Notes on Updating and Improving the ILBM (ILLBM) Training Resource Materials, the Evolving States and Toward the Future

Masahisa Nakamura

March 15, 2021

1. Background of Project

- The JICA-ILEC training resource materials provided under the website on ILBM (ILLBM), i.e., https://ilec.or.jp/ILBMTrainingMaterials/, were assembled in the earlier JICA-supported project in 2010 based on the premise that;

  - Lakes around the world are facing many problems that threaten their sustainable use.
  - Lake management experiences around the world show both success and non-success "stories" in addressing problems facing the lakes.
  - These "stories" provide useful lessons for managing lakes globally.
  - There is therefore need to encourage and support lesson learning among lakes globally.

  (see details in the Power Point presentation entitled, "Methodology for Learning Within and Across Lake Basins: The Lake Basin Management Initiative Approach", i.e., https://ilec.or.jp/ILBMTrainingMaterials/wp-content/uploads/methodology_of_learning_presentation.pdf)

- Though these resource materials are still very much relevant and useful, the situation surrounding the world's lakes over the past decade has significantly changed, and a great deal of new information has been generated on experience and lessons learned of lake basin management during the period.

- This project was implemented to address the above challenge, with participation of local and international experts well versed with the situation, and update and improve the quality and quantity of the resource materials assembled earlier.

- This "Notes" give a brief account of the evolving states of the above activities, with some representative outputs, and some discussion toward the future", particularly in relation to the growing needs at the national and international levels of basin management involving lakes and other inland lentic waters as well as coastal water.

- Particular attention is directed on the need to advance the activity toward "Knowledge Mining and Synthesis using a knowledge mining and knowledgebase system called LAKES "Learning Acceleration and Knowledge Enhancement System" having been developed in collaboration with the National University Corporation of Shiga University, Japan.

- The era of remote learning and cross-fertilization in the post-COVID19, with possible involvement of the Past KCCP-Program graduates and other experts is also briefly discussed, with suggested approaches for regional and global networking.

2. Conceptual Framework

2-1. In-Phase Design of the Existing Resource Materials

- The in-phase design in the 2010 version pertaining to the contributed theme by the authors included, (1) Power Point presentation and (2) a thematic paper.   The in-phase design pertaining to the JICA-ILEC Module Chapters included also (1) Power Point presentation and (2) the thematic paper, but it also included (3) an abridged version of the thematic paper to facilitate easer exposure for the module users to the subjects that may not be easily digestible.

2-2. In-Phase Design of the Newly Developed Resource Materials

- The above approach in 2010 has been useful but not to the extent that the materials were used without the facilitation of the course leaders specifically referring to the subjects themes of importance to individual trainees.
- Thus, a trial is made to develop the narrated and visual video clips (the "Videoscribe" versions and narrated and animated Power Point) for a major thematic presentations on "The Story of Lake Biwa", "The Story of Lake Biwa Management", and "What is ILBM?".   Also, a "Videoscribe" version was also developed for Module Chapter 4, "Institution".
- The above trial seems to be quite promising, and it is currently planned that the "Videoscribe" version of other module chapters will also be attempted in the forthcoming months.

3. Development and Use of the Modular Resource Materials

3-1. List of Resource Materials Already Available (2010)

- Altogether 35 resource materials were commissioned for developed
- Some were developed based on the output of the "GEF-LBMI Project"[1] completed in 2005.
- Others were developed based on the lecture materials prepared and presented during the period of 2008 through 2009 as part of the initial phase of the JICA-ILEC ILBM Training Course as well as on the presentations made in the ILBM workshops organized as part of the project funded by Ministry of Education, Culture, Technology and Science, Japan, and implemented at Research Center for Sustainability and Environment, the National University Corporation of Shiga Prefecture, Japan, during the period between 2008 through 2010.

	List of Comissioned Resource Materials for JICA-ILEC ILBM Module, 2010				
1	Acquisition and Management of Lake-related Water Quality Information at the Global Level	Robarts, Richard	19	Lessons from Malaysia on Developing a Nationwide Strategic Plan for the Management of Lakes and Reservoirs	Abdullah, Shahrizaila
2	An Application of GIS and Remote Sensing in the Management of Lake Kyoga, Uganda	Gyllenhammar, Andreas	20	Lessons from Nepal on Developing a Strategic Plan for the Integrated Lake Basin Management: The Case of Lakes Phewa, Bengas, and Rupa	Pokharel, Shailendra
3	Applications of Remote Sensing for Lake Basin Management	Bradt, Shane	21	Lessons on Attaining Sustainable Financing for Lake Basin Management Authorities in the Philippines	Santos-Borja, Adelina
4	Biodiversity Loss in a Saline Lake Ecosystem	Aladin, Nick	22	Lessons on Preparing and Implementing a Management Plan within an Urban Development Framework	Majizat, Akashah
5	Charging for Use of Natural Resources: Practical Lessons for Lake Basin Managers	Dixon, John	23	Lessons on Project Design and Stakeholder Engagement from the Songkhla Lake Case	Chatchai Ratanachai
6	Economic Instruments for Environmental Protection	Ballatore, Thomas	24	The Management of Hoars, Baors, and Beels in Bangladesh	Tapas Ranjan Chakraborty
7	Economic Valuation in the Lake Basin Management Decision Making Process	Verma, Madhu	25	Methodology for Learning Within and Across Lake Basins	Muhandiki, Victor
8	Ecosystem Services and Values for Stakeholders	Niren, Takaaki	26	Moving Towards Integrated Management of the Plateau Lakes in Yunnan Province, China: Lessons for Planning and Finance	Wang Li
9	Environmental User Fee System for Laguna de Bay	Santos-Borja, Adelina	27	Multi-level Water Governance for Closed and Closing Systems: The Murray-Darling Basin, Australia	Connell, Daniel
10	Fundamentals of the Economic Approach	Kondo, Manabe	28	Participation in Japan	Ide, Shinji
11	Global Review of Lake and Reservoir Eutrophication and Associated Management Challenges	Mendiondo, Eduardo Mario	29	The Planning Process for Lake Basin Management: Lessons from Some North American Lakes	Holdren, Chris
12	Implementing Sewerage and Sewage Treatment Schemes in Developing Countries	Muhandiki, Victor	30	Re-Eutrophication and Pathogenic Contamination of Lake Chivero	Magadza, Chris
13	Implementing the Ecosystem Approach to Preserve the Ecological Integrity of Urban Lakes	Kodarkar, Mohan	31	Regulatory Approach For Water Quality Protection In Chile: Key Aspects to be Considered	Villa-Lobos, Sybil
14	Indigenous Peoples and Lake Basin Management	Skinner, Juan	32	Review of Technical Interventions to Restore the Northern Aral Sea	Aladin, Nick
15	Informational Requirements for a Lake Basin Management Program	Rast, Walter	33	River/Lake Basin Approaches to Water Resources Management	Oya, Kenji
16	Innovative Financing Methods for Lake Basin Management	Santos-Borja, Adelina	34	The Role of Agriculture and Irrigation in Lake Basin Management	Watanabe, Tsugihiro
17	Institutional Coordination and Policy Development in Lake Basin Management	Pattnaik, Ajit	35	The Use of Workshops as a Planning Tool in ILBM: Lessons from Lake Chapala, Mexico	Juarez, Alejandro
18	Jal Dindi, the Water Pilgrimage: How Tradition and Culture can Used to Promote ILBM	Kodarkar, Mohan			

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[1] The "GEF-LBMI Project" stands for a project called the "Lake Basin Management Initiative (LBMI) implemented during the period of 2003-2005 by ILEC, the World Bank, the Global Environment Facility, UNEP, UNDP, Ramsar and Shiga Prefectural Government, with a resultant report entitled "Managing Lakes and Their Basins for Sustainable Use: A Report of Lake Basin Managers and Stakeholders".

3-2. List of Resource Materials Newly Developed (2019 and 2020)

- The list of Resource Materials newly developed in 2019 are shown in the following table.
- Many of the materials were commissioned to ILEC Scientific Committee Members with international reputation (see https://www.ilec.or.jp/en/about/scicom/).
- Others were commissioned to the experts in ILBM including those of past JICA-ILEC ILBM Training Course participants as well as those identified in the course of implementing the ILBM workshops and projects undertaken as part of various international collaboration programs.

		教材名 Resource Material Title	執筆者 Author	モジュール Module	現在のモジュール内容 TM Content (Current)	JICA-ILEC研修講義資料 KCCP Content	GEFレポート GEF LBMI Thematic Paper	ツール Tools	国家戦略・計画 National ILBM Strategies and Plans	新規/地域課題 Emerging/Regional Issues
1	新規追加	African Lake Basin Management: Key Issues and Challenges	Daniel Olago, Professor, University of Nairobi	1						○
2	新規追加	Cyanobacterial Problems in South American Reservoirs: Historical Background, Current Status and Prospects for Countermeasures	Sandra Azevedo, Professor, Brazil Federal University of Rio de Janeiro	2						○
3	新規追加	Lake Baringo: A Transient Physical Chemical Environment, Diversity and Livelihoods	Jones Muli, Researcher, Kenya Marine and Fisheries Research Institute	3			○			
4	新規追加	Into the Golden Year of Lake Basin Management in Laguna de Bay, Philippines	Adelina Santos-Borja, Vice President, ILEC Scientific Committee Member	4			○			
5	新規追加	Role of District-level Organization in Decentralized Arrangement of Irrigation Management: Lessons from Water Users Association of Farmers in Japan and Egypt	Tsugihiro Watanabe, Professor, Kumamoto University	4		○				
6	新規追加	Water Resources Management within the Climate Change Context in Africa	Salif Diop, Professor, University of Cheikh Anta Diop	5						○
7	新規追加	Climate Change Adaptation and Mitigation Measures in the EU Water Environments	Tiina Noges, Professor, Estonian University of Life Sciences	5						○
8	改訂	Participation in Japan	Shinji Ide, Professor, University of Shiga Prefecture	6	○					
9	改訂	Chilika Lake: Restoring Ecological Balance and Livelihoods through Re-Salinization	Ajit K. Pattnaik, Vice President, Wetlands International South Asia	7	○		○			
10	新規追加	Assessment of Pollution Load on the Kenyan Catchment of Lake Victoria Basin using GIS Tools	Charles Kipkoech, Lecturer, Jomo Kenyatta University of Agriculture and Technology	8				○		
11	新規追加	GIS-based Lake Basin Delineation and Computation of Risk Indicators as part of the TWAP Project	Khila Dahal, Professor, Temple University	8				○		
12	新規追加	Application of Remote Sensing to Generate Historical Water Quality Data to Support Lake Management in Indonesia	Luki Subehi, Senior Researcher, Indonesian Institute of Sciences	8				○		
13	新規追加	Environmental Education: Its Evolution, ESD, Participation and Governance	Masahisa Sato, Professor, Tokyo City University	8		○				
14	新規追加	Monitoring and Evaluation of Water Quality and Ecosystem in Lakes, Rivers and Coastal Zones in Japan	Shigekazu Ichiki, Secretary General, ILEC Secretariat	8		○				
15	新規追加	Introduction to Lake Modeling	Shinji Ide, Professor, University of Shiga Prefecture	8		○				
16	新規追加	Assessment of Management of Lake Malawi Basin through Application of ILBM-Based Tools	Clara L. Chidammodzi, Environmental Consultant	10				○		
17	新規追加	The Lake Cluster Pokhara Valley: An Overview of Lake Basin Environment and Governance Improvement	Shailendra Kumar Pokharel, Coordinator, Conservation Development Foundation, Nepal	10		○			○	
18	新規追加	Strengthening Integrated Lake Basin Management Implementation in Malaysia through Research Framework	Zati Sharip, Senior Researcher, National Hydraulic Research Institute of Malaysia	10		○			○	

- The list of Resource Materials newly developed in 2020 are shown in the following table.
- They were commissioned to ILEC Staff and their national and international colleagues.

		教材名 Resource Material Title	執筆者 Author	モジュール Module
		Reports and PPTs		
新規追加	1	Summary and Key Messages from Resource Materials	ILEC (中村とVictor)	1,2,3
新規追加	2	GIS-based Lake Basin Delineation Procedure	Khila Dahal, Assistant Professor, Temple University	8
新規追加	3	Sewerage Policy and Finances in Lake Basin Management, a Case of Lake Biwa, Japan	Naoko Hirayama, Senior Lecturer, University of Shiga Prefecture	4,7,9
改訂	4	Towards the Future?	ILEC (中村とVictor)	11

4. Analysis of the Resource Material Contents

4-1. The GEF Lakes Cited in the 2010/2020-2021 Reports

- The following table shows a list of GEF Lakes Cited in the 2010/2020-2021 Reports

28 "Lake Brief" Lakes in the LBMI Report	In the Module Chapter	In the 2010 Reports (by Author)	In the 2020-21 Reports (by Author)	28 "Lake Brief" Lakes in the LBMI Report	In the Module Chapter	In the 2010 Reports (by Author)	In the 2020-21 Reports (by Author)
Aral Sea	2, 3, 6, 7, 8, 9, 10	Aladin		Laguna de Bay	2, 3, 4, 5, 6, 7, 8, 9, 10	Santos-Borja, Dixon, Oya, Skinner, Muhandiki, Rast	Santos-Borja, Muhandiki, Olago
Baikal	2, 6, 7, 8, 9	Dixon, Rast	Pattnaik	Malawi/Nyasa	2, 3, 4, 6, 7, 8, 9, 10		Chidammodzi, Olago, Muhandiki, Muli
Baringo	2, 3, 4, 6, 7, 8, 9	Dixon, Rast	Olago, Muli	Naivasha	2, 3, 4, 5, 6, 7, 8, 9, 10	Muhandiki	Muli, Olago
Bhoj Wetland (Bhopal)	10	Muhandiki, Verma		Ohrid	2, 3, 6, 7, 8, 10		
Biwa	2, 3, 4, 5, 6, 7, 8, 9, 10	Ide, Watanabe, Rast, Dixon, Muhandiki, Oya	Hirayama, Ide, Chidammodzi, Olago	Peipsi/Chudskoe	2, 3, 6, 7, 9	Rast	
Chad	2, 3, 4, 6, 7, 8, 10		Chidammodzi	Sevan	2, 3, 5, 6, 7, 8	Dixon, Robarts	
Champlain	6, 7, 8, 10	Rast		Tanganyika	2, 6, 7, 8, 10	Rast	Olago
Chilika Lagoon	2, 4, 6, 7, 8, 10	Pattnaik, Rast, Verma	Pattnaik, Olago	Titicaca	2, 7, 8, 10	Rast	K. Dahal
Constance	2, 4, 5, 6, 7, 8, 9, 10			Toba	2, 3, 4, 5, 6, 7, 8, 9		L. Subehi
Dianchi	2, 3, 4, 5, 6, 8, 9, 10	Li, Oya, Dixon		Tonle Sap	2, 3, 4, 6, 7, 10, 11		L. Subehi
Great Lakes (N. America)	2, 3, 4, 5, 6, 7, 8, 9, 10	Rast, Muhandiki, Li, Gyllenhammar, Shahrizaila, Skinner, Robarts, Pokharel	Olago, Chidammodzi, Muli	Tucurui Reservoir	2, 7		
Issyk-Kul	2, 6, 7, 9, 10	Aladin		Victoria	2, 3, 4, 5, 6, 7, 8, 9, 10	Gyllenhammar, Rast, Connell, Oya, Kondo, Dixon	Cheruiyot, Olago, Muli, K. Dahal, Chidammodzi
Kariba Reservoir	2, 3, 4, 7, 8	Magadza, Rast	Olago	Xingkai/Khanka	2, 7, 8		

4-2. Knowledge Mining and Synthesis using the "LAKES" Knowledgebase System[2]

- The details of this LAKES system is provided the attached "Enhanced Version of Knowledge Base System, LAKES-IV Users Guide Version 1, June, 2018.

- In short, "LAKES" (Learning Acceleration and Knowledge Enhancement System) is a knowledgebase cum knowledge-mining software system specifically developed for facilitating the Integrated Lake Basin Management (ILBM) analysis. The key feature of LAKES is to allow users to mine the specifically sought-after knowledge at the sentence level buried in a set of preselected documents. Knowledge-mining is performed based on the relationship between all of the sentences in all of the documents and the combination of predetermined thesaurus words. It differs from the conventional sentence-based search in that the emphasis is placed on the relationship between the knowledge mined out of the documents at a sentence level and the knowledge associated with other words in the

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[2] The term "LAKES" stands for "Learning Acceleration and Knowledge Enhancement System". This knowledgebase/knowledge-mining search-engine and literature repository-retrieval system was developed by M. Nakamura at Research Center for Sustainability and Environment, The National University Corporation of Shiga University, Japan. Its intellectual property of the current version, LAKES-IV, is jointly owned by Shiga University and ILEC.

thesaurus as related to the same set of documents.　The sentences in text form are extracted from PDFs for database development. Due to the characteristics of PDFs, some sentences may not be identical to the original text form.　The system can also display HTML documents converted from PDFs, but the original PDFs may not be reproduced perfectly. In most cases, you can view both the HTML documents and the original PDF documents.

- The important outputs of this process are contained in the following folders being identified as part of the electronic outputs of this project, partly being attached as Appendix 1.

- 📁 Module Ch.2 Key Issue LAKES Output
- 📁 Module Ch.3 Key Issue LAKES Output
- 📁 Module Ch.4 Key Issue LAKES Output
- 📁 Module Ch.5 Key Issue LAKES Output
- 📁 Module Ch.6 Key Issue LAKES Output
- 📁 Module Ch.7 Key Issue LAKES Output
- 📁 Module Ch.8 Key Issue LAKES Output
- 📁 Module Ch.9 Key Issue LAKES Output
- 📁 Module Ch.10 Key Issue LAKES Output
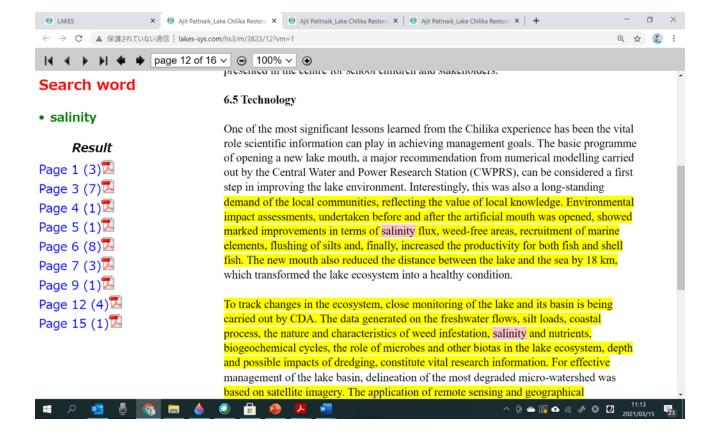- 📁 Module Ch.11 Key Issue LAKES Output

- The outputs contained in these folders, with the chapter title indicated as, e.g., "Ch.2 for Chapter 2" of the Module, are the candidates for integration into the writings in that chapter.　For example, the LAKES knowledge-mining in relation to "climate resilience" may provide the following specific factual statements identified in the 2019-2020 new resource materials to be considered to be integrated into the current Chapter 2 for the purpose of updating and upgrading the 2010 contents.　A whole range of such mined knowledge have be provisionally been identified for discussion with regard to the Chapter 2 through Chapter 11.

- For example, the PDF files contained in "Module Ch.4 Key Issue LAKES Output" are the following.

名前	更新日時	種類	サイズ
📁 Old PPT files	2020/07/30 13:11	ファイル フォルダー	
📁 Word Files	2020/07/30 11:03	ファイル フォルダー	
📄 Module, Ch.4, effective_institution_bookmarks	2021/03/13 20:11	Adobe Acrobat Docu...	127 KB
📄 Module, Ch.4, institution_coordinate_bookmarks	2021/03/13 20:12	Adobe Acrobat Docu...	112 KB
📄 Module, Ch.4, institution_management_effective...	2021/03/13 20:13	Adobe Acrobat Docu...	116 KB
📄 Module, Ch.4, institutions, Clara, Jones, Salif, Sh...	2021/03/13 20:08	Adobe Acrobat Docu...	133 KB
📊 effective_institution_bookmarks	2021/03/07 10:19	Microsoft Excel ワーク...	15 KB
📊 institution_coordinate_bookmarks	2021/03/07 0:08	Microsoft Excel ワーク...	8 KB
📊 institution_management_effective_bookmarks	2021/03/07 0:12	Microsoft Excel ワーク...	9 KB
📊 institutions, Clara, Jones, Salif, Sheirendra_book...	2020/12/31 20:40	Microsoft Excel ワーク...	18 KB
📊 Chapter 4-ppt	2004/04/21 10:31	Microsoft PowerPoin...	33 KB
📊 Chapter4, Institutions (Chapala, Nov18.2008)	2008/11/19 8:20	Microsoft PowerPoin...	91 KB
📝 institutions, Clara, Jones, Salif, Sheirendra_book...	2021/03/01 12:57	Microsoft Word 文書	28 KB

- The PDF file "Module Ch.2, salinity_bookmarks look like the following.

Created Date : March 9, 2021
Total Count of All documents : 3,305

Title	Author	Page	Document Title Filter	Subset Filter	Search Word	Sentence	URL in the LAKES
Ajit Pattnaik_Lake Chilika Restoration_PPT_2020.03.05	Victor	3		JICA-ILEC KCCP Module Reports 2020-21	salinity	Complex ecosystem, multitude stake holders •Shrinkage of water spread area due to siltation (degradation of lake basin) •Fall in *salinity* level of lake water , resulting change in ecological character.	http://lakes-sys.com/hs3/m/5f02c1d1e2f90 433447545_Ajit20Pattnaik_Lake20Chilik/3?k=salinity&vm=1
Ajit Pattnaik_Lake Chilika Restoration_PPT_2020.03.05	Victor	11		JICA-ILEC KCCP Module Reports 2020-21	salinity	To track the changes, close monitoring of the lake and its basin is being carried out by CDA. The data generated on the freshwater flows, silt loads, coastal process, the nature and characteristics of weed infestation, *salinity* and nutrients, biogeochemical cycles, the role of microbes and other biotas in the lake ecosystem, depth and possible impacts of dredging, constitute vital management inputs .	http://lakes-sys.com/hs3/m/5f02c1d1e2f90 433447545_Ajit20Pattnaik_Lake20Chilik/11?k=salinity&vm=1
Jones Muli_Lake Baringo_Paper_2020.05.04	muli	35		JICA-ILEC KCCP Module Reports 2020-21	salinity	Ionic composition of the lake shows a trend of increase in *salinity* as lake level decreases.	http://lakes-sys.com/hs3/m/5f02d4b247494 102861966_Jones20Muli_Lake20Baringo_P/35?k=salinity&vm=1
Jones Muli_Lake	muli	40		JICA-ILEC KCCP Module	salinity	These include among others: very turbid waters and corresponding very low transparency, high conductivity	http://lakes-sys.com/hs3/m/5f02d4b247494 102861966_Jone

- The original text of the knowledge source of the 2nd paragraph, i.e., "To track the changes,…." can be directly seen as follows:

Search word

• salinity

Result

Page 1 (3)
Page 3 (7)
Page 4 (1)
Page 5 (1)
Page 6 (8)
Page 7 (3)
Page 9 (1)
Page 12 (4)
Page 15 (1)

presented in the centre for school children and stakeholders.

6.5 Technology

One of the most significant lessons learned from the Chilika experience has been the vital role scientific information can play in achieving management goals. The basic programme of opening a new lake mouth, a major recommendation from numerical modelling carried out by the Central Water and Power Research Station (CWPRS), can be considered a first step in improving the lake environment. Interestingly, this was also a long-standing demand of the local communities, reflecting the value of local knowledge. Environmental impact assessments, undertaken before and after the artificial mouth was opened, showed marked improvements in terms of salinity flux, weed-free areas, recruitment of marine elements, flushing of silts and, finally, increased the productivity for both fish and shell fish. The new mouth also reduced the distance between the lake and the sea by 18 km, which transformed the lake ecosystem into a healthy condition.

To track changes in the ecosystem, close monitoring of the lake and its basin is being carried out by CDA. The data generated on the freshwater flows, silt loads, coastal process, the nature and characteristics of weed infestation, salinity and nutrients, biogeochemical cycles, the role of microbes and other biotas in the lake ecosystem, depth and possible impacts of dredging, constitute vital research information. For effective management of the lake basin, delineation of the most degraded micro-watershed was based on satellite imagery. The application of remote sensing and geographical

4-3. Involvement of the Past KCCP-Program Graduates and Other Experts

- As mentioned under 3-2, the contributors identified and collaborated in developing the 2019-2020 resource materials were the current and past ILEC Scientific Committee members, the current and pst lecturers and other contributors in the JICA-ILEC KCCP program as well as the members of various ILEC networks including, and particularly, the graduates of past KCCP programs already having successfully expanded their knowledgebase to be able to contribute to this kind of updating and upgrading the ILBM related knowledge.

4-4. Regional and Global Networks

- There is growing interest in the ILBM KCCP Training Module developed by JICA/ILEC in many national and international programs facing the need for human resource development in ILBM.
- The interests pertain to (1) easier access to the resource materials and tools at ILEC, and to (2) development on their own of the training module similar to the ILEC one. In either case, it is ILEC's mandate, with due support nationally (e.g., through JICA) and internationally (e.g., through UNEP).

5. Toward the Future

- For the JICA-ILEC ILBM(ILLBM) Training Module to be able to knowledge-mine from the ever expanding sources of knowledge contributed by an increasing number of ILBM (ILLBM) experts, the Module has to be usefully linked with the LAKES Knowledge-mining and Knowledgebase system, as having been tested on a pilot project basis under 4.2, 4.3 and 4.4.

Appendix 1.   Module Chapter Knowledge-Mining Outputs using LAKES-IV

Appendix 2.   LAKES User Manual