CONSTRUCTED WETLANDS AND MAN-MADE LAKES

Putrajaya Experience

Datuk Hj Hasim Hj Ismail
President, Perbadanan Putrajaya
LOCATION OF PUTRAJAYA, MALAYSIA

- Kuala Lumpur City Centre
- 25 KM to Kuala Lumpur International Airport
- 20 KM to Putrajaya

Diagram showing the location of Putrajaya, Malaysia with respect to Kuala Lumpur, Selangor, and the Straits of Malacca.
THE PUTRAJAYA MASTER PLAN

Key Features

- Putrajaya covers an area of 4,931 hectare (12,184.7 acre/49 km²)
- Divided into 20 precincts & core precincts (1-5) form as Central Business District (CBD)
- 40% of the city area is designated as green open space & lake
- Green and blue areas intertwined within the residential, work places & commercial areas
- Man-made lake as micro-climate moderator & serve as sports and recreational purpose
- Constructed wetlands as natural filtration & natural habitat
- 38km of the waterfront created along the lake
- 13 metropolitan parks with different themes & functions
BLUE AREAS OF

PUTRAJAYA LAKE AND WETLAND

Man-Made Lake & Constructed Wetland
Total area 600 hectares (200ha wetlands + 400ha lake)

The Putrajaya Lake Management 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 & WETLAND

LARGEST CONSTRUCTED FRESHWATER WETLANDS IN THE TROPICS
- Source of water: Sungai Chuau and Sungai Bisa
- Comprises of 5 arms namely UW, UN, UE, LE & UB
- Planted with more than 70 species of wetland plants and ZII, totaling 12 million altogether

PUTRAJAYA LAKE
- 400 ha lake surface, creating 38 km shoreline
- It serves as a climate moderator
- Centre for water sports, recreation and tourism
Similar to Natural Wetlands

They perform many vital functions as:

- Water capacitor, buffers and connectors
- Life support habitats
- Cradles of biodiversity
- Stabilizers of local climate conditions
- Nutrient regulators
Other Functions of Putrajaya Wetland

- Cost-effective treatment of non-point-source of pollution
- Hydrological modification (by providing flood detention area and reducing peak discharge and flow velocities)
- Water storage for irrigation purposes
- Opportunities for space enhancement for development recreational amenities (i.e.: for community, school children)
- Tourism and community recreation amenities
- Opportunities for academic research and public education
<table>
<thead>
<tr>
<th><strong>Location</strong></th>
<th>Southern part of the wetlands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Catchments</strong></td>
<td>60% wetlands</td>
</tr>
<tr>
<td></td>
<td>40% promenade and peripheral area</td>
</tr>
<tr>
<td><strong>Buffer features</strong></td>
<td>20m promenade; 200 ha wetlands</td>
</tr>
<tr>
<td><strong>Water surface area</strong></td>
<td>400 ha</td>
</tr>
<tr>
<td><strong>Storage volume</strong></td>
<td>24.5 million cubic meters</td>
</tr>
<tr>
<td><strong>Water depth</strong></td>
<td>2-14 metres</td>
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<tr>
<td><strong>Average depth</strong></td>
<td>6.6 metres</td>
</tr>
<tr>
<td><strong>Usage</strong></td>
<td>Recreation, fishing, water sports, water transport</td>
</tr>
<tr>
<td><strong>Lake Shoreline</strong></td>
<td>38.0 kilometres</td>
</tr>
<tr>
<td><strong>Water level</strong></td>
<td>21.0 m above MSL</td>
</tr>
<tr>
<td><strong>Construction started</strong></td>
<td>year 1998</td>
</tr>
<tr>
<td><strong>Completed</strong></td>
<td>year 2002</td>
</tr>
</tbody>
</table>
The Promenade
- Buffer zone along the shorelines
PRESENTATION OUTLINE

Introduction
Where and who we are?

ILBM of Putrajaya Lake and Wetland Management at basin level
Maintenance activities Monitoring and survey

Stakeholders management Diversity assessment Public participation

Management measures

Success Stories

Conclusion
Ecohydrology is a scientific concept applied to environmental problem-solving”

Zalewski et al., 1997

It quantifies and explains the relationships between hydrological processes and biotic dynamics at a catchment scale. The concept is based upon the assumption that sustainable development of water resources is dependent on the ability to restore and maintain evolutionarily established process of water and nutrient circulation and energy flows at the basin scale.
STAKEHOLDERS MANAGEMENT

The catchment’s areas lies within three (3) different municipalities
✓ Majlis Perbandaran Sepang
✓ Majlis Perbandaran Subang Jaya
✓ Perbadanan Putrajaya

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
MAINTENANCE ACTIVITIES

- Up-keeping and cleaning;
- Maintenance of structures and facilities (weir, jetty, pontoon, lake shorelines, dam)
  - Management of plants in nursery/cells;
  - Prunning/Trimming/Thinning of ZII plants;
  - Manual weeding
  - Plants Pest & Disease Control

MONITORING EXERCISES

- Physico-chemical and biological of water
- Hydrological monitoring
- Rainfall and weather monitoring
- Dam safety monitoring

ECOSYSTEM (DIVERSITY) ASSESSMENT

- Terrestrial Fauna survey including birds, insects, reptiles, mammals and amphibians;
- Surveillance & Evaluation of Plants Growth;
- Fish
Habitat Enhancement – for birds, fish
Ensuring the health of aquatic life;
Fish Stocking;
Elimination of unwanted species of fish
Protection of rare and endangered bird species;
Refitting – Desilting / Plant Harvesting / Replanting
An integrated system of the wetlands and lake management
LAKE USE MANAGEMENT ZONING PLAN

Zone 1
- Restricted Access Wetland Zones
- Sensitive ecological areas

Zone 2
- (Central Wetland)
  - Controlled Access
  - CW environmental reserve

Zone 3
- (Lake bordering Pr. 1, 8 and 10)
  - Permit controlled access zone
  - Critical security and privacy

Zone 4
- (Lake bordering Pr. 3, 7, 17 & 18)
  - General Navigation Zone

Zone 5
- (Lake bordering Pr. 4, 5 & 6)
  - Active Recreation
  - General navigation zone

Zone 6
- (Lake bordering Pr. 7 & Cyberjaya)
  - Passive recreation
  - General navigation zone

- • General Navigation Zone
- • Permitted Recreation
- • General Navigation Zone
- • Active Recreation
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- Public participation
- Success Stories
- Conclusion
PUBLIC PARTICIPATION
- getting communities and stakeholders involved in lake and wetland management (inventory record/data and survey)

✓ Workshop & Photography Contest on Biodiversity Appreciation
✓ Catch and Release Fishing Competition
✓ Bird Watching and Identification
ENVIRONMENT, ECOSYSTEM AND EDUCATIONAL PROGRAM (3EP)- ‘know your ecosystem’

- To engage the community/stakeholder particularly the school children to be involved in Putrajaya Lake and Wetland management.

• Objectives:
  ✓ to create awareness, sense of belonging and ownership among communities especially young generation
  ✓ To educate school children and be more responsible of what they discharge in order not to pollute environment and not to harm inhabitants.

• Target group: school children (primary and secondary school within Putrajaya Lake Catchment)

• Field-based learning through actual monitoring of water quality, survey of vertebrates/invertebrates, know-what biological indicator of healthy ecosystem

  ✓ Data collection, assessment and interpretation
  ✓ Discussion on how to sustain the good ecosystem
  ✓ Threat? How to get rid?

- To engage the community/stakeholder particularly the school children to be involved in Putrajaya Lake and Wetland management.
PUBLIC PARTICIPATION
Intellectual Discourse (sharing ideas and thought): Jointly organised by Perbadanan Putrajaya with other government agencies/private sector/NGO

✓ Series of Putrajaya Lake and Wetland Management seminar/workshop/colloquium
✓ Series of ILBM Malaysia – ILEC Consultative Forum
✓ Series of UNESCO-IHP Malaysia National Water Watch Programs for Young Leaders – facilitator for Lake and Wetland module
✓ Series of technical discussion related to water and lake basin management at national and international level
National UNESCO Water Watch Programme for Young Leaders
UNESCO-IHP Malaysia
Putrajaya Lake and Wetland ecohydrology programmes
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The lake has now become a renowned venue to community, national and international high-profile events, though an attraction for domestic and international tourism as well. There are about 30 events of activities carried out in a year.
AN ATTRACTION FOR RECREATIONAL ACTIVITIES

- sightseeing by boats
- lake cruising
- fishing
- bird watching
- walking
- cycling
- jogging
AN ATTRACTION FOR RESIDENT, DOMESTIC AND INTERNATIONAL TOURIST
Sharing the success story

VENUE
- To community
- National and international events

ATTRACTION
- For water sports
- Recreational activities

AESTHETIC
- Resident
- Domestic tourist
- International tourist

NATURE IN THE URBAN FABRIC
- Centre of reference
- Operational project

AWARD
- Gold Award
- Excellence award
- Outcome
The ecosystem supports diversity of aquatic life: **202** species of phytoplankton, **111** species of zooplankton, **20** species of macrobenthos and **55** species of fish were recorded until 2015.

The survey also recorded **1421** species of insects, **13** species of amphibians, **21** species of reptiles and **17** species of mammals.
CENTRE OF REFERENCE FOR LAKE & WETLAND
Sharing the success story

VENUE
- TO COMMUNITY
- NATIONAL AND INTERNATIONAL EVENTS

ATTRACTION
- FOR WATER SPORTS
- RECREATIONAL ACTIVITIES

AESTHETIC
- RESIDENT
- DOMESTIC TOURIST
- INTERNATIONAL TOURIST

NATURE IN THE URBAN FABRIC
- CENTRE OF REFERENCE
- OPERATIONAL PROJECT

AWARD
- GOLD AWARD
- EXCELLENCE AWARD
- OUTCOME
The International Awards for Livable Communities 2012

Malaysia Landscape Architecture Awards 2012

Malaysia Landscape Architecture Awards 2012
NATIONAL DEVELOPMENT PROJECTS - OUTCOME EVALUATION

PUTRAJAYA LAKE AND WETLAND

PRESENTED TO IMPLEMENTATION COORDINATION UNIT (ICU), PRIME MINISTER’S DEPARTMENT

Prepared by:
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Bahagian Alam Sekitar, Tasik & Wetland
9 Mei 2013
DEMONSTRATION OF ECOHYDROLOGY BIOTECHNOLOGIES IN PUTRAJAYA LAKE AND WETLAND, MALAYSIA - Ecosystem Services Economic Assessment

Duration of research project:
Mac – December 2015

Funded by:
UNESCO Office in Jakarta

Supported by:
Malaysia Fund-in-Trust (MFIT)
Demonstration Project Networks

Category III: Operational Projects

>> Are implementing EH Principles and involved with stakeholders in project management (Argentina, China, Germany, Kenya, Italy, Malaysia)
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What's next?
The application of eco-hydrology concept using wetlands and lake can be seen as a successful approach to pursue sustainability, by bringing nature back into the urban surrounding and benefiting the communities.
Thank you
Terima kasih

PUTRAJAYA LAKE AND WETLAND
One of the Seven Operational Demonstration Sites of UNESCO-IHP Ecohydrology Programme (since 2010)

.......... Towards A Global Reference Site
UNESCO – IHP Ecohydrology Programme