Methodology for Learning Within and Across Lake Basins:

The Lake Basin Management Initiative Approach

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1. Introduction

Lakes are immensely important. They are a source of drinking and industrial water, fisheries, hydropower, and also act as important transportation routes. Lakes also provide aesthetic beauty and have cultural and religious values. In addition, lakes are important ecosystems that support a large proportion of the world's biodiversity. Despite these many values of lakes, globally, lake environments are showing a degrading trend as reported by the Lake Basin Management Initiative, LBMI (ILEC, 2005) and several other studies. This calls for concerted global efforts to save lakes by implementing appropriate management measures.

Lake management is not an easy task. Problems affecting lakes originate from within lake basins and also from outside the basins. Almost all human activities and natural processes occurring within lake basins affect lakes. Thus, lake management essentially entails dealing with a wide range of issues inside and outside lake basins. Different lakes show different levels of success in dealing with management issues in their basins. Some lakes have had success stories for some issues, while other lakes have not been successful. Regardless, both positive and negative stories provide useful lessons for managing lakes globally. Experiences and lessons learned at one lake may usefully be applied in addressing similar issues in the same lake or a different lake. The lesson learning process is vital for lake basins around the world.

This paper reviews the methodology applied in the LBMI with a view to drawing lessons on how to learn from lake experiences within and across lake basins. The next sections discuss the lesson learning process employed in the LBMI. The paper concludes with lessons learned from the LMBI.

2. Collection and Compilation of Data and Information: LBMI Approach

This section discusses the methods used in the LBMI to collect and compile relevant data and information for the case study lakes. The methods included preparation of lake briefs and thematic papers, holding of Regional Review Workshops, field visits, and establishment of an electronic forum.

2.1 Lake Briefs and Thematic Papers

Lake briefs were prepared for each of the 28 study lakes in the LBMI and thematic papers were prepared for 17 selected subjects. Lake briefs described in detail the situation of the lake basins including the biophysical, social and management environments (Box 1). The briefs and thematic papers provided the bulk of information from which lessons were drawn. The briefs and thematic papers were prepared by individuals or teams of persons who were well knowledgeable about the particular lake or theme. In selecting resource persons, emphasis was placed on the choice of local people.

2.1.1 Selection of resource persons

One of the challenging tasks for the LBMI was setting the criteria for selection of resource persons to prepare lake briefs and thematic papers. One important question that had to be considered was whether or not to engage project staff involved in the implementation of past or ongoing lake basin projects/programs as key resource persons. This is because of the possible conflict of interest that would arise if project staff were involved. Obviously, there are pros and cons of such involvement. On the one hand, individuals with past involvement in projects have a lot of useful information, some of which is not documented. On the other hand, the objectivity with which project staff may prepare reports for drawing lessons may be questionable. The LBMI decided not to involve project staff as lead resource persons. Instead, the project staff facilitated the process by providing relevant information. Additionally, project staff reviewed lake briefs, thematic papers, and other LBMI outputs. The contribution of project staff was extremely invaluable.

Another important consideration the LBMI made was whether to engage individual experts or teams of experts. Teams have obvious advantages over individuals, including the multi-perspective views that teams provide. To the extent possible the LBMI engaged teams. The challenge posed by teamwork was ensuring effective coordination among team members. While good coordination was achieved for most of the teams, a few teams could not agree on some issues and the end result was, for example, more than one output for the same team. This scenario, though cumbersome from an administrative perspective, served

to reinforce the importance of multi-perspective views in learning from experiences in lake basins. Handling conflicting opinions of team members was in itself perhaps a good lesson to LBMI Project Management Team of the LBMI about conflict resolution that is inherent in lake management.

2.1.2 Access to data and information

Drawing lessons requires access to relevant data and information. For many lakes in developed countries (such as Lake Biwa and the North American Great Lakes), a lot of information has already been published and is readily available in the public domain. Therefore, for such lakes no difficulties were encountered in collecting data and information. However, for some lakes especially those in developing countries, information is not readily accessible. The bulk of data and information are stored by individual lake project offices or relevant government agencies and are not easily accessible to the general public. In the LBMI, project executing agencies cooperated in facilitating access to relevant data and information. In particular, the World Bank, which was the implementing agency of the LBMI, facilitated access to information on Global Environment Facility (GEF) funded lake basin projects. Without this facilitation, it would have been very difficult for the LBMI to access the information.

2.1.3 Structure of lake briefs

The 28 case study lake basins in the LBMI have different biophysical and socio-economic settings. While some issues of concern are common among the lakes, other issues that are unique to individual lakes. The LBMI faced the challenge of constructing an outline for preparation of lake briefs. The outline had to ensure that common issues among lake basins were captured to facilitate lesson learning among the case studies. At the same time the lake brief outline had to capture important "lake stories" that are unique to individual lakes. Also, consideration had to be made regarding the extent of detail to be provided in the outline. While a very detailed outline gives authors a clear picture of the expected final output, at the same time it is bound to constrain authors to the specifics of the outline.

Box 1 shows the outline for preparation of lake briefs that was proposed to be used in the LBMI. In the process of preparing and reviewing the briefs, it became clear that some lakes had interesting "lake stories" that necessitated changes in the proposed lake brief structure in order for the stories to be told properly. In the end, the proposed lake brief outline served only as a guide, with authors being allowed the flexibility to deviate from the proposed structure. Looking back, it seems that the process of preparing briefs should emphasize first the identification of major "impact stories" and then the development of the brief structure around the identified major "impact stories" as Nakamura and Rast (2009) have suggested. The "impact stories" are narratives of successful and non-successful human interventions that were undertaken to deal with specific management challenges in the lake basin (Nakamura and Rast, 2009). Examples of such "impact stories" include:

- Awareness raising and public education activities in Lake Bhopal (India) that led to the abandonment of centuries old religious practice of idol immersion that was a major source of pollution to the lake.

- The Soap Movement in Lake Biwa (Japan) that led to the banning of the use of phosphorus containing detergents in Lake Biwa Basin and subsequent development of phosphorus-free detergents and enactment of a eutrophication control ordinance.

- The establishment of the International Joint Commission (IJC) in 1909 for the North American Great Lakes (Canada and USA), which is one of the oldest international lake institutions that has overseen the management of the Great Lakes.

- The introduction of an Environmental User Fee at Laguna de Bay (Philippines) which provides incentive for pollution load reduction by polluters and also generates revenue for managing the lake.

- Long-term monitoring and simple modeling of water levels at Lake Naivasha (Kenya) that predicted extraction of water for horticulture as the cause of observed water level decline in the lake.

2.2 Regional Review Workshops

The LBMI organized three regional experience sharing workshops for Africa, Asia, and Europe and Americas. The workshops provided opportunities for various stakeholders to review and comment on draft outputs particularly

Box 1. Proposed Outline of Lake Briefs for the LBMI

1. Introduction
2. Background
2.1. Biophysical Features
2.2. Institutional and Managerial Features
3. Biophysical Environment
3.1. Past and Current Conditions
3.2. History of Lake Degradation
3.3. Lake and Drainage Basin Resource Conflicts
4. Management Environment
4.1. Lake Management Programs and Processes
4.2. Reduction of Lake Stresses
4.3. Environmental Status
4.4. Enabling Environment
5. Lessons Learned and Recommended Initiatives
5.1. Political Interest and Commitment
5.2. Sustainable Institutions
5.3. Financing Mechanisms
5.4. Legislative Frameworks and Policies
5.5. Stakeholder Participation
5.6. Linkages Between Lake Programs and other National and Regional Efforts
5.7. Scientific Information and Research
6. References

lake briefs and thematic papers as well as to discuss other pertinent lake management issues. A wide range of stakeholders attended the workshops, including government officials, politicians, development partners, lake managers, scientists, NGO representatives, and ordinary citizens. The workshops provided very useful inputs to the lake briefs and thematic papers. They also helped identify important themes for elaboration, especially those cross-cutting the study lakes. Though the workshops were one of the most expensive activities in the LBMI, they proved to be worth their cost because they in many cases provided the only opportunity for the PMT to hear "lake stories" firsthand from people on the ground. Interestingly, some local participants observed that the workshops provided their very first opportunity to openly discuss about their lake or lake project in a forum with diverse stakeholders. The firsthand interaction with local people greatly assisted the PMT to understand the issues on the ground and this greatly helped in the synthesis of lessons learned.

2.3 Field Visits

Field visits to project sites, facilities and other establishments within lake basins are real eye openers. Writing a lake report on the basis of what one has heard or read about is different from writing about a lake one has been to. Likewise, trying to understand a report of a lake one has not been to is different from understanding a report of a lake one has visited. These two preceding statements sound obvious but they are sometimes ignored or taken for granted in some lake studies. The LBMI provided opportunities for participants at the three Regional Review Workshops to make field visits to lake basins in the host countries of the workshops (Kenya, Philippines and USA). It was not surprising that for some participants the field trips provided the very first opportunity to visit for not only foreign participants but also local participants. There is probably no better method to learn about "lake stories" than to go out in the field and listen to or see the stories by yourself.

For logistic reasons, it was not possible to arrange field visits to most LBMI study lakes even for the PMT. However, after completion of the LBMI some field visits to the study lakes have been arranged through LBMI-related or separate initiatives. Such visits have been real eye openers and have facilitated better understanding of the lake basins and the lessons they offer. This perhaps reinforces the fact that lesson learning should be a continuous process and needs to be facilitated as such.

2.4 Electronic Forum

In today's digital age the internet provides an excellent forum for interaction. The LBMI established an electronic forum on which project outputs including lake briefs and thematic papers were posted for discussion. The objective was to solicit input from a wider audience who may not have otherwise had a chance to participate in the preparation of the project outputs. Some important inputs were received through the electronic forum. However, the major limitation with the electronic forum seemed to be how to get more people interested in the discussion or how to keep the discussion going on. As one of the tools for learning, the electronic forum was definitely useful. However, the electronic forum would probably not substitute traditional learning methods such one-to-one meetings at opinion exchange workshops.

3. Synthesis of Lesson Learned: LBMI Approach

In this section, the approach used in the LBMI to synthesize lessons is discussed. To some extent the synthesis process overlapped with the data and information collection process discussed in the previous section. This section concentrates on two aspects of the synthesis process, namely, Expert Group Meetings and analytical framework.

3.1 Expert Group Meetings

Several Expert Group Meetings were organized in the LBMI to synthesize and draw lessons from the various project outputs including 28 lake briefs, 17 thematic papers, reports of the three Regional Review Workshops and electronic forum, and several other lake documents. The experts had a lot of experience in lake management globally and were drawn from diverse backgrounds (such as civil society, economics, engineering, environmental resources management, natural and social science, project management, etc.). The diverse backgrounds and global experience of the experts greatly enriched the synthesis process.

A daunting task for the experts was how to practically go through the volumes of documents available for review. Of course being world experts and having participated in most of the LBMI data and information collection and compilation activities, the experts were well familiar with most of the key issues to be addressed. However, the documents contained so many other hidden "lake stories" that were not well known to the experts but which were vital for learning. At the initial stages of the synthesis process, the only option available to the experts was going through each document manually picking out the important "lake stories". Later on, a database with a search engine was developed and it proved to be a very useful and efficient tool for handling large volumes of information. Details of the database and search engine are described by Sekino and Nakamura (2006) and Sekino *et al*. (2007).

3.2 Analytical Framework

Compiling individual "lake stories" is interesting but the big question is "how can we draw lessons from the stories in a format that best informs management of the individual lakes and also other lakes globally?" This is the question that the Expert Group Meetings had to address. It became apparent that there was need to develop a framework for analyzing lake management issues. The Expert Group Meetings identified six elements as important components of lake management and subsequently drew lessons learned around the six components. The six components

have evolved into what has come to be known as Integrated Lake Basin Management, ILBM (Box 2).

The ILBM framework provided a very useful tool to analyze case studies and draw important lessons learned. The framework is continuously being elaborated (e.g. ILEC, 2007). Broadly speaking, ILMB is essentially a planning procedure that helps lake basin managers and stakeholders to make sustainable use of lake basin resources.

In a complementary report to the ILMB report, the World Bank (2005) proposed an analytic framework for assessing lake basins based on "Process Indicators" for the six components of ILBM (Table 1). The World Bank framework particularly targets funding agencies for lake basin programs. The "Process Indicators" in the World Bank framework are expanded from those proposed by the GEF in Duda (2002). The World Bank framework is useful especially for making cross-cutting comparisons among lake basins. However, the framework is rather qualitative than quantitative and therefore bound to be subjective. A related framework for evaluating lake basin projects has been proposed by Muhandiki *et al*. (2007).

4. Lessons Learned from the LBMI Process

The LBMI represents one of the most comprehensive lesson learning processes so far undertaken on a global scale. It offers several lessons on the methodology of learning within and across lake basins, including the following:

4.1 *Engagement of local people as lead resource persons is essential*. Local persons should be engaged as lead resource persons in the documentation of lessons learned to ensure that knowledge accumulated in the process remains at the local level and also to ensure that the process continues even after the "formal lesson learning processes" such as the LBMI ends. It needs not be emphasized that "foreign experts will always go away but local experts will always remain".

4.2 *Involvement of past and current lake basin project staff in the most effective way is essential*. Staff who have been

Box 2. Components of Integrated Lake Basin Management (ILBM) Framework

1.	Institutions:	The management system (including organizations) that ensures equitable use of the lake basin resources.
2.	Policies:	The "rules of the game" that govern the use of lake basin resources and their impacts on lakes.
3.	Participation:	The involvement of all stakeholders in the decision making process.
4.	Technologies:	Physical interventions that help improve lake environments.
5.	Information:	Generation and sharing of both traditional and scientific knowledge for lake management.
6.	Finance:	Financial resources that fund the various lake basin management activities.

Source: Adopted from ILEC 2007

Table 1. Process Indicators of Effective Implementation of ILBM

	ILBM Components					
	Institutions	Policies	Participation	Technologies	Information	Finance
Criteria for Effective Implementation	Sufficient technical and administrative capacity	Clarity of direction and inherently fair	All affected groups are involved	Sustainable with local human resource capacity	Reliable understanding	Appropriate charge levels for resource use
	Pathway to decision makers and stakeholders	Cross-sectoral consistency	Allow sufficient time for performance improvements	Due considerations for operations and maintenance	Long-term monitoring	Linkage to representation and local use of funds
	Use existing structures	Assignment of powers and resources for enforcement	Use existing representative structures	Adoptability and adjustability	Pathway to management	Legal authorization
	Flexibility	Roles of community, local government and NGOs well defined	Clearly defined roles	Linked appropriately with institutions and participation	Available to stakeholders	Multiple sources of funds
		Presentation of alternative mix of policies	Access to information resources	Reliable funding	Sustainable knowledge and capacity	

Source: Adopted from ILEC (2005) and World Bank (2005)

engaged in lake basin projects have a lot of information that is vital for lesson learning including non-documented information. Even though it may not be desirable to engage such staff as lead resource persons, they should be facilitated to participate in the lesson learning process in the most meaningful manner. Lakes should be encouraged to keep a roster of such persons and other lake experts.

4.3 *Access to relevant data and information is inevitable for lesson learning*. Access to data and information on some lakes especially in developing countries is a difficult task because they are not readily available in the public domain. Facilitation of access by project implementing agencies and relevant government agencies is essential. Projects and government agencies should be encouraged to share data and information on the internet and through other means.

4.4 *Identification of major "impact stories" is an essential first step in the preparation of reports for drawing lessons*. The process of preparing lake briefs and related reports should emphasize first the identification of major "impact stories" and then the development of the report structure around the identified major "impact stories". The "impact stories" are narratives of successful and non-successful human interventions undertaken to deal with specific management challenges in the lake basin. Having a suggested outline of the report before hand is helpful but the structure should be flexible to accommodate the "impact stories".

4.5 *Multi-stakeholder opinion exchange meetings are a vital component of the lesson learning process*. Opportunities should be provided for stakeholders to meet and discuss draft documents for lesson learning. Interactions by people on the ground provide useful insights to those tasked with drawing lessons.

4.6 *Field visits are an inevitable component of lesson learning*. Visits to project sites, facilities and other establishments within lake basins are real eye openers to the actual issues on the ground and should be facilitated. There is probably no better method to learn about "lake stories" than to go out in the field and listen to or see the stories by yourself.

4.7 *The electronic forum is a useful learning tool that complements traditional learning methods*. The electronic forum provides a good opportunity to solicit input from many stakeholders who may not otherwise have an opportunity to participate in the lesson learning process. However, the electronic forum has its limitations and it cannot probably substitute traditional learning methods such face-to-face opinion exchange meetings.

4.8 *Focused Expert Group Meetings were essential for the synthesis of lessons learned*. With volumes of documents to be reviewed and a host of issues to be addressed, focused Expert Group Meetings for synthesizing lessons proved to be an essential component of the LBMI process. Experts from diverse backgrounds and with global experience on lake management were an invaluable resource. Maintaining a roster of such global expertise (one of the outputs of the LBMI) is essential for lake management.

4.9 *Data and information management systems are vital tools for lesson learning*. Drawing lessons involves reviewing volumes and volumes of documents. Manual review of documents is a difficult, if not an impossible task. The data and information management system developed by the LBMI was a very handy tool. Development of such tools should be supported globally.

4.10 *The ILBM framework is an essential tool for learning within and across lake basins*. Based on consideration of special characteristics of lakes as lentic (static) water systems, the ILBM framework offers a useful tool to draw lesson on lake management around the six major components of lake basin management. Continuous development and refining of the ILBM concept will be a major contribution to lake management.

In closing, it is noted that lesson learning is a process rather than a one-time event. The individual and institutional networks established through the process are expected to play an important role in lake management globally. This lesson learning process needs to be supported globally.

References

Duda A. (2002). Monitoring and Evaluation Indicators for GEF International Waters Projects. Global Environment Facility, Washington DC, USA.

International Lake Environment Committee Foundation, ILEC (2007). Integrated Lake Basin Management (ILBM): Towards Preservation and Sustainable Use of Lake Ecosystems. International Lake Environment Committee Foundation, Kusatsu, Japan.

International Lake Environment Committee Foundation, ILEC (2005). Managing Lakes and their Basins for Sustainable Use: A Report for Lake Basin Managers and Stakeholders. International Lake Environment Committee Foundation, Kusatsu, Japan.

Muhandiki, V.S., Ballatore, T.J. and Nakamura, M. (2007). Framework for Evaluating Lake Basin Management Projects. Proceedings, 11th International Conference on Diffuse Pollution and 1st Joint Meeting of the IWA Diffuse Pollution and Urban Drainage Specialist Groups, Belo Horizonte, Brazil, 26 - 31 August.

Nakamura, M. and Rast, W. (2009). Author Guidelines for Preparation of a Lake Brief. (Draft Working Paper)

Sekino, T., Nakamura, M., Ballatore, T. and Muhandiki, V. (2007). Knowledge-Base System for Lake Basin Management. Proceedings, 12th International Conference on the Conservation and Management of Lakes (12th World Lakes Conference), Jaipur, India, 28 October - 2 November.

Sekino, T. and Nakamura, M. (2006). Application of Knowledge Management to Environmental Management Projects: A Case Study for Lake Management. *Lakes & Reservoirs: Research and Management*, 11(2), 97-102.

World Bank (2003). Lessons for Managing Lake Basins for Sustainable Use. Environment Department, World Bank, Washington DC, USA.