# STRATEGIC PLAN FOR THE MANAGEMENT OF LAKES AND RESERVOIRS IN MALAYSIA

STATUS REPORT
Annual Review Meeting of ILBM – Governance Project for fiscal year 2008
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# 1.Study on Eutrophication of Lakes in Malaysia – 2005

- IAP Programme on Water initiated in 2004 - ASM is the Malaysian focal point.
- Eutrophication of Lakes and Groundwater Management – initial priority focus areas
- ASM jointly with NAHRIM initiated a desk study end 2004 on eutrophication of lakes in Malaysia.

# Desk Study – Eutrophication of Lakes

## (i) Inventory of lakes and reservoirs in Malaysia

### LAKE

- a natural, standing, freshwater or saline water body found on the Earth's continental land masses.

### RESERVOIR

- water bodies with different shapes and sizes that have been constructed by humans by damming a river.

# Desk Study – Eutrophication of Lakes

## (i) Inventory of Lakes and Reservoirs in Malaysia (2)

- Multi-Purpose Functions
- 90 lakes in Malaysia
  - 55 lakes (61%) – water supply & irrigation
  - 35 lakes (39%) - hydropower, flood control, silt retention & recreational

# Desk Study – Eutrophication of Lakes
## (ii) Distribution of Lakes and Reservoirs by State in Malaysia

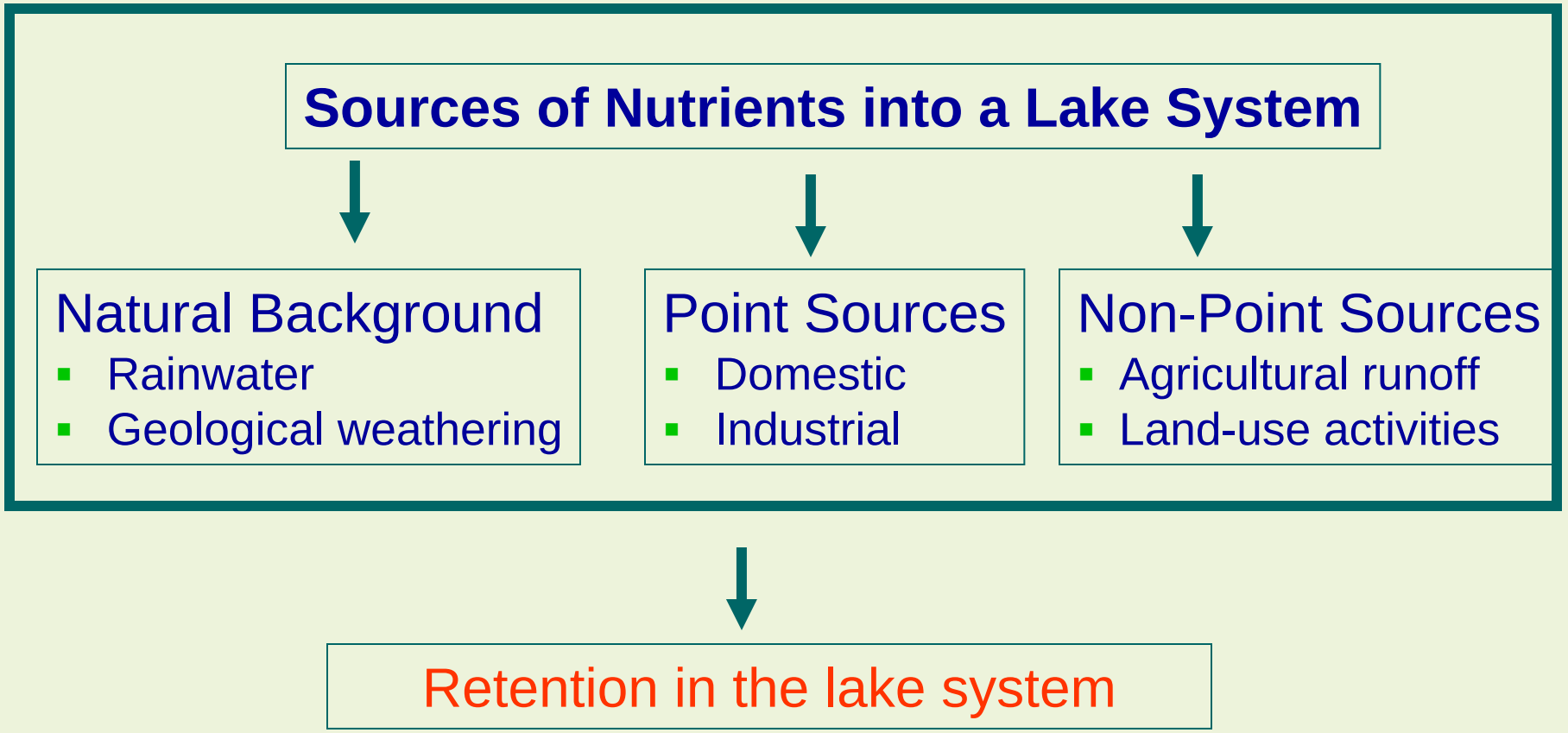
| No. | State | Lake | Reservoir |
|---|---|---|---|
| 1. | Perak | 2 | 9 |
| 2. | Selangor | 5 | 10 |
| 3. | Pahang | 2 | 8 |
| 4. | Kelantan | - | 3 |
| 5. | Johor | - | 13 |
| 6. | Kedah | 1 | 6 |
| 7. | Labuan | - | 3 |
| 8. | Melaka | - | 4 |
| 9. | Negeri Sembilan | - | 5 |
| 10. | Pulau Pinang | - | 4 |
| 11. | Perlis | 1 | 1 |
| 12. | Sabah | 1 | 5 |
| 13. | Sarawak | 2 | 2 |
| 14. | Terengganu | 1 | 1 |
| 15. | W.P. Putrajaya | 1 | - |

# Desk Study - Eutrophication of Lakes

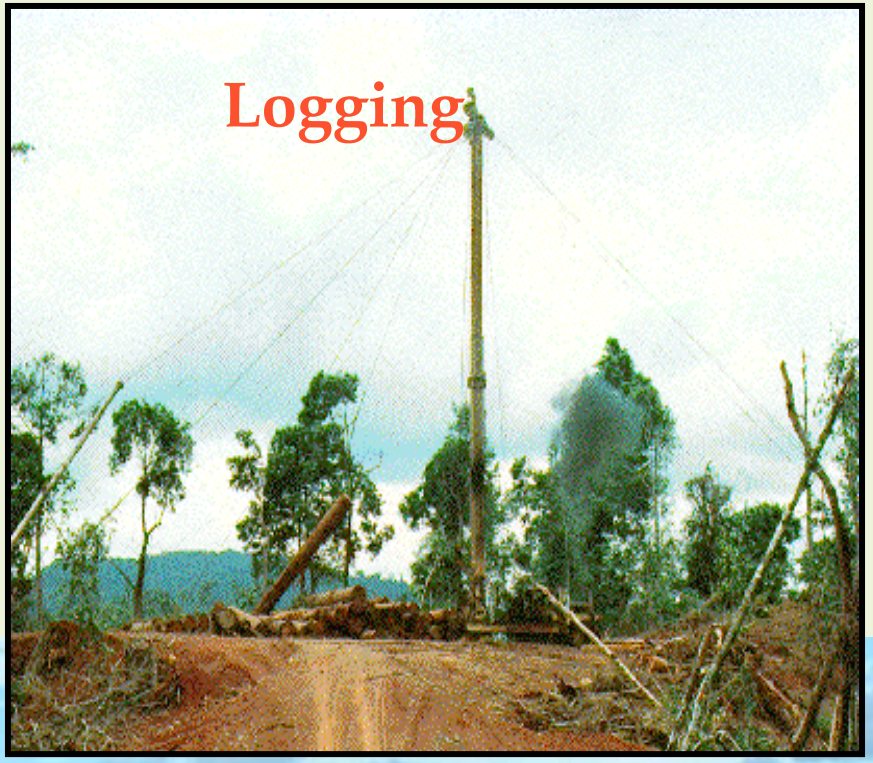
**Lake eutrophication is "the nutrient enrichment of lakes.“**

- *Largely due to elements like phosphorus and nitrogen* -

# Sources of Nutrients



# Erosion from construction sites

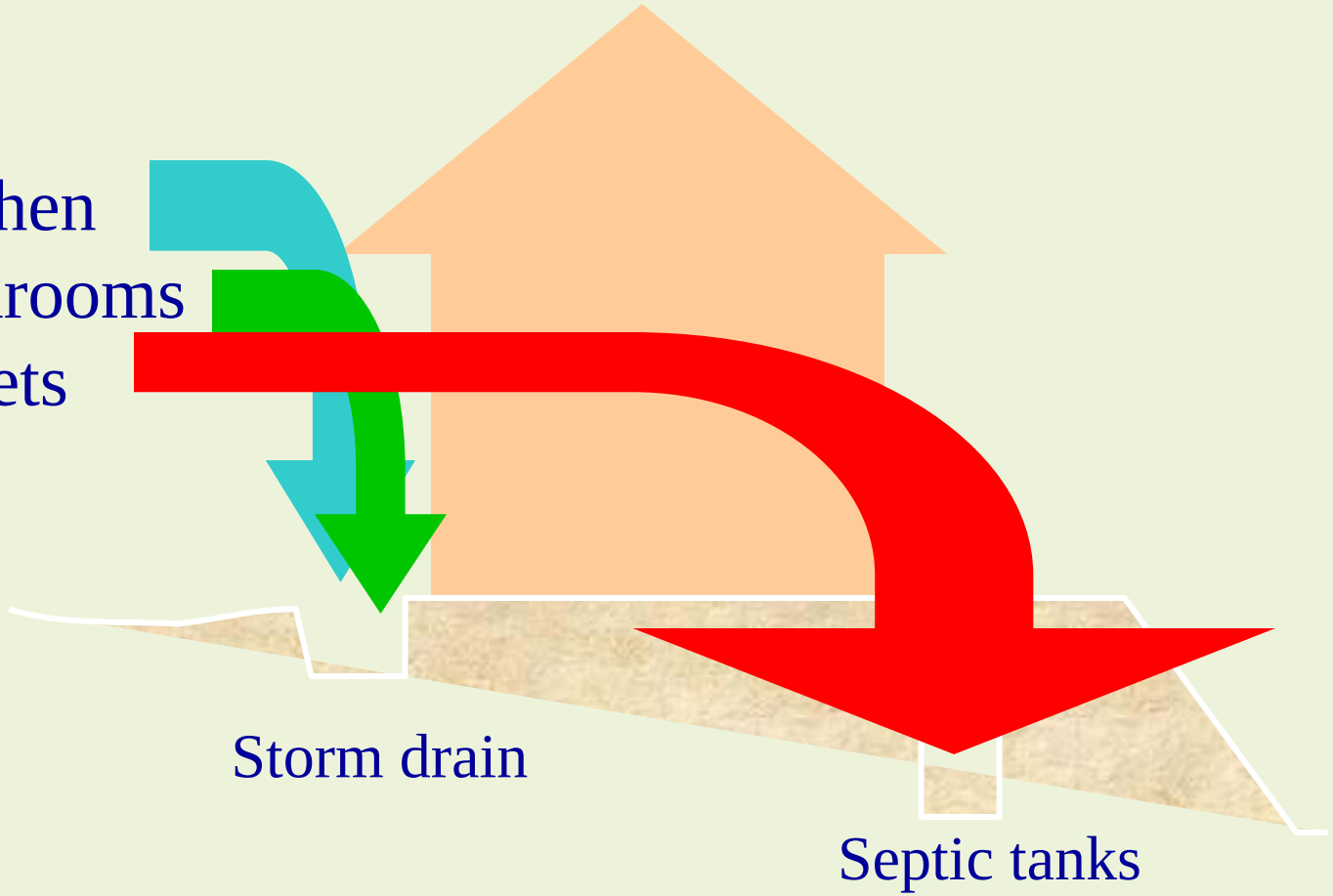



Major contributor to non point
source (NPS) pollution

# Agricultural Runoff – Cameron Highland

# Wastewater from rural and urban building development

- Kitchen
- Bathrooms
- Toilets

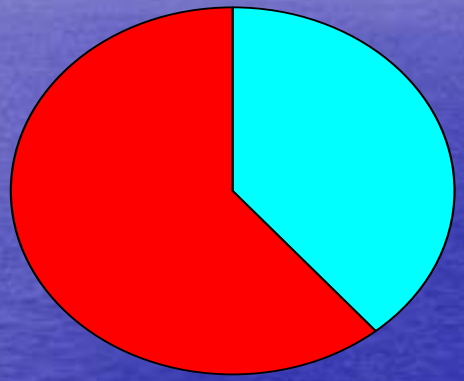


# Desk Study – Eutrophication of Lakes
## (iii) Lake Classification

To reflect overall eutrophication status, the lakes are graded as good, medium or bad based on Vollenweider's (1976) allowable nutrient loadings:

| Grading | TSI (Trophic State Index) |
|---|---|
| Good | < 37.4 |
| Medium | 37.4 < TSI < 47.4 |
| Bad | TSI > 47.4 |

# Classification of Lakes Studied




**Overall**
(90 Lakes)

Medium (Mesotrophic)

Bad (Eutrophic)

# Desk Study –Eutrophication of Lakes
## (iv) Conclusions and Recommendations

- Eutrophication of lakes has reached levels for serious concern
- Restoration efforts needed for lakes in the BAD category
- Plan needed for lake management and restoration
- Immediate follow-up study needed to confirm TSIs
- More research needed in identified priority areas
- Public awareness and Capacity building

# 2. Colloquium on Lakes and Reservoirs in Malaysia – 2nd and 3rd August 2007

- MONRE/ASM/NAHRIM sponsored event officially opened by the Rt. Hon.  Minister of Natural Resources and Environment, Malaysia
- 120 participants from the public and private sector including NGOs.
- 2 keynote addresses and 2 lead papers by 3 international experts from Japan, Poland and Brazil.
- 8 case studies by lake managers and researchers from Malaysia focusing on lakes in Malaysia used for various purposes

# 2. Colloquium on Lakes and Reservoirs in Malaysia – 2nd and 3rd August 2007 (Contd.)

- Panel Discussion by 6 nominated Discussants to discuss *The Way Forward* from the following perspectives:
  - Governance
  - Lake Management
  - Research Needs
  - Stakeholder Participation
  - Capacity Building, and
  - Lake Information Management.

# 2. Colloquium on Lakes and Reservoirs in Malaysia – 2nd and 3rd August 2007 (Contd.)

- Colloquium Highlights and Outcomes
  - Stock-taking with good quality papers from both local and international speakers which would be documented for future reference.
  - Varying standards in lake management – largely sectoral
  - Good lessons and new knowledge to be learned from within and from overseas through closer cooperation/collaboration and effective networking especially with regard to the World Lake Vision and ILBM initiatives driven by ILEC
  - Need for a National Plan for Integrated Lake Management building on the momentum provided by the Colloquium.

# 3. Development of Strategic Plan for Lake and Reservoir Management

- Conceptual Framework Plan using Logical Framework Approach (LFA) format – multi-stakeholder workshop on 15 January 2008
- Six Component Plans – consultation workshops on LFA format
  - Governance – 19th August 2008
  - Management – 8th July 2008
  - Research and Development – 3rd June 2008
  - Capacity Building – 4th June 2008
  - Information Management – system developed at NAHRIM
  - Community Stakeholders – 2nd December 2008
- Synthesis Report and Strategic Plan for Lake and Reservoir Management – currently at Drafting stage

# 4. ASM/NAHRIM/ILEC Collaboration

- Keynote Speaker at Lake Colloquium (August 2007) – Prof. Nakamura
- Malaysian participation at World Lake Conference, Jaipur 2007, roundtable discussion and post-conference study tour facilitated by ILEC
- Participation of ILEC SC members at Management Component Plan LFA Workshop at Putrajaya – 8th July 2008
- Discussion with ILEC SC on candidates for ILBM-G project in Malaysia followed by site visits – July 2008
- ILEC fact finding team visit to 2 selected lake sites (Tasek Cini and Bukit Merah) – December 2008
- Preparatory workshop for selected lake sites – June 2009?
- Participation/host ILEC Regional Training Courses

# Conceptual Framework Plan
# 15 January 2008

- Vision and Mission
- Main Issues
- Main Objectives
- Outputs
- Activities
- LFA Matrix – Governance, Management, R&D, Capacity Building, Information Management, Community Stakeholders

# Conceptual Framework for Lake Management in Malaysia – LFA on 15 January 2008

## Vision:

All lakes and reservoirs in Malaysia are managed and conserved on a sustainable basis

## Mission:

To advance sound management of lakes and reservoirs in Malaysia

# Main Issues

1. Lack of a national policy, associated legislation, appropriate action plans and guidelines on lake management and development, with an associated lack of enforcement,
2. Unclear roles and responsibilities among agencies currently undertaking different aspects of lakes management, leading to either overlaps or gaps in lake management, and stakeholder conflicts
3. Lack of awareness and commitment from public and politicians in part due to apathy, self-interest, and poor stakeholder participation,

# Main Issues (2)

3. Lack of relevant research and technical knowledge on lake management, insufficient critical mass of local expertise, and poor information exchange locally and international,
4. Poor data management of available data,
5. Lack of funds for lake management
6. Lack of thorough understanding of lake basin ecosystem

# Main Objectives

1. In the short term to set up a special national committee on lake management,
2. In the long term to develop an integrated national policy on lake basin development and management, with appropriate legislation,
3. To establish agency roles and responsibilities for lake development and management, including identification of lake managers, and development of appropriate guidelines for lake management and development,
4. To create awareness among the civil society, lake managers and political masters,
5. To educate, and train stakeholders and conduct conflict resolution forums,

# Main Objectives (2)

6. To incorporate water and lake management curricula from primary to universities level,
7. To enhance local R & D for lake management and development.
8. To create, manage and promote a database system for information and knowledge in a central depository for the management and exchange of information among stakeholders,
9. To source and obtain funding allocations for capacity building, research and data management for lake basin development and management.

# Outputs

1. Formation of different tiers of governance
   a) a panel/commission at cabinet level,
   b) a national lake basin management authority/body, incorporating multi-stakeholder participation, and defining roles & responsibilities of different agencies at federal, state & local levels.
   c) roundtable of experts including researchers & other stakeholders at advisory level
   d) roundtable of lake managers at operational level
2. Policies & legislation in place for lake management and development
3. Guidelines on lake management and development including monitoring system.

# Outputs (2)

4. Formation of a central depository for management of data for depositing and disseminating data/information
5. Provision of funds for R & D on lake management and development
6. Publications on lake management for awareness raising
7. Training modules on lake management & development
8. Trained local experts on lake management and development
9. Fund allocation for activities leading to the above outputs

# Activities

1. Identification of agencies/organizations to be responsible for each of the proposed activities
2. Formation of various lake management committees & panel through meetings and drawing up of institutional framework
3. Formation of a Secretariat (NAHRIM)
4. Drawing up of policies & legislation for lake management

# Activities (2)

5. Outsourcing to consultants the preparation of guidelines for lake management & development and preparation of training modules
6. Preparation of awareness materials
7. Conducting need surveys
8. Organising of training and awareness programmes to various stakeholders
9. Organising seminars, conferences
10. Identifying and developing research proposals
11. Identifying funding requirements and preparing funding proposals

# LFA Matrix – Governance (Logical Framework Approach)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| ***1. Main Objectives***<br>a) To develop an integrated, proper and effective national policy on lakes basin development and management leading to formulation of legislation, regulations and mandates. | The policy document is developed | Hard and softcopy document can be forwarded to high level government channel and adopted by the government | Accepted and adopted by the government. |

# LFA Matrix – Governance (2)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **2. Immediate Objectives**<br>a) To identify the related agencies involved, their functions in lakes development and management, existing rules and regulations pertaining to lakes;<br>b) Set up a committee to coordinate the formulation of standards, policies, legislation and mandates. | No. of related agencies and their functions identified, existing rules and regulations identified and a Committee set up | i. Documentation , reports, minutes of agencies in operation<br>ii. No. of meetings and seminars | Agencies do not exist. Members have no commitment and do not attend meetings |

# LFA Matrix – Governance (3)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **3.Expected Outputs**<br><br>a) Policies and legislation formulated and gazetted, published and enforced | Policies and legislation documented and enforced | Policy and legislation document ready | Risk of lack of manpower, Incompetence of enforcement |

# LFA Matrix – Governance (4)

| ELEMENT | INPUTS/ STAKEHOLDERS | ESTIMATED BUDGET | ASSUMPTIONS |
|---|---|---|---|
| **4. Proposed Activities**<br>a) Conference/ Seminar/Meetings for the related agencies.<br><br>b) Prepare the policy document and TOR for legal drafting<br>c) Presentation to forum on agreement and TOR to Commission on Legal drafting of laws on lakes, Steering Committee meeting, AG Chambers and adoption by state/federal | a) EPU, Treasury, Law Department, Local council, NRE, TNB, DID and others including politicians<br><br>b) Consultant hired to draft<br><br>c) Finalized documents | a) Total of RM 174,560 | Not Available |

# LFA Matrix – Capacity Building

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| ***1. Main Objectives***<br>a) Build and strengthen capacity at all levels for sustainable lake basin management. | Lakes Basins in Malaysia are well managed. | i. Good water quality<br>ii. Optimum utilization of lake basin by the beneficiaries is reported. | i. Risk of continued sectoral conflicts<br>ii. Assumption - existence of political will and institutional framework in place. |

# LFA Matrix – Capacity Building (2)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **2. Immediate Objectives**<br>a) Increase awareness on integrated Lakes Basin Management at all levels and increase/improve dissemination information and technologies. | Stakeholders and lakes managers are well informed.<br>Lake Basin Management Network formed between government, NGOs, private sectors and international agencies | i. Increase in number of workshop, training programs, awareness campaigns an dialogues<br>ii. Number of publications, books<br>iii. More project collaboration between agencies and LBM well managed.<br>iv. Increase of capacity building programs. | i. Risk of lack of interest and funding by authorities.<br>ii. Risk in lack of funding to carry out R&D and dissemination of knowledge.<br>iii. No critical mass in lakes researchers.<br>iv. Risk of bureaucratic and legislative inhibition.<br>v. Risk that no/insufficient funding will result in no/poor quality program. |

# LFA Matrix – Capacity Building (3)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **3.Expected Outputs**<br><br>a) Training Modules<br><br>b) Publications,<br><br>c) Revised curricula,<br><br>d) Panel/Comm. (Commission?) for Lake Basin Management (LBM) | a) Brochures on training and training module, Trained participants<br>b) Brochures, electronic print media, flyers, etc.<br>c) Students at all levels well informed about lakes and water management.<br>d) Formation of LBM panel | a) Published brochures & Module, Training report<br><br>b) Printed and published brochures, flyers, etc.<br>c) Increase in number of well informed individuals<br><br>d) Establishment of LBM body integrated at a cabinet level | a) Sufficient funds, resource persons and target groups attend<br>b) Sufficient funds and availability of information<br>c) Ministry approval, well implemented at all levels<br><br>d) Cabinet Approval for LBM panel (Commission?) formation. |

# LFA Matrix – Capacity Building (4)

| ELEMENT | INPUTS / STAKEHOLDERS | ESTIMATED BUDGET | ASSUMPTIONS |
|---|---|---|---|
| **4. Proposed Activities**<br>a) Awareness programs (Workshop, training, courses, handouts, mass media)<br>Target group:<br>Civil society, politicians, NGO, Public and private sector.<br>b) Dissemination of knowledge and information<br><br>c) Re-evaluate curricula at all levels to include water resources, conservation and management issues<br>d) Integration of cross-sectoral LBM | a) Resource persons,Water professionals/managers Venue, My CapNet, Agua Jaring<br><br>b) Publications(mass media, books, journals and etc)<br><br>c) Ministry of Education, Ministry of Higher Education<br><br>d) All relevant agencies involved in LBM<br>-Dialogues and workshop<br>-Cabinet level committee | a) RM50,000 /yr<br><br>b) RM200,000/yr<br><br>c) Gratis<br><br>d) RM100,000 | a) Funding available<br>Fully sponsored<br>Interested target group<br><br>b) Availability of knowledge and information<br>c) Cabinet approval<br><br>d) Acceptance or agreed by all agencies involved. |

# LFA Matrix – Research Needs

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| ***1. Main Objectives***<br>a) Enhancement of Integrated Lake R&D activities towards sustainable management of resources for the betterment of the society | Formulation of research policy for Integrated Lake Research and Development towards lake basin sustainable management | i. Policy documents for integrated research<br>ii. No. of integrated research projects | Not available |

# LFA Matrix – Research Needs (2a)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **2. Immediate Objectives**<br>a) To enhance coordination for integrated lake research<br>b) To improve the funding mechanism and quantum for effective lake R & D | a) National lake experts committee<br><br>b) Incorporation of lake research in Malaysian Development Plan and national budget allocation; Increase contribution from corporate sectors | a) Frequency of meeting/report<br><br>b) No./ amount of grants, and<br>No. of research projects | a) Risks in lack of commitment & will<br><br>b) Economic downturn and natural disaster |

# LFA Matrix – Research Needs (2b)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **2. Immediate Objectives(Cont)** | | | |
| c) To enhance specialized expertise | c) Intensification and diversification of research component | c) No. of experts in respective field & No. of research/ findings/ papers/ publications | c) Lack of funding |
| d) To enhance the dissemination mechanism of research findings especially to policy makers | d) Establishment of national repository | d) No. of materials, researches & uses | d) Lack of fund and commitment |

# LFA Matrix – Research Needs (3a)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **3.Expected Outputs** | | | |
| a) National lake expert committee | a) Formulation of policy, guideline/procedures for integrated lake R & D | a) Documents published | a)Will power commitment from top management |
| b) Establishment of lake funding management body | b)Fund acquired | b) No. of funded research | b) Funding provided |

# LFA Matrix – Research Needs (3b)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **3.Expected Outputs(Cont)** | | | |
| c) More specialized research activities & findings | c) High impact outcome | c) No. of publications, technologies made available and products | c) Risk of no donor sponsors & Economic downturn |
| d) Highly informed decisions | d) Good governance & management | d) Increased number. of well-managed lake basin | d) Risk of lack of will & poor implementation |

# LFA Matrix – Research Needs (4a)

| ELEMENT | INPUTS/ STAKEHOLDERS | ESTIMATED BUDGET | ASSUMPTIONS |
|---|---|---|---|
| **4. Proposed Activities**<br>a)<br>i. Preparation of concept paper<br><br>ii. Establishment of taskforce<br><br>iii. Identify & evaluation of experts<br>iv. Selection of committee members<br>v. Approval from government for-<br>concept papers,<br>- appointment of national expert lake committee, &<br>- lake funding body | a)<br>i. Consultants, 6 meetings<br>2 workshops<br><br>ii. Consultants, 6 meetings<br>2 workshops<br>iii. Taskforce, 2 meetings<br><br>iv. Taskforce, 2 meetings<br><br>v. Secretariat (NAHRIM) | a) RM300,000 | a) Federal Fund (NRE) made available and a Central Agency to obtain and manage research funds |

# LFA Matrix – Research Needs (4b)

| ELEMENT | INPUTS / STAKEHOLDERS | ESTIMATED BUDGET | ASSUMPTIONS |
|---|---|---|---|
| **4. Proposed Activities(Contd.)**<br>b)<br>i. Establishment of taskforce for research activities<br>ii. Determination of research program<br><br><br><br>iii. Research proposal<br>iv. Funding acquisition<br>v. Research activities | b)<br>i. NAHRIM, meeting<br><br><br>ii. Universities, research institutions & managers (stakeholders), meeting , workshop<br>iii. Researchers, universities<br>iv. Researchers<br>v. Researchers | b) M300,000<br><br><br><br>)<br>} RM20 million, 5 years<br>) 3 basins | b) Federal Fund (NRE) made available and a Central Agency to obtain and manage research funds |

# LFA Matrix – Lake Management

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| ***1. Main Objectives***<br>a) To develop a Lake Management Plan for all lakes in Malaysia | **a)** One Management team for one lake<br>**b)** One management plan for one lake | **a)** Database / authorities<br>**b)** Published the management plan<br>**c)** Distributed to each responsible agency | **a)** Sufficient funding , Knowledge/ expertise,<br>**b)** Integration and cooperation among Federal-State Governments |

# LFA Matrix – Lake Management (2a)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **2. Immediate Objectives**<br>a) To develop National Management Guidelines for all lakes | a) One guideline for all lakes | a) Published and distributed guidelines | Under Ministry, Sufficient funding |

# LFA Matrix – Lake Management (3a)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **3.Expected Outputs**<br><br>a) Implementation of Management Plans resulting in clean lakes and reservoirs<br>b) Well managed catchments green corridors/buffer,<br>c) Improve and maintain the biodiversity of lakes | a) Formulation of policy, guideline/procedures for integrated lake R & D<br>b) Fund acquired | a) Results of Water Quality Monitoring (Reports)<br>b) Results of Diversity Index,<br>c) No illegal activities such as fishing,<br>d) More funds and cooperation, | By laws in place, Sufficient funding, Commitments and participation of all involved agencies or stakeholders<br>Risk :<br>Lack of interest and commitment |

# LFA Matrix – Lake Management (3b)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **3.Expected Outputs(Cont)**<br>d) Increased potential for Eco-tourism Programme,<br>e) More recreational activities are introduced<br>f) Zero poachers/ encroachment | | d) Amounts of funds spent | |

# LFA Matrix – Lake Management (3c)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **3.Expected Outputs(Cont)**<br>g) Stakeholders and public participation<br>h) Establishment and allocation of funds (Eg: RM9)<br>i) Established a Strategic Plan | | | |

# LFA Matrix – Lake Management (4a)

| ELEMENT | INPUTS/ STAKEHOLDERS | ESTIMATED BUDGET | ASSUMPTIONS |
|---|---|---|---|
| **4. Proposed Activities**<br>a) Training of managers and technicians *(To establish and strengthen the knowledge and skills in lake management)*<br>b) Engage consultant *(To develop Management Plan)*<br>c) Habitat Creation *(To recreate natural habitats of lakes)*<br>d) Management Measures/ Interference *(To satisfy the lake owners requirements)* | a) Target groups (Managers & technicians in lakes management agencies/ ministry/developers)<br>b) Local or foreign consultant<br>c) Input: Cooperation and MOU between stakeholders | a) 400,000/training/ year<br>b) 2 Million<br>c) 100, 000 /lake/year<br>d) 2 Million /lake/year | Sufficient funding, Venue and man-power are available |

# LFA Matrix – Lake Management (4b)

| ELEMENT | INPUTS / STAKEHOLDERS | ESTIMATED BUDGET | ASSUMPTIONS |
|---|---|---|---|
| **4. Proposed Activities(Cont.)**<br>e) Road Shows – Estimated 10 locations for the 2 years of early implementation of Management Plan *(To evaluate and assess the weaknesses in draft lake management plans)* | d) Input: Cooperation and MOU<br>Marketing, Venue (All over Malaysia- around 10 locations), Costing, Secretariat (NAHRIM/ASM)<br>Target group (Public)<br>- | e) 20,000/road show/ location | b) Federal Fund (NRE) made available and a Central Agency to obtain and manage research funds |

# LFA Matrix – Lake Management (4c)

| ELEMENT | INPUTS/ STAKEHOLDERS | ESTIMATED BUDGET | ASSUMPTIONS |
|---|---|---|---|
| **4. Proposed Activities(Contd. )**<br>f) Workshops *(To evaluate and assess the weaknesses in draft lake management plans)*<br>g) Seminars *(To evaluate and assess the weaknesses in draft lake management plans)* | e) Draft Management Plan is ready, Target group (Decision makers, planners and implementers) Secretariat - NAHRIM/AS - Target group (Decision makers, planners and implementers), Secretariat - NAHRIM/ASM | f) 30,000/workshops<br>g) 50,000/seminar | b) Federal Fund (NRE) made available and a Central Agency to obtain and manage research funds |

# LFA Matrix – Stakeholder Participation

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| ***1. Main Objectives***<br>a) To enhance stakeholder awareness and knowledge in lake management and development with participatory approach as guiding principles | a) No. of training, education, campaigns and various awareness activities carried out | a) Documentation of the training and various awareness activities | a) Documentation of the training and various awareness activities |

# LFA Matrix – Stakeholder Participation (2)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **2. Immediate Objectives**<br>a) - To impose effective empowerment to carry out their activities within the lake basin<br>- To enhance awareness among direct and indirect stakeholder on the importance of proper lake management and development | a) No. of direct contact stakeholder carried out. No. of conflict recorded and resolved | a) Documentation of all awareness campaign and conflict | a) Lack of Participation.<br>Lack of support |

# LFA Matrix – Stakeholder Participation (3)

| ELEMENT | VERIFIABLE INDICATOR | MEANS OF VERIFICATION | RISKS/ ASSUMPTIONS |
|---|---|---|---|
| **3.Expected Outputs**<br>a) Quality of the natural lake improved Improvement of the lake ecosystem | a) Quality of stakeholder life improve | a) Sampling of fish, water quality monitoring, gross domestic happiness index, satisfaction | a) Improve quality of life.<br>Lack of sustainability |

# LFA Matrix – Stakeholder Participation (4)

| ELEMENT | INPUTS / STAKEHOLDERS | ESTIMATED BUDGET | ASSUMPTIONS |
|---|---|---|---|
| **4. Proposed Activities**<br>a)- Carry out a needs assessment survey of stakeholder living near degraded lake, choose a pilot site, formatting a committee to write the TOR and choose the site<br>- Carry out needs assessment survey<br>- Seminar on the result of needs assessment survey and choice of site<br>- Carry out the pilot to create awareness<br>- Seminar on pilot<br>- Replication / Seed Fund | a) - Relevant agencies, Head of Committee living and using the lake,NGO/ academics<br>- Consultant<br>- All relevant agencies and consultant | a) - RM5000 - meeting?<br>RM1000 - facilities?<br>- RM 100,000<br>- 200 x 1 day @ RM 30<br>= RM 16,000<br>- RM 150,000<br>- 200 x 1 day @ RM 30<br>= RM 16,000<br>- RM 100,000 x 3 communities<br>= RM 300,000 | a) Enough Funds<br>People participation<br>Conflicts improve |