, 2018



- Description
- Evaluation
- Management Objective
- Action Program





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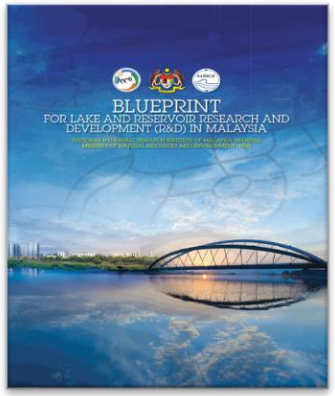
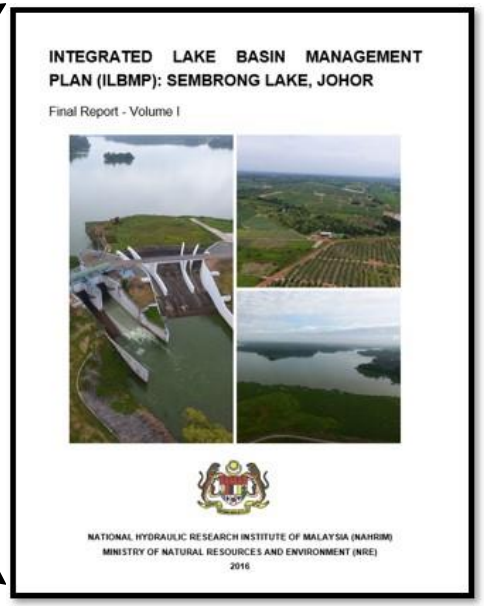
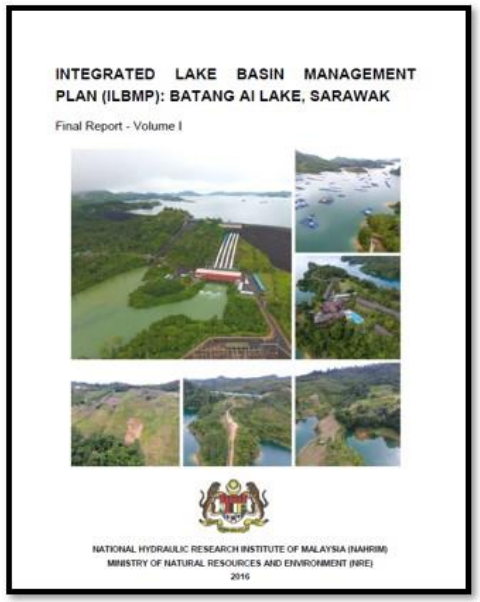
ILBM Initiatives

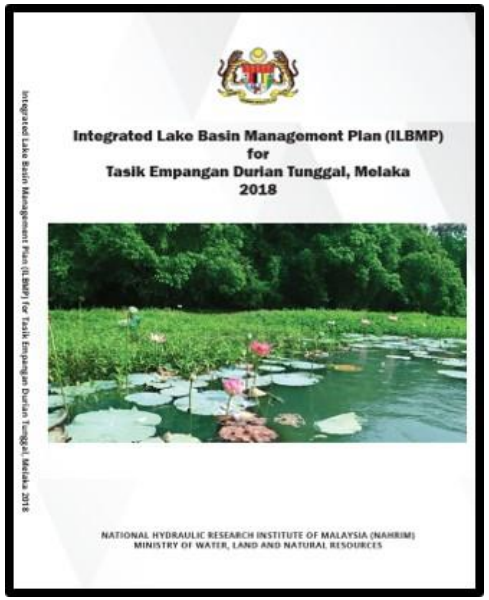
INTEGRATED LAKE BASIN MANAGEMENT PLAN

- Three ILBM PLAN completed (2016 – 2018: Sembrong, Batang Ai, Durian Tunggal);
- Four ILBM plan in progress (2019 – 2020: Bukit Merah & Chenderoh; 2020: Timah Tasoh & Melati)



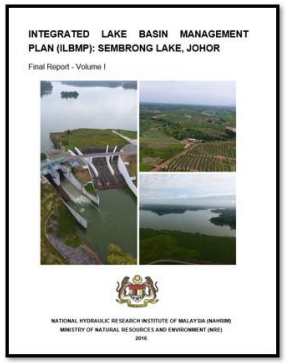






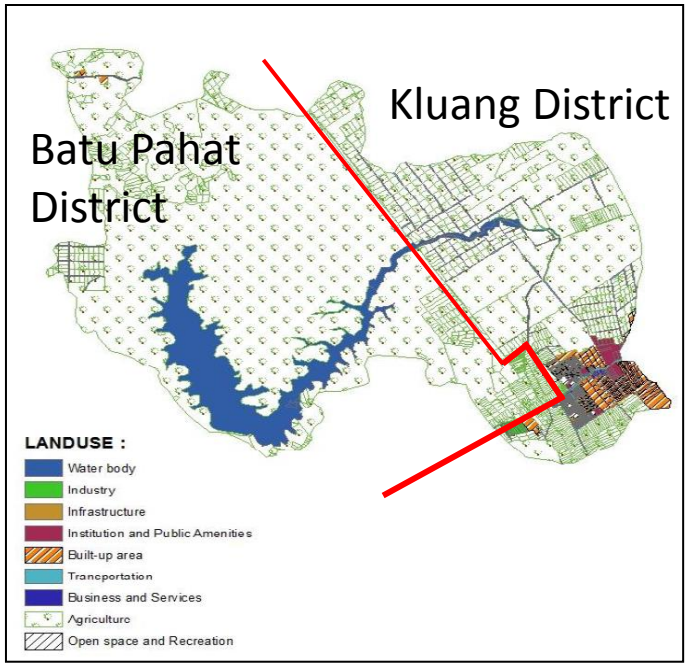
ILBM Initiatives

ILBM PLAN FOR SEMBRONG LAKE



Major issues/Focus area: Eutrophication

- Hyper-eutrophic; high level of cyanobacteria or blue green algae poses health threat to water consumers
- sources of pollution: agricultural activities, untreated wastewater and land development within catchment



- Proper wastewater treatment plant for the residential area & subsurface filtration and activated sludge at **individual premises**;
- Buffer Zone for plantation and modern agriculture
- Proper cross drain to control surface run-off
- Lead agency: **one stop centre (OSC) at BAKAJ**

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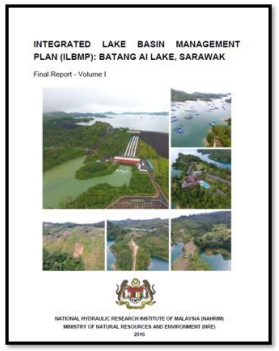
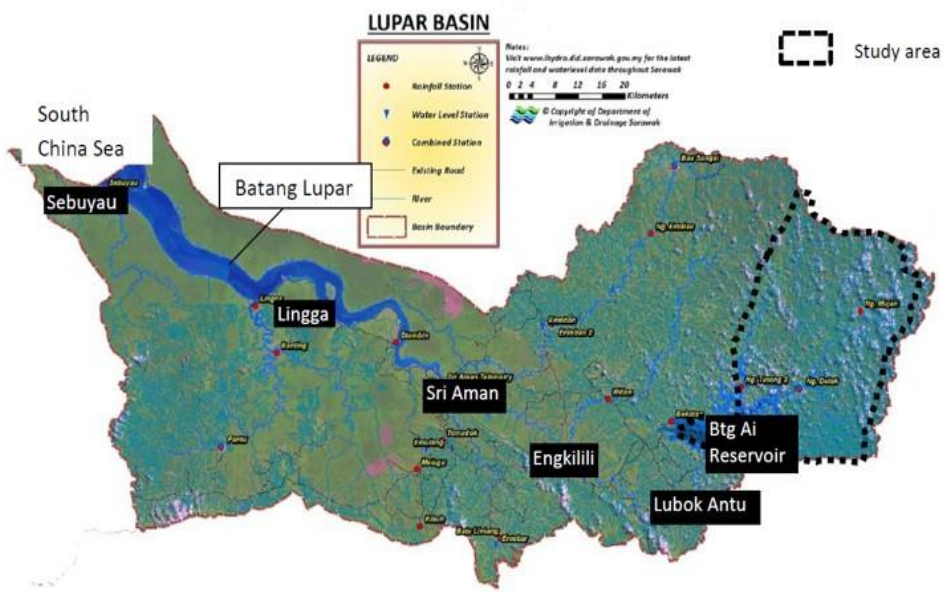
ILBM Initiatives

ILBM PLAN FOR BATANG AI RESERVOIR



Major focus area:

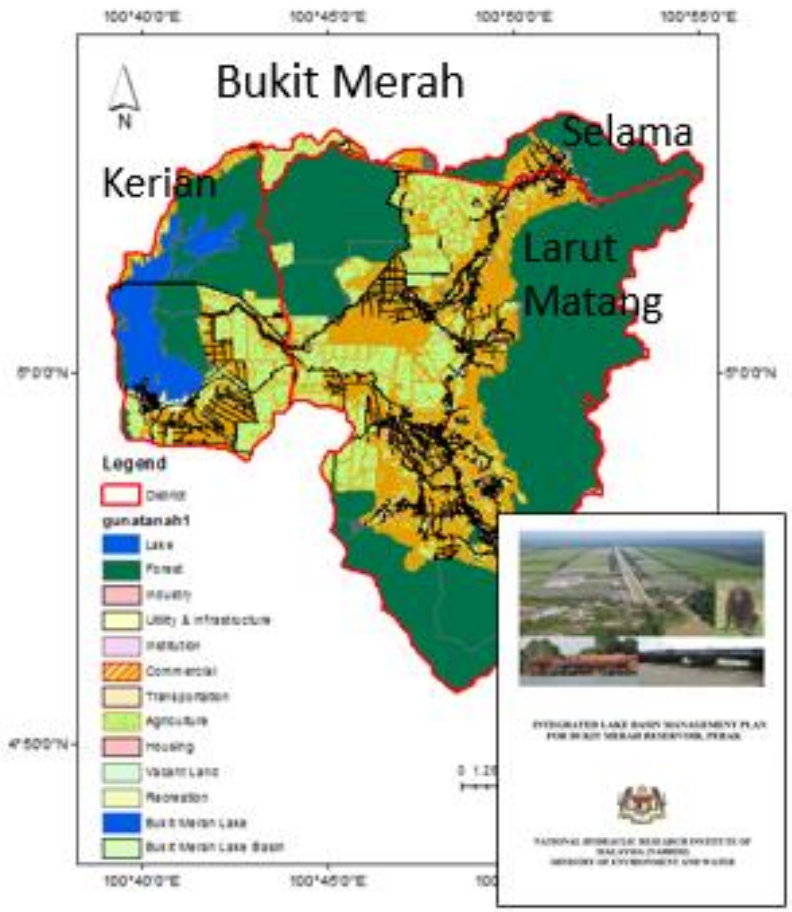
- Water quality still good; Cage culture; floating houses along Sg Engkari; villages/longhouses along rivers
- sources of pollution: agricultural activities, untreated wastewater and land development within catchment



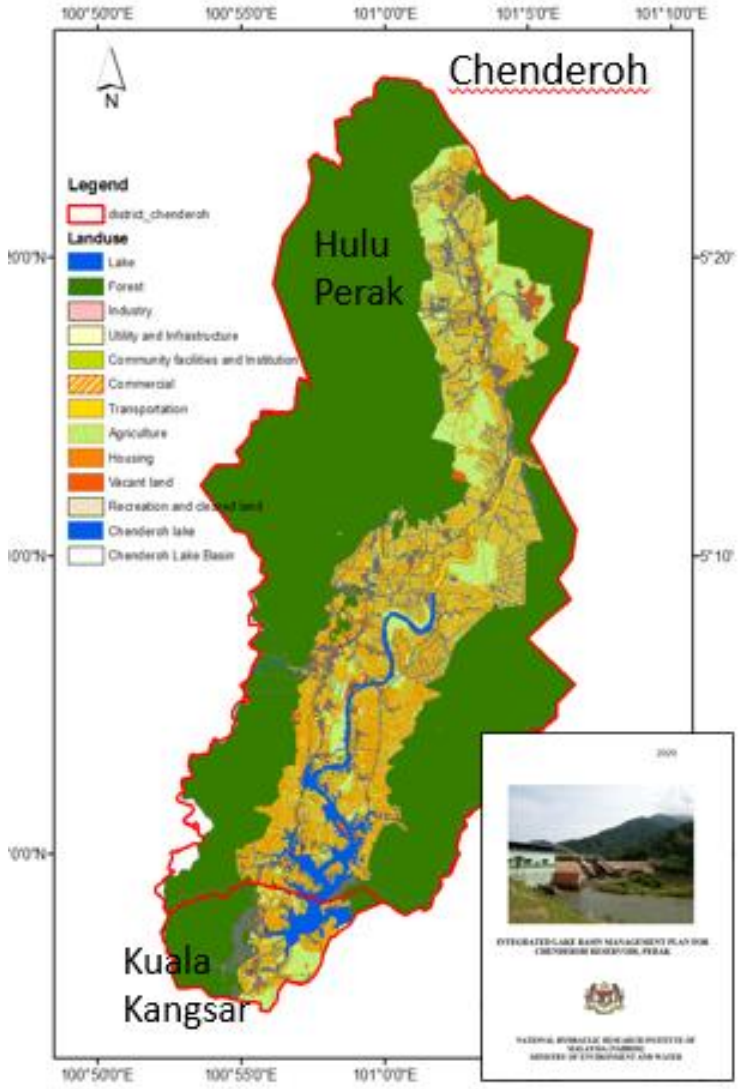
- Strengthen Development Planning conditions
- Buffer Zone along rivers
- **One dedicated institution** to manage the catchment
- Lead agency: Sarawak EPU-NREB

ILBM Initiatives

ILBM PLAN FOR BUKIT MERAH & CHENDEROH LAKES



- Two oldest reservoirs
- Multiple functions
- Multiple districts



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ILBM Initiatives

ILBM PLAN FOR BUKIT MERAH & CHENDEROH LAKES

Bukit Merah Lake

Ecosystem services

a. Kerian Irrigation Scheme – 24,000 hectare
b. Domestic Water Supply
c. Flood Mitigation
d. Tourism – Bukit Merah Lake Town Resort
e. Arowana Sanctuary





Recommendation:

- Buffer Zone
- Construction of bund
- Proper maintenance and management
- Lead agency: State EPU-DID



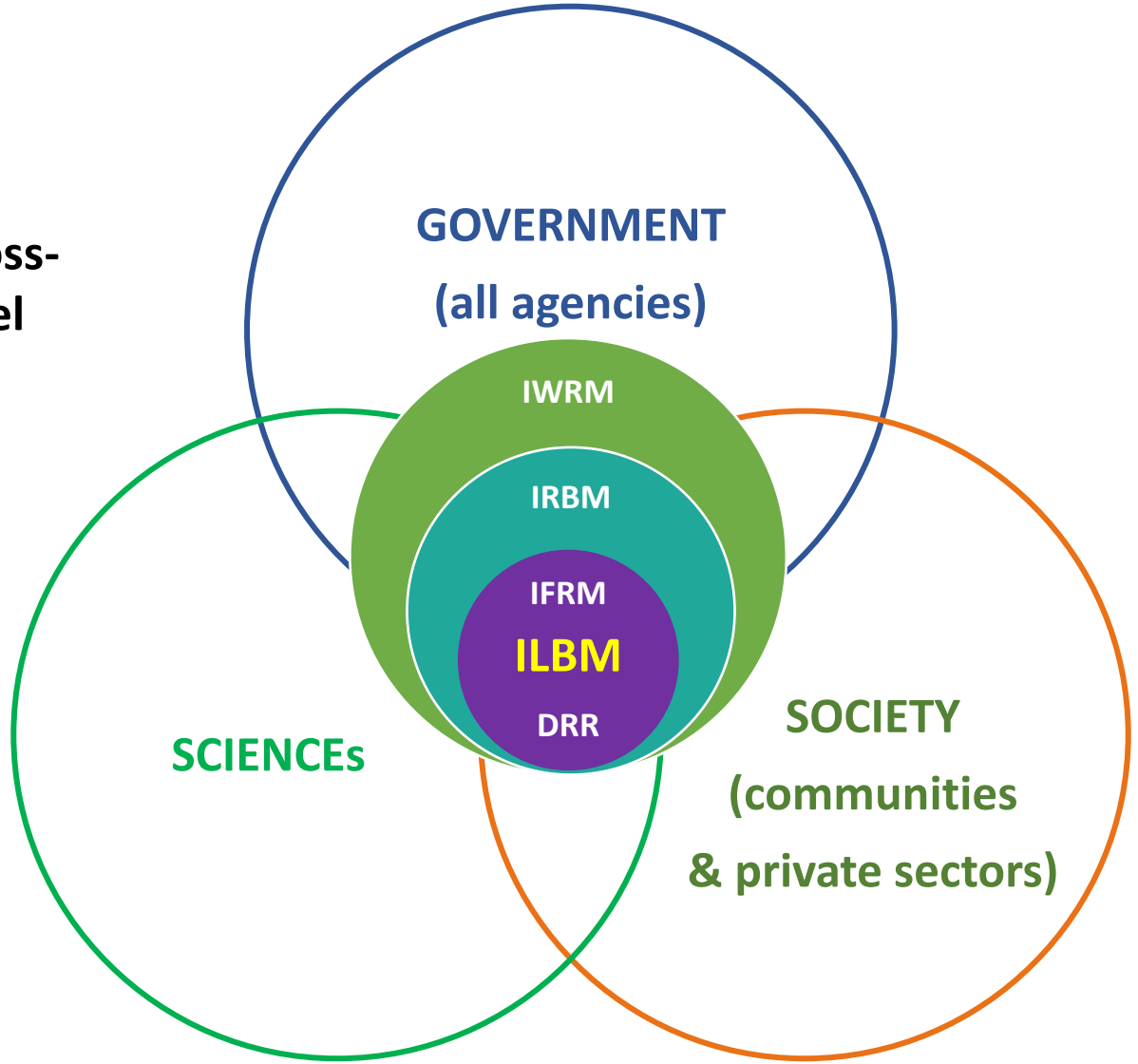

Chenderoh Lake

Ecosystem services

a. Chenderoh hydropower generation
b. Tourism & Heritage
   i. Raban lake
   ii. Lenggong World Heritage Site & Geopark
   iii. Freshwater fishing hotspot
c. Flood Mitigation

IWRM BIG PICTURE

IWRM requires cross-sectoral, multi-level approach

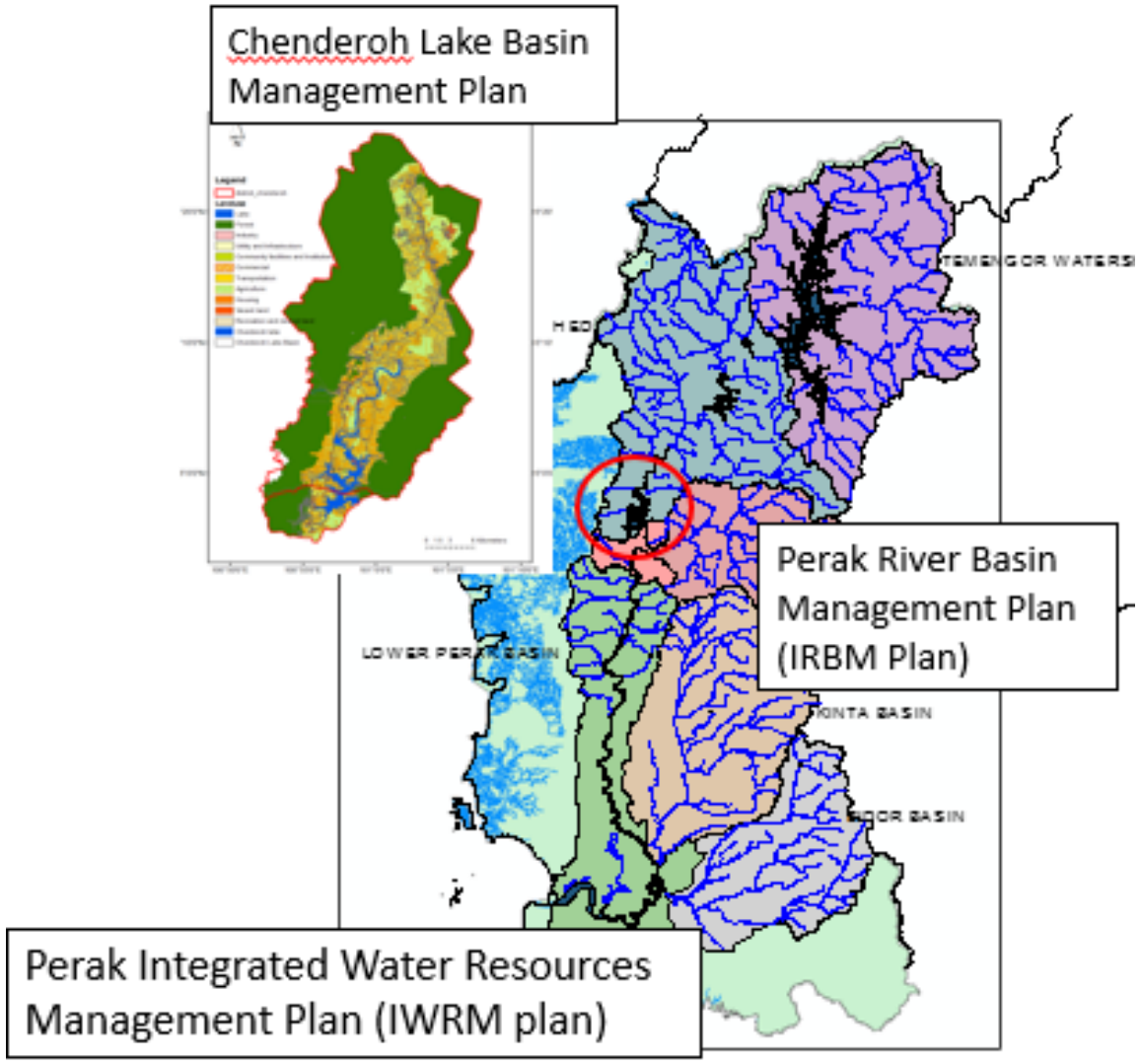


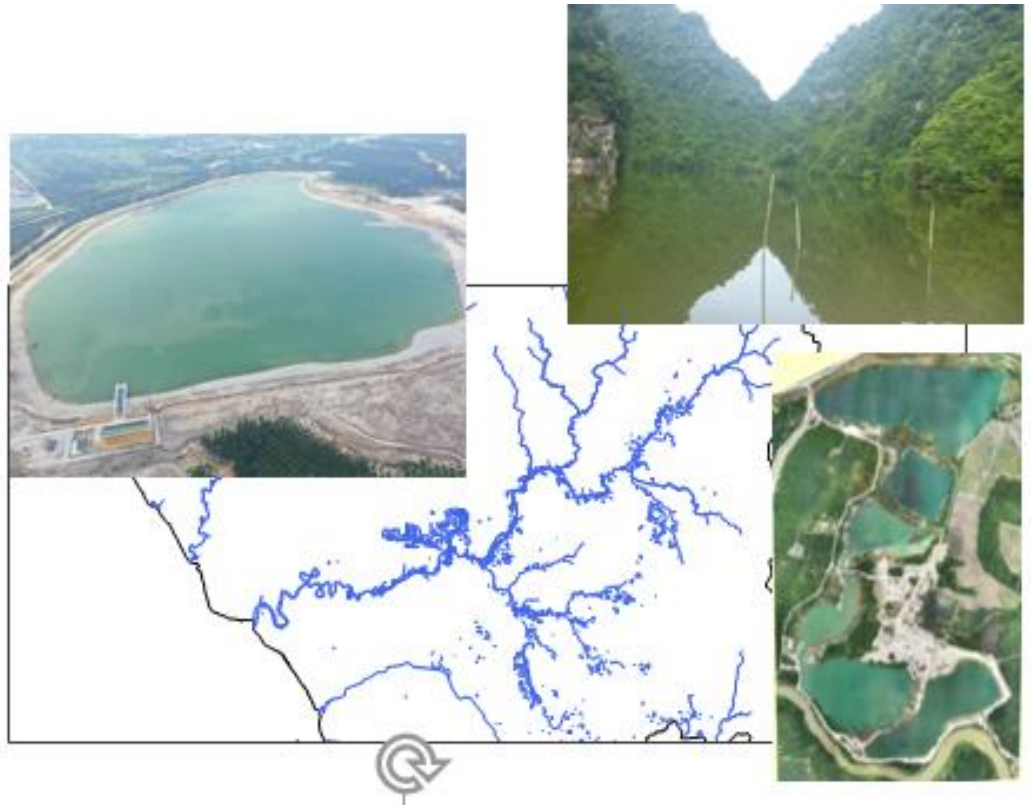
IWRM – (*Integrated Water Resources Management)*

Components

IRBM – Integrated River Basin Management
IFRM – Integrated Flood Risk Management
ILBM – Integrated Lake Basin Management
IAWM – Int Agriculture Water Management
IUFM – Int Urban Flood Management
DRR – Disaster Risk Reduction
CCIA – Climate Change Impact Adaptation,
etc

Connection between ILBM & IWRM





- The need to focus on lake management due to
  - lentic characteristics
  - Impact on the river quality
  - Impact to the water supply/resources

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IWRM – Key Milestones in Malaysia

ILBM related

1992 ICWE Dublin & Earth Summit Rio

1993 Love Our River Campaign

1998 Formation of National Water Resources Council

2000 Formation of Selangor Water Management Authority - LUAS

2001 Adoption of IWRM under:
- 3rd Outline Perspective Plan
- 8th Malaysia Plan

2002 Rio+10 Summit Johannes-burg

2003 **MSAN 02** National Adoption of Integrated River Basin Management

2004 Natural Resources and Environment Ministry created

2005 National Study for the Effective Implementation of IWRM in Malaysia

2006 Formation of Sabah Water Resources Council

2007 **MSAN 03** Rain Water Harvesting

2008 Water Service Industry Act
Formation of Kedah Water Resources Board
MSAN 04 Gazette River Reserves and Flood Mitigation

2009 Implementation of IWRM BMP's

2010 **MSAN 05** Resolution of issues involving rivers shared between States

2011 **MSAN 06** Endorsement of National Water Resources Policy
Completion of National Water Resources Study

2012 National Water Resources Policy (NWRP) launched
MSAN 07 Strategy Plan for Integrated Lake Basin Management
Adoption of IASM By NRE/JMG

2013 **MSAN 08** Expedited the Formation of State Water Resources Council

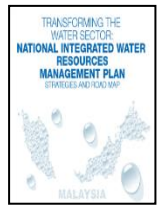
2014 **MSAN 09**
- Urban Flash Flood Management
- Framework for Water Resources Sharing Between States

2015 UNSD Summit New York

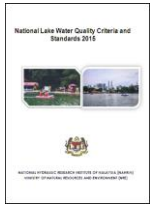
MSAN 10 National Agenda on Integrated Water Research Strategy Plan to Address Climate Change Impacts on Water

2016 **MSAN 11**
- Groundwater Usage during Droughts
- Alternative Water Resources Master Plan
- Inter-basin Transfer
- Water Demand Management

2016 Launched of **National Integrated Water Resources Management Plan**



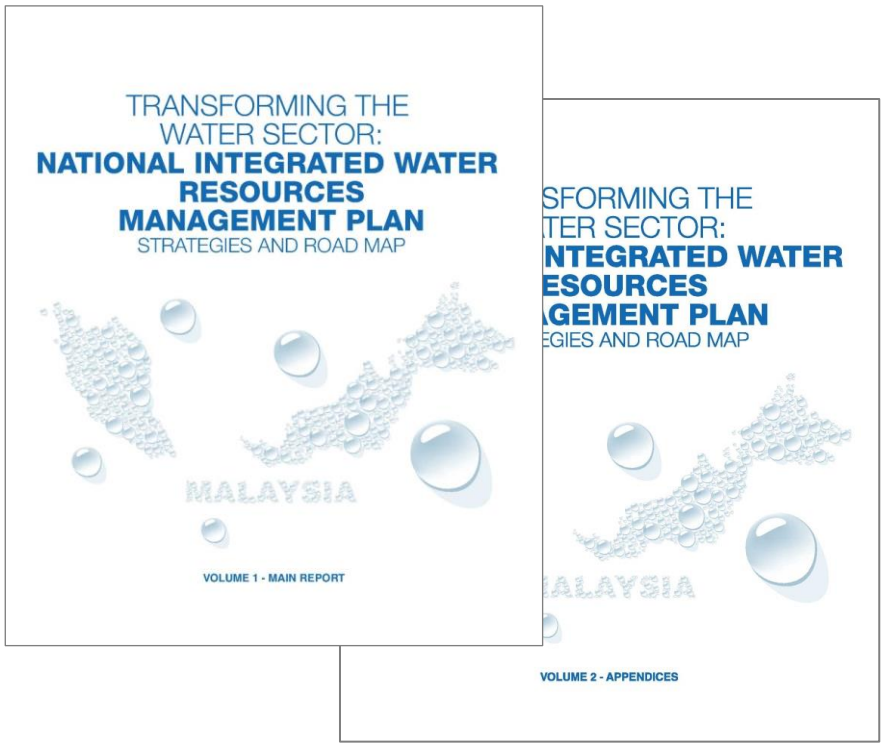
2017 **MSAN 12** Adoption of **National Lake Water Quality Criteria and Standards**



2030 **Fulfilling UN Sustainable Development Goal 6: Clean Water and Sanitation**

Transforming the water sector:
National IWRM Plan – Strategies and Road Map (NIWRMP)

- Academy of Sciences Malaysia



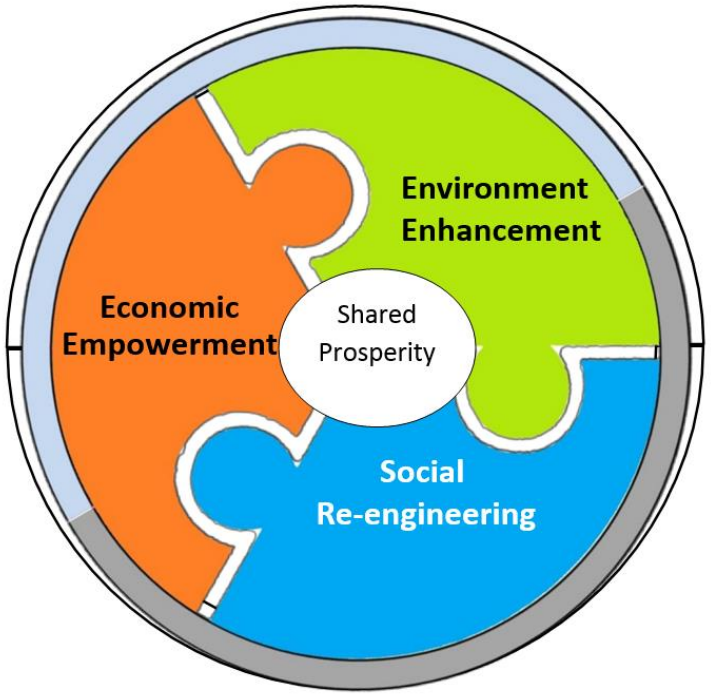
https://issuu.com/asmpub/docs/web_vol1_gf

No	Component Plan Study Report	Completed
1.	Integrated Lake Basin Management	2009
2.	Integrated Aquifer Systems Management	2011
3.	Water Demand Management	2016
4.	Water Supply & Wastewater Management Services	2016
5.	National Agenda for Integrated Water Research	2014
6.	Climate Change and Water	2014
7.	Integrated River Basin Management	2016
8.	Agriculture Water Services for Water Business	2016
9.	NKPA on Water	2015
10.	ASM Mega Science Study: Water Sector	2011

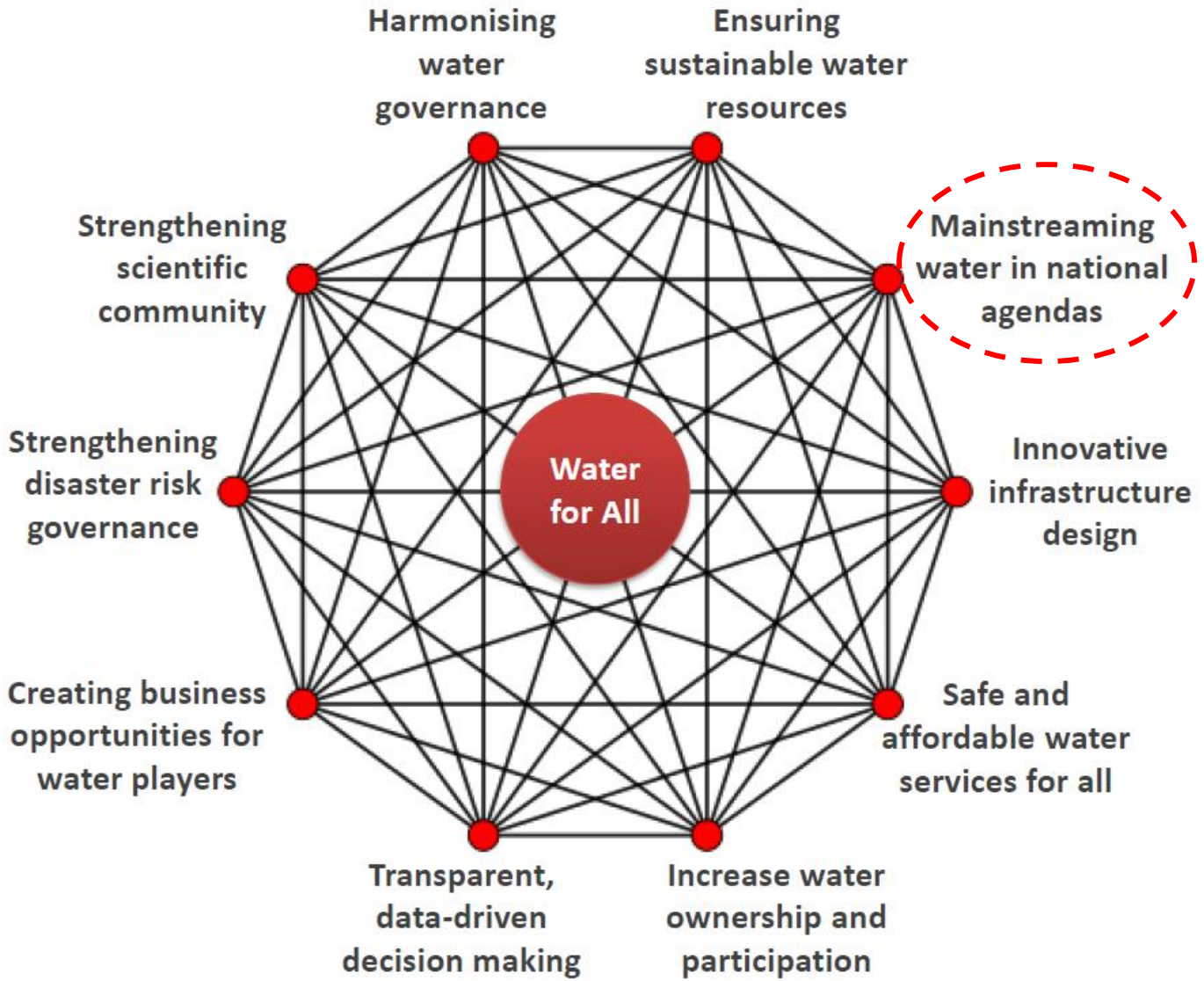
The 12th Malaysia Plan

Water - a resource, an asset, a precious commodity, a lifeline for the nation

A major national dynamic economic sector, within a pristine environment which providing sustenance, security, support and joy to the nation



10 PILLAR STRATEGIES



Ministry of Economic Affairs, 20th June 2019

THANK YOU

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