



UNITED NATIONS
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UNU-INWEH

Minutes of Lake Twinning Workshop on Science and Policy Linkages 24th – 26th September, 2008 Entebbe, Uganda



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Introduction:

What happens to the great lakes of the world has significance not only to their riparian countries but also to the surrounding regions and the global community. The waters and fisheries of these lakes bring enormous economic and livelihood benefits for the peoples of the countries and surrounding regions who enjoy them; but natural resources do not recognize international boundaries. Sustainable utilization of these great lakes' natural resources requires informed and effective multi-national, collaborative management. Without harmonization of natural resource policies and management efforts, tragedy of the commons-type use of the resource often endangers the integrity and sustainability of the resource.

To address threats to fresh-water natural resources on multi- and trans-national scales, stakeholder organizations from both North America and Africa developed a project titled: "Regional Dialogue and Twinning to Improve Trans-boundary Water Resources Governance in Africa". The project is funded under the Global Environmental Facility (GEF) Medium Sized Projects (MSP). "Lake Twinning" is part of this MSP and the main purposes of the Lake Twinning project are: (a) to facilitate policy, legal and institutional reform for trans-boundary waters management (quantity and quality) – through comparative analysis between African and North American great-lakes systems; (b) to enhance regional and national knowledge and capacity for the integrated management of shared water resource systems; and (c) to strengthen participatory planning processes to prevent degradation and balance multiple uses through adaptive shared water resources management, to help establish self-sustaining regional water institutions in Africa. This project will lead to the development of a framework for collaboration on great lakes systems through enhanced science and policy linkages. That framework will form the basis for longer term partnership between the commissions.

Lake Twinning Workshop on Science and Policy Linkages (Lake Twinning Workshop) is the first of two policy workshops specifically addressing issue linkages between Lake Victoria, East Africa, and the North American Great Lakes. It was held in Entebbe, Uganda from 24 to 26 September 2008. This meeting was largely by invitation and had participants from North American and African trans-boundary lake commissions, governments, universities, and research institutions (**see Annexure 1: full list of participants**). This document serves as the minutes and proceeding of the Lake Twinning Workshop held in Entebbe.

The major premise of the Lake Twinning Workshop is based on the similar management issues that confront the large lakes of North America and Africa in spite of their different origins and histories. The shared management issues confronting the Laurentian Great Lakes and Lake Victoria, East Africa, include eutrophication, fisheries exploitation, exotic species introductions, toxic contamination, lake level fluctuations, and climate change, among others. Consequently, there are broad similarities in the mission, vision statements, and management objectives of the different management organizations whom address fresh-water resources in each of these basins. The North American Great Lakes have demonstrated that large size alone does not provide protection from environmental degradation driven by rapid economic development. The United States and Canada also have had dramatic economic growth since the Boundary Waters Treaty of 1909 founded the International Joint Commission (IJC). In fact it was the rapidly expanding economies that often led to excessive demands being made on shared resources that brought these commissions into being just as with the African commissions, and it is the continuing economic expansion and sometimes negative impacts on the Laurentian Great Lakes that have driven the evolution of concern over the sustainability of water quality and fisheries resources. The longer history of the North American commissions gives them a reservoir of experience, including successes and failures, in managing shared resources that can be used to accelerate the capacity of the emerging African international organizations. There are lessons that

can be transferred about effective organizational structures and management practices that may have value to the new African agencies. Also there has been a recent rapid growth in knowledge and capacity as a result of investments by GEF, and collaborating agencies on the African lakes, so the new commissions also have a challenge to incorporate this new knowledge into effective policy, regulatory action, and management while responding to stakeholder expectations and needs. Lastly there are common and emerging challenges (e.g. climate change) that will affect natural resources and their management. These issues require all commissions to hasten and optimize their recommendations, and thus, increases the necessity of strong global natural resource governance partnerships.

General objectives of the Lake Twinning Workshop:

- To highlight regional issues of interest, such as eutrophication, fisheries exploitation, exotic species introductions, toxic contamination, lake level fluctuations, and climate change, that may require collective action;
- To share a comparative analysis of lake management, leading to a synoptic overview of related science;
- To improve translation of science into policies and resource management;
- To communicate scientific information emerging from GLFC-funded workshops – leading to a synthesis report;
- To develop a framework for cooperation on great lakes systems through enhanced science and policy linkages, which will form the basis for longer term partnership between the commissions;
- To develop and sustain communications on challenges & opportunities on issues of mutual interest & concern.

Minutes:

The meeting was opened with welcoming remarks from the chairs (Dr. Emmanuel Nsanzumuganwa and Dr. Zafar Adeel) followed by opening remarks from Dr. Tom Okurut, Executive Secretary, LVBC; Dr. Zafar Adeel (and introduction to the project), Director, UNU – INWEH; Dr. Christian Severin, GEF(IW program); Ms. Irene Brooks, Commissioner, IJC; Dr. Chris Goddard, Executive Secretary, GLFC; Mr. Dick Nyeko, Executive Secretary, LVFO; Dr. Henry Mwima, Executive Secretary, LTA and the Permanent Secretary MWE, Uganda. The remainder of the meeting consisted of three theme areas success and failures of Commissions, using science to guide management and policy, and governance structure;. Each session had a set of presentations followed by discussion. **Annexure 2, presents the agenda for the Lake Twinning Workshop and Annexure 3 presents the full meeting notes, panel discussion, and summary of papers.**

Some lessons learnt during the meeting (based on meeting deliberations and comments from, John Gannon, Gail Krantzberg, Henry Mwima, Tom Okurut, Martin van der Knaap and GLFC team):

- 1 **Take home messages: Comparing and contrasting Laurentian and African Great Lakes:** whereas decision making in North America appears to be a multi-organization and multi-stakeholder process; the opposite is true on African Great Lakes where decisions are made and implemented by relatively much smaller groups of personalities.

1.1 The way trans-boundary issues in African Great Lakes are addressed, determines the willingness for shared water and living resources management, whereas in the Laurentian Great Lakes the issues are dealt

with from a holistic perspective, and equally shared by the partners whatever the size of their parts of the lakes.

1.2 How the communities in the two great lake systems participate in the management of the lake resources. In both cases the public did participate but the extent of involvement was different; the East Africa (EA) ones had just started a coordinated process through the development of the shared Vision while the North America (NA) one was well entrenched through various voluntary associations and groupings including the academia. Consequently, the public influence on policy seems to be more on the NA great lakes than in the EAC though the latter was now on that track

1.3 The principles of Integrated Water Resources Management (IWRM) are being applied in both the NA and the Africa Great Lakes although again to the differing levels of implementation. In the EA region; this principle now forms the basis for administrative water resources management arrangements in the countries; however this was not the case for the NA that base theirs on the Federal and State systems. The concept of Adaptive Management was welcomed and could be an added tool to IWRM for resources (fish and water) management in both Great Lake systems

1.4 Application of adaptive management to the African Great Lakes is limited as adequate resource and production estimates are still not being achieved. Data gathering, presentation and analysis are still consuming relatively large amounts of funds, which may be obtained through projects. When projects come to an end however so does data collection and any form of adaptive management. That is quite different in North America.

1.5 In North America there is a tendency to maximise benefits whereas in Africa it is the production that is maximised, despite all the co-management initiatives that have been taken (on Lake Victoria). For Lake Tanganyika there is still a long way to go as particularly fisheries legislation and research are lagging behind, in practically all four riparian countries.

1.6 The issue that was mentioned many times was the lack of translation of science into policy. It should be noted that the Lake Victoria Fisheries Research Project produced a Fisheries Management Plan for the lake in 2002. The Council of Ministers of the Lake Victoria Fisheries Organization endorsed the major recommendation for fisheries management and that was the introduction of the slot size for Nile perch from 50 to 85 cm, allowing the fish below 50 cm to grow to commercial size (and length at first maturity), as well as allowing the fish over 85 cm to continue reproducing. The selectivity by means of a range of mesh sizes of gillnets could be easily regulated. Despite ministerial endorsement this measure was never properly implemented and enforced. The result is presently the Nile perch is heavily overfished and that a considerable number of processing plants around the lake had to close doors. The reason why the approach failed is that there were no accompanying measures for the period that losses would be incurred by the sector due to the impact of the measure (particularly at fishing and artisanal processing levels). In many other multi-million dollar fisheries there are compensation schemes when fishing effort is reduced for conservation purposes. This is not the case on Lakes Victoria and Tanganyika.

1.7 The threat of invasive species cuts across the two Great Lake systems and it has posed a constant obstacle for the sustainable utilization of the water and fish resources of the regions. In the East African region, Water Hyacinths is the major invasive weed in Lake Victoria and other fresh water bodies while Sea Lamprey is the main invasive fish in the NA systems. In both Lake systems concerted control measures informed by science are being used to fight these invasive species that indeed threaten the livelihoods of

many. The extent of research past and ongoing is however more in the NA than in EA.

2 Adaptive management

The traditional approach to water resources and fisheries management is command and control through regulating programs. However, this works, only when the ecosystem is understood and predictable. This is rarely the case, which has given rise to an adaptive management approach that accepts uncertainties and uses such uncertainties as an opportunity to learn and adapt resource management and policy decisions. The six steps in an adaptive management approach include: assess problem>design solution>monitor>evaluate>adjust/adapt solution. A challenge to overcome is that changing a program or policy based on new information sometimes clouds a resource manager's or policymaker's image because the initial decision may be perceived as an error. An independent, peer review mechanism is often an essential feature of successful adaptive management.

Adaptive management needs to be integrated into an institution's mission statement with a clear link to evaluation and learning. The higher the level of uncertainty, the more learning and adjustment is needed to help reduce uncertainty. Adaptive management is compatible with the precautionary principle. This is, however, a governmental responsibility not to be passed down to the community level. It needs to be built into programs. An evaluation of the effectiveness of an intervention is central to adaptive management; consequently, it requires investment in monitoring to have the data to detect changes and respond with adjusted programs.

The need to integrate water quality, water quantity, biodiversity, ecosystem health, and watershed management will overcome constraints in simply trying to address one aspect of a resource, such as a fishery. Inter-disciplinarity is required to institute programs that can respond to a multiplicity of stressors.

Adaptive management in the field of fisheries on the African Great Lakes sounds fascinating, but can fisheries managers afford the time to conduct management experiments. The uncertainties regarding fish biomass and fish catches are still too great to form the basis for this type of management. Therefore the precautionary approach would still be the optimal way of addressing fisheries problems as too many livelihoods and investments are at stake.

Even the North American Commission (GLFC) feels that adaptive management has the potential to allow a greater understanding about how fresh-water ecosystems respond to human actions, including fishing and land use in the drainage basin. Adaptive management can lead to effective resource management approaches if there is sufficient scientific and political will to allow truly adaptive management regimes to occur. It is necessary to properly define adaptive management and how it can be successfully implemented, however, so that it can be used as an effective tool for its intended purpose.

3 Funding

The challenge of raising multi-billion dollar funding of for instance water ballast remedies from the national budgets on the Laurentian Lakes versus the national funding of the staff salaries of the Lake Tanganyika Authority and Lake Victoria bodies (of the order of hundreds of thousands of dollars). For the implementation of lake-related activities there is the dependency on outside funding, with possibly strings attached, ignoring many standard monitoring activities of the lakes' environments. This monitoring on Laurentian lakes is taken for granted, whereas on the African Great Lakes it is only for the lifetime of projects.

It was also discussed that although international funding is required for some projects, public-private partnership and other options should be explored for sustainability of the commissions. For local ownership and long term sustainability it is important that the funds are raised from the stakeholders who will benefit from service provided by commissions.

4 Lessons learnt

Science conducted in vacuum, even when published in peer-reviewed scientific journals, is often ineffective in influencing resource management and policy decisions. Institutional arrangements are needed to link science with resource management and policy. This is particularly important on large lakes ecosystems with large watersheds that transcend multiple jurisdictional boundaries. There is also growing recognition that the science should not be confined to open waters but rather should encompass watershed and socio-economic issues that impact lake water quality and quantity. Socio-economic considerations should include full-cost accounting of shared costs and benefits of resource uses as part of better understanding of the ways and means of achieving sustainability. Institutional arrangements to foster integrated water resources management (IWRM) are required to catalyze implementation of basin-wide policies to sustain long-term resource protection and restoration for sustainable uses. This should include a visioning process with the public and stakeholders to obtain “buy-in” and support for science-based management programs and policies.

The term “Ecosystem Health” is well used and understood qualitatively, but the challenge is how to measure ecosystem health in ways that would be useful in communicating research and monitoring information to resource managers and policymakers. Metrics were developed that show promise in detecting trends in large lakes ecosystems at the first GLFC/BOTE Workshop on ecosystem health in large lakes of the world. Useful metrics included trophic structure, exploited species, habitat changes and catchment changes. Challenges remain, including determining the appropriate scale for measurement, cross-lake differences in monitoring methods and frequency, and costs and logistics for conducting large lakes assessments.

The GLFC’s strategic vision incorporates the ecosystem concept as its underpinning for fisheries management and research. To this end, the commission developed the Ecosystem Health of Large Lakes research theme to explore the ecosystem concept within and beyond the geographical boundaries of the Laurentian Great Lakes. This research theme included establishing an international forum for exchanging information about issues affecting fisheries and the health of large lakes across a spectrum of systems under a range of environmental stresses. The objective is to develop robust metrics to assess the state of ecosystem health and to guide corrective actions to reduce the risk of deteriorating ecosystem health or to assess the efficacy of restorative actions.

In concert with the Ecosystem Health of Large Lakes research theme, GLFC established a Human Dimensions of Great Lakes Fisheries Management research theme to recognize humans as a central component in the ecosystem. These two research themes reflect the global efforts to sustainably manage natural fresh-water resources, and the understanding that the commonalities between fresh-water governance structures, successes, and failures can improve resource governance on the Laurentian Great Lakes.

One of the objectives of the Ecosystem Health of Large Lakes research theme is to reach consensus on what criteria to use to evaluate the health of fresh water lakes around the world. Further, it is clear that the successful management of freshwater natural resources incorporates an assessment of economic, cultural, political, and social factors. It is with this approach that the commission recognizes that the *Lake Twinning*

Workshop creates a crucial dialogue about fresh-water ecosystem knowledge, and reveals the variety of influences which must be addressed among global fresh-water resources.

One thing in common that was learnt was that there are institutions established by constituent governments in both NA and EA that have been created to deal with issues of the Lakes; the Great Lakes Fishery Commission and the International Joint Commission, in North America and; the Lake Victoria Basin Commission; the Lake Victoria Fisheries Organization and the Lake Tanganyika Authority in East-Central Africa. The existence of these institutions provides a great opportunity for collaboration and cooperation for the sole objective of sustaining the Great Lakes eco-systems.

It became clear once again that the difference between the North American way of managing the lakes and the African one is still enormous. In terms of human wellbeing the difference could be described as leisure versus survival. On the leisure side ecological and biodiversity values can be maintained, whereas on the survival side the care for the environment is of less importance, resulting in pollution and overexploitation.

In the weekend of 8-9 February many ice fishermen drifted on Lake Erie and were rescued by specialized vessels and helicopters. In Africa (and not only on the Great Lakes) fishermen in trouble (canoes capsized by storms or waves) do not have this luxury of being rescued.

It was felt that the “Optimization of natural resources” was not clearly defined at the workshop and it must first be clearly defined, widely understood, and broadly accepted to effectively apply this concept to management approaches. In the context of the *Lake Twinning Workshop*, let us ask the following questions about optimizing the “use of resources”:

- Are we optimizing the amount of resource extraction at sustainability?
- Does optimization pertain to profits, utility, or equity?
- For whom are we optimizing and to what end?
- What should we include in our optimization and what adds or lessens the optimization?
- Do we include markets and non-market goods and services?
- What are internal to our optimization and what is external?
- Are ethical parameters included; does optimization cost us in equality?
- What does optimization mean to other stakeholders?
- What are the trade-offs in other sectors by optimizing in just one?
- Is it possible to have an optimality model that incorporates all perspectives and uses (e.g. market value, ecosystem function, etc.)?

By answering the questions above, a more complete understanding of optimization can be achieved. This would be a first step toward using the concept for effective management and governance of fresh-water resources.

6 Future benefits

The African organizations may benefit from studying the North American approach of integrated multi-sectoral management of lake resources, whereas the North American organizations may benefit of co-developing policy appraisal techniques for their younger sister organizations in Africa.

The new governance structures being implemented in Lake Victoria provided useful guidance to the century old structure in the Laurentian Great Lakes. The regular reporting to a tri-national ministerial

committee was very instructive; something that our governments and IJC do not have. The IJC and the parties would be more accountable to the public if required to report to a bi-national ministerial/administrator body.

Localized water quality deterioration in the near shore of the Laurentian Great Lakes are similarly experienced in the Rift Valley Great Lakes. The response of beach development units is a model that could be deployed more expansively in the Laurentian Great Lakes, well beyond our RAP program and connected to watershed and sub-watershed management with intense civic engagement supported by government technical expertise.

GLFC, through its participation in the *Lake Twinning Workshop*, gained new perspectives, knowledge, and understanding of global issues in fresh-water natural resource management. The commission realizes that these lessons will be important in identifying common theoretical and applied fisheries resource management concepts, defining ecosystem health for the management of large lake systems, and the relationship between the two.

Throughout the workshop's many presentations, the commissions identified commonalities in water resource management between the Laurentian Great Lakes and the African Great Lakes. Although similarities in many of the biophysical aspects do not necessarily mean that management approaches are similar, failures and successes of management approaches highlight many of the critical variables which influence fresh-water resource management. In summary, context is critical; it is this realization that will allow each organization involved in the workshop to facilitate new and existing management approaches. It is for these reasons that GLFC views the *Lake Twinning Workshop on Science and Policy Linkages* a success and looks forward to advancing further collaboration and twinning efforts between these and other organizations involved with fresh-water resource management and governance.

Near the conclusion of the workshop, a closed-door session occurred to discuss the second policy meeting of the *Lake Twinning Workshop on Science and Policy Linkages*. The results of the concluding closed-door session are:

The final discussion on "next steps" led to the conclusion that the next policy workshop, to be held in June, 2009 at Niagara Falls, ON, focus on several of the following themes of joint interest which will also form a framework for future joint collaboration:

1. Climate change (adaptation/mitigation) – including:
 - a. Vulnerability mapping
 - b. Management strategies
2. Governance Structure – including:
 - a. Who should manage the trans-boundary lakes
 - b. How should trans-boundary lakes be managed
 - c. How to deal with uncertainties
 - d. Invasive species management
 - e. A lot of scientists are getting into politics, this can be a first step in bridging science and policy but it is important to understand politicians as well!!
3. Human Well-being – including discussion topics on:
 - a. The importance of communicating to the communities the linkages between healthy lakes (ecosystem) and human well being, not only in developing countries but also in North America.

- b. Natural resources evaluation
- c. Poverty in Africa and its link to Great Lakes
- 4. Public-private partnerships – including:
 - a. Engagement of private sector
 - b. The systematic analysis of partnerships
 - c. Analysis of the institutional side of how to foster public-private partnerships
 - d. Sustainability of these partnerships
- 5. Gender Balance (this can be discussed under Governance Structures and includes women for the advancement of education, other social development, etc)
- 6. Ecosystem Approach/management – including:
 - a. Ground water management
 - b. Integrated Water Resources Management
 - c. Research and policy development on invasive species (based on the lessons learnt from the success of the North American experience of formulating effective policies, based on addressing issues which have large economic and ecological impacts, and communicating these policies and approaches to government and community through successful education and outreach programs).
 - d. Pollution control
 - e. Water quality standards
 - f. Include near shore communities and community engagement

An overarching theme was identified in this session: monitoring and evaluation. This theme includes defining indicators and common guidelines, the issue of diminishing resource availability for monitoring and evaluation, including policy into monitoring and evaluation, and defining endpoints and outcomes rather than just indicators.

In the end the following four themes were identified for the second policy workshop in Niagara Falls, Canada:

1. Governance Structure
2. Ecosystem approaches
3. Climate change
4. Public-private partnership

The dates for the workshop have been tentatively fixed for 14 and 15 June, 2009, to be held in Niagara Falls, Ontario, Canada. It was also agreed that each session will have two chairs who will be identified in advance, and they will then (in collaboration with UNU-INWEH) identify two or three key questions that all speakers should answer during their talk during that session, facilitate background papers, chair the session, and help in the peer-review process of the set of publication(s) coming out of the workshop. This will help keep discussion on track and will be more effective for comparison of issues across continents and publication.

The possibility of bringing art related to water, lakes, and communities around lakes for the second policy workshop for an exhibit during the IJC's centennial celebration was also discussed. The commissioners from African have agreed to bring art for the exhibition when they come for the meeting in Canada.

Architecture under which the collaboration of five commissions can take place was identified as "structure of framework for future collaboration". The framework will be further refined for the meeting in

North America in June 2009. To further build on the project, it was suggested that joint collaborations/activities can be carried out:

- Joint studies
- Joint research
- Joint publication
- There can be MOUs spelling out collaborative areas (MOUs can give obligation to parties involved)
- Database of the projects/activities carried out by all the Lake Commissions, UNU-INWEH and GEF in trans-boundary lakes
- Webpage with all the contacts and some kind of facility for uploading and sharing documents
- Establishing mailing list
- Possibility of a newsletter or some kind of a joint publication of all the commissions
- Documentaries to compare fisheries and communities across North American and African Great Lakes (however, it was pointed out that this can be a nightmare for the commissions).

There was also a discussion on the type of outputs/publications from the first policy workshop and it was agreed that there will be three outputs:

1. Minutes of the meeting
2. Proceedings
 - a. Collaborative papers across commissions
 - b. Alternatively, authors will submit a summary of their power-point slide presentations prepared the workshop.
3. Policy Briefs

ANNEXURE 1: List of Participants

Zafar Adeel

Director, United Nations University, International Network on Water, Environment and Health, Hamilton, Canada

Henry Aryamanya-Mugisha

National Environmental Management Authority, Kampala – Uganda

J. Balirwa

Director, National Fisheries Resources Research Institute (NaFIRRI), Uganda

Irene Brooks

Commissioner, U.S. Section Chair, International Joint Commission

Y. Budeba

Director General, Tanzania Fisheries Research Institute (TAFIRI), Dar es Salaam, Tanzania

Jeremiah Daffa

Manager of Tanzania Coastal Management Project (TCMP)

John Dettmers

Senior Fisheries Biologist, Great Lakes Fishery Commission

Sinankwakure Fabien

Permanent Secretary, Ministry of Environment, Bujumbura, Burundi

Hakizimana Gabriel

Director of Environment, Ministry of Environment, Land Management, and Public Works, Bujumbura, Burundi

Marc Gaden

Communications Officer and Legislative Liaison, Great Lakes Fishery Commission

John Gannon

Limnologist, International Joint Commission

John Gichuki

Director, Kenya Marine and Fisheries Research Institute (KMFRI), Mombassa, Kenya

Chris Goddard

Executive Secretary, Great Lakes Fishery Commission

Velma Grover

United Nations University, International Network on Water, Environment and Health

Bob Hecky

Commissioner, Canadian Section, Great Lakes Fishery Commission;
Professor of Biology, United Nations University Research Chair in African Great Lakes and Rivers,
University of Waterloo; Professor of Biology, University of MN, Duluth

Jim Houston

International Joint Commission

Gary Isbell

Senior Fisheries Manager, Great Lakes Fishery Commission

Inga Jacobs

St. Andrews University

Gail Krantzberg

Adjunct, United Nations University, International Network on Water, Environment and Health
Director, of the Centre for Engineering and Public Policy in the School of Engineering Practice McMaster
University

Ted Lawrence

Communications and Policy Associate, Great Lakes Fishery Commission;
Ph.D. student, School of Natural Resources and Environment, University of Michigan

Theobald Mashinga

National Focal Point – LVEMP, Director of EIA, Compliance & Enforcement, Rwanda Environment
Management Authority, Kigali, Rwanda

Stanley Matowo

National Focal Point Officer, Ministry of Water and Irrigation, Dar es Salaam, Tanzania

Yunus Mgya

University of Dar es Salaam

Oliva Mkumbo

Senior Scientist, Lake Victoria Fisheries Organization

Carol Mukassa

Socio-Economist, Lake Victoria Fisheries Organization

Washington Mutayoba

Director of Water Resources, Tanzania

Henry Mwima

Executive Director of the Lake Tanganika Authority

A. Mwinzi

Director general, National Environment Management Authority (NEMA), Kenya

Dr. James Njiru

Professor, Moi University, Kenya

Laurent Ntahuga

Lake Tanganyika Authority

Wivine Ntamubano

East African Community (EAC) Secretariat

Fiona Nunan

Management LTTA, Uganda

Dick Nyeko

Executive secretary, Lake Victoria Fisheries Organization

David O. Obong

The Permanent Secretary, Ministry of Water and Environment, Kampala, UGANDA

Konstantine Odongkara

Senior Research Officer, Socio-economist, National Fisheries Resource Research Institute

Tom Okurut

Executive Secretary, Lake Victoria Basin Commission

Terry Quinney

Provincial Manager of Fish & Wildlife, Ontario Federation of Anglers and Hunters

Member, Council of Great Lakes Fishery Agencies

Matano Saidi

Lake Victoria Basin Commission

Christopher Sayi

Deputy Permanent Secretary, ministry of water and irrigation, tanzania

Christian Severin,

Global Environment Facility, USA

Mugisha Shillingi

Ag. Director, Directorate of Water Resources Management, Minister of Water & Environment, Entebbe, Uganda

Kelley Smith

Chief of Department of Natural Resources, Fisheries Division, State of Michigan
Chair, Council of Great Lakes Fishery Agencies

Tim Twongo
Lake Victoria Basin Commission

Martin van der Knaap
Food and Agriculture Organization

Tom Waako
Nile Basin Initiative

Robert Wafula
Deputy Executive secretary, Lake Victoria Fisheries Organization

ANNEXURE 2: Agenda



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LAKE VICTORIA BASIN COMMISSION SECRETARIAT

Lake Twinning

Workshop on Science and Policy Linkages

24th – 26th September, 2008

Imperial Botanical Hotel, Entebbe, Uganda

September 24th 2008. Day 1

9:00 – 10:30 Plenary (welcome speech)

Chair: Emmanuel Nsanzumuganwa and Zafar Adeel (UNU-INWEH)

Opening of the Meeting and Welcome remarks

- Dr. Tom Okurut, LVBC
- Dr. Zafar Adeel (and introduction to the project), UNU – INWEH,
- Dr. Christian Severin (IW program), GEF
- Ms. Irene Brooks, IJC
- Chris Goddard, GLFC
- Dr. Dick Nyeko, LVFO
- Dr. Henry Mwima, LTA
- The Permanent Secretary MWE, Uganda

10:30 – 11:00 BREAK

Theme 1, part 1: Successes and failures of the commissions

Chair: Bob Hecky (UNU-INWEH) and Mr. David O. Obong

Rapporteur: Marc Gaden and Mr Fred K. Mwango

- 11:00 - 11:20 Successful control of water hyacinth in Lake Victoria - (Tom Okurut).
- 11:20 – 11:40 Successful implementation of co-management of the Lake Victoria fisheries including successful transboundary conflict resolutions at national and regional levels on the sharing of the Lake Victoria resources amongst the stakeholders (LVFO led by Dick Nyeko).

11:40 – 12:00 Successful control of eutrophication in the Laurentian Great Lakes (IJC) in the late 1970s-early 1980s and recent challenges with the resurgence of eutrophication problems (IJC led by John Gannon)

12:00 – 1:30 LUNCH

Theme 1, part 2: Successes and failures of the commissions (continued)

Chair: Chris Goddard and Patrick Rutabanzibwa

Rapporteur: Velma I Grover and Mr Washington Mutayoba

1:30 – 1:50 Measuring the Success of the International Joint Commission through its Experiences in Managing Shared Waters (IJC led by Jim Houston)

1:50 – 2:10 Whether you manage fisheries to protect the environment or to protect economic well being (case study of Alewife) (GLFC led by John Dettmers).

2:10 – 2:30 Failure to deal effectively with aquatic invasive species (GLFC led by Marc Gaden).

2:30 – 2:50 Basin wide management of cormorant in the North American great lakes (GLFC led by G. Isbell)

2:50 – 3:10 Discussions on Theme 1

3:10 – 3:30 Break

3:30 - 5:30 Discussions on Theme 1

RECEPTION/DINNER

September 25th , Day 2 (Wednesday)

Theme 2: Using Science to Guide Management and Policy

Chair: Jim Houston and David Stower

Rapporteur: John Gannon and Eng Mugisha Shillingi

9:00 – 9:20 Summary of GLFC/BOTE ecosystem health in large lakes of the world workshop series. (Bob Hecky).

9:20 – 9:40 Public participation and public expectations in resource management in North American and African great lakes. (Tom Okurut and Irene Brooks)

9:40–10:00 Benefit sharing methodology for effective fisheries management: the East African experience (Constantine Odongkara)

10:00 – 10:20 Adaptive management: Challenges and opportunities for Water Resource Management (Gail Krantzberg)

10:20 – 10:40 Lake Victoria Environmental Management Plan (Christian Severin (GEF))

10:40 – 11:00 Discussions on Theme 2

11:00 – 11:30 BREAK

11:30 – 1:00 Discussions on Theme 2

1:00 – 2:30 LUNCH

Theme 3: Governance structure

Panel: Bob Hecky, Marc Gaden, John Gannon, Gail Krantzberg, Tom Okurut, Henry Mwima
Moderated by: Zafar Adeel and Sinankwakure Fabien
Rapporteur: Martin van der Knaap and Theobald N. Mashinga

Part 1: Analyze the governance structures in the existing commissions for commonalities and differences. How these (commonalities and differences) have affected policy delivery in the different commissions to achieve their objectives UNU-INWEH
 Governance Structure of the Lake Victoria Basin Commission & Service Delivery (Tom Okurut)
 Governance Structure of the Lake Tanganyika Commission (Henry Mwima)
 Nile Basin Initiative: Roles, Functions, and Governance Structure (Tom Waako)

Part 2: Ecosystem/watershed approach – struggle from concept to practice, how to work into governance structure. Under this theme, the Nile Basin project could be a good case on how to transition from ecosystem to watershed approach.
 Ecosystem and watershed approaches (Eng. Mugisha-Shillingi)
 Kenya’s Governance Structure for watershed management (Fred Mwangi)
 Burundi’s Governance Structure
 Tanzania—Water resources management governance structure (Washington Mutayoba)

Part 3: LVBC: a review paper on governance structure in EAC with regard to watershed management – the influence of National Integrated Water Resources Management (NIWRM), AMCOW, the African Water Vision 2025, et cetera.

Discussions

September 26th, Day 3

Reporting out by Rapporteurs
 Discussion on North American policy workshop and sessions
 Discussion on publication output and responsibilities

Closed door meeting:

ANNEXURE 3: Lake Twinning Workshop on Science and Policy Linkages

Workshop Notes

September 24th 2008. Day 1

Plenary (welcome speech)

Chair: Emmanuel Nsanzumuganwa and Zafar Adeel (UNU-INWEH)

The meeting was opened with welcomes from the chairs followed by opening remarks from

- Dr. Tom Okurut, LVBC
- Dr. Zafar Adeel (and introduction to the project), UNU – INWEH,
- Dr. Christian Severin (IW program), GEF
- Ms. Irene Brooks, IJC
- Chris Goddard, GLFC
- Dr. Dick Nyeko, LVFO
- Dr. Henry Mwima, LTA
- The Permanent Secretary MWE, Uganda

The remainder of the meeting consisted of three theme areas consisting of presentations and a question and answer session. A panel discussion occurred at the end of the theme sections.

Theme 1, Part 1: Successes and failures of the commissions

Chair: Bob Hecky (UNU-INWEH) and Mr. David O. Obong
Rapporteur: Marc Gaden and Mr Fred K. Mwango

Successful Control of water hyacinth in Lake Victoria *Tim Twongo*

Water Hyacinth Initiative, currently being implemented by Uganda, was discussed. There are several methods to control hyacinth including:

- manual removal
- mechanical controls (harvesters, loaders, etc.)
- biological controls (weevils)
- chemical controls, and
- ecological succession (use of native plants to displace hyacinth)

Dr. Twongo presented with lessons learned from the Water Hyacinth Initiative. Hyacinth will pose a continued threat to the lake's ecosystem. There is an inability to control hyacinth in a riverine environment. Of the above methods, biological control was rated the most effective. Chemical controls were rejected in Uganda after public hearings, though officials were asked to review options. Large lakes tend to have the ability to reverse ecological disturbance.

Successful implementation of co-management of the Lake Victoria Fisheries *Dick Nyeko*

The Lake Victoria Fisheries Organization (LVFO) is an institution of the East African Community (EAC). The LVFO is older than the EAC. The LVFO is structured with committees and processes related to specific goals outlined by the LVFO's guiding documents. LVFO uses working groups to inform the scientific community and directors from the parent countries. LVFO is the only organ of the community with grassroots (in-village) institutions, including 1069 beach management units (BMUs). Government agencies, police, private corporations, and the public support the LVFO.

LVFO's processes involve management and scientific committees reporting to an executive committee, which reports to the policy steering committee, which reports to the Council of Ministers. LVFO is not itself a decision-making body but it does provide advice and honest information to governments. LVFO is led by management and research themes, which include fisheries co-management, fisheries policy and legislation, fish quality assurance, "people" management, fish abundance, biomass monitoring, socio-economic research and monitoring, and catch assessment.

The LVFO works with stakeholders in co-management. These include groups dependent on fishing (boat owners, processors, boat builders, fishers, etc.), fish consumers, credit providers, and private industry (exporters). The rationale for co-management on Lake Victoria is rooted in the need to adopt a new management approach, as traditional command-and-control approaches from far away have not safeguarded the resource. The LVFO was established partially because the governments realized it was more effective to

involve local people and processors in management. The goal is to empower stakeholders and improve governance. This includes involving those who are most disadvantaged and are traditionally disenfranchised (e.g., women).

The estimated total value of the Lake Victoria fisheries is \$500 million. Dagaa is the “food security” fish; dagaa is still very abundant. The number of fishermen has increased 52% since 2000 and the number of boats has increased 63%, as have gillnets (87%). Experts of Nile perch are significant. Where are the proceeds of the fishery going? Mr. Nyeko reported that 37% of the value goes to fishermen, 14% to factory agents, 21% to processing plants, 7% to importers/exporters, and 38% to supermarkets.

Mr. Nyeko concluded by listing the challenges facing the Lake Victoria fishery: environmental degradation, overfishing, and illegal trade are major problems, exacerbated by population increases, weak governance. Other challenges include cross-border conflicts, the need to obey laws and access regulations, climate change, and piracy and theft.

Successful control of eutrophication in the Laurentian Great Lakes (IJC) in the late 1970s-early 1980s and recent challenges with the resurgence of eutrophication problems *John Gannon*

The symptoms of eutrophication (blue-green algae blooms, rotting *Cladophora* on beaches, decreased water clarity, loss of aquatic macrophytes, and hypoxia in the bottom waters of the central basin of Lake Erie) were serious and highly visible to the public in the 1960's. These problems were especially severe in the shallow waters of Lake Erie, Green Bay of Lake Michigan and Saginaw Bay of Lake Huron. As a sign that most human uses of Lake Erie were being severely impaired, the media declared, “Lake Erie is Dead”. This public concern led to political action and was the main catalyst for the federal governments of the United States and Canada to sign the Great Lakes Water Quality Agreement (Agreement) of 1972 as a permanent reference under the Boundary Waters Treaty of 1909. Although subsequent revisions of the Agreement in 1978 and by Protocol in 1987 broadened the provisions of the Agreement, the 1972 Agreement specifically addressed eutrophication.

The dramatic reduction of eutrophication symptoms in the late 1980's – early 1990's is widely heralded with one of the most significant success stories in international cooperation on transboundary waters. The Agreement provided the political will and framework for cooperation between the U.S. and Canada and the scientific community developed the predictive models that guided phosphorus (P) control. Phosphorus was established as the limiting nutrient and the models were used to establish the quantitative relationships between offshore P concentration targets and the target P loads for each lake. Loads from inadequate sewage treatment facilities and P in detergents were identified as the main sources for control. Through initiatives conducted under the auspices of the Agreement in the 1970's, the two countries spent over \$8 billion in sewage treatment plant improvements and the eight Great Lakes states and the Province of Ontario instituted P bans in detergents. The lakes responded faster with a reversal in eutrophication than the scientists predicted with visible improvements by the late 1980's (McGucken, 2000).

Success in eutrophication control, however, was short lived. In the mid-1990s, nearshore P concentrations became elevated to the pre-P load control period while P concentrations in offshore waters declined despite no appreciable increase in P loads. Nuisance eutrophication conditions, including blue-green algae blooms, rotting *Cladophora* on beaches and the persistence of hypoxia problems in Lake Erie's central basin returned as in the 1960's. The loss of productivity in offshore pelagic waters is so severe that the term,

“desertification”, is being used, especially for Lakes Michigan, Huron and Ontario. Questions remain whether there are undocumented increases in P loads, especially from non-point sources in the watershed or the introduction of dreissenid mussels are “re-engineering” the lakes and causing internal cycling and sequestering of P in the nearshore waters of the Great Lakes (Hecky, et al 2004) .

The Great Lakes Water Quality Agreement is currently undergoing review by the governments. The International Joint Commission offered advice to governments on Agreement review (IJC, 2006), including recommendations to more comprehensively take a watershed approach to research and resource management of the Great Lakes. The Great Lakes ecosystem is significantly different than it was in the 1960’s and the IJC recommended a new Agreement is needed to address the problems in the Great Lakes during the 21st century. To address the resurgence of eutrophication in the Great Lakes will require the same kind of effort in science-policy linkages that was so effective in the 1970’s but now will require much more attention to the watershed, tributaries and nearshore areas of the Great Lakes.

The Great Lakes Water Quality Agreement was an important catalyst for improvement, however, it is dated and in need of a re-write. The International Joint Commission (which implements the agreement) recommended that the agreement be changed from a list of specific actions to an “operating framework,” a framework much like *A Joint Strategic Plan for Management of Great Lakes Fisheries*, which establishes regular strategic procedures for ongoing interactions. Dr. Gannon also stressed the need to link land and water (from both a technical and a governance perspective) and the need to improve flexibility and accountability. It is important not to focus on just one problem.

Question and answer session

1. *Are any positive benefits to water hyacinth?*

Some people have been using it as a resource, but if you look at the overall impact, the socio-economic benefits of leaving it in the lake and rivers is far less than eradication. Many people benefit from the water, and the hyacinth is a big problem for them. Water hyacinth control is inhibited when the countries do not provide funds for control.

2. *Is there an issue with security on Lake Tanganyika?*

There are three main organs of the Lake Tanganyika Authority: the Conference of Ministers, the Authority’s secretariat, and the management committee. Activities are only now beginning to happen and the issue of security can be tabled at the management committee level. After discussion there, it can be elevated to the Council of Ministers.

3. *How does land use fit into the strategic plan for the Great Lakes Water Quality Agreement?*

The agreement is a large document but does not really mention new issues (e.g., aquatic invasive species, climate change, etc). Most official agreements and treaties are very short. The agreement does not establish a strategic process; rather, it contains a lot of technical information. A strategic approach modeled after *A Joint Strategic Plan for Management of Great Lakes Fisheries* would be best. Regarding the link between water quality and land use, nonpoint source pollution is a big issue today and not being sufficiently addressed. However, there was an International Joint Commission study in the late 1970s that clarified how land use affects water quality. The study was not incorporated into the agreement. There is a need for both technical information and good governance to better link land use and water quality in the North American Great Lakes.

4. *How are nutrients and fisheries production balanced in the Laurentian Great Lakes and is atmospheric deposition a source of phosphorus?*

Phosphorus is not a major source from atmospheric deposition though there has been a substantial increase in inorganic nitrogen, which does come from the atmosphere. Science does need to drive the balance between phosphorus and fisheries. It is important to better understand nutrient loadings from land and air and how loadings affect the nearshore zone.

5. *What is the level of consensus among the eight Great Lakes states and the province of Ontario during the 1960s and when was the decision made to introduce Pacific salmon into the Laurentian Great Lakes?*

This issue was not discussed among the jurisdictions, rather, it was a relatively unilateral decision made by the State of Michigan. Today, with the Joint Strategic Plan structure, such a proposal would go through an extensive, multilateral decision making process before it would occur.

Theme 1, Part 2: Successes and failures of the commissions

Chair: Chris Goddard and Patrick Rutabanzibwa
Rapporteur: Velma I Grover and Mr Washington Mutayoba;
additional meeting notes provided by Ted Lawrence

Measuring the success of the IJC through its experiences in managing shared waters *Jim Houston*

By the IJC definition, success is measured by two approaches:

1. Review its track record, which is done under two categories:
 - a. The receipt of applications: most of the commission's earlier work involved reviewing applications to construct and operate dams that would affect flows of water in boundary waters. In this regards commission was successful in reviewing all the applications and out of 69 applications 49 were approved for structures such as Lawrence structures to Grand Cooley dam. A reduction in applications has taken place and only 1 has been received since 1990.
 - b. References from the two governments
2. Trends in applications and references: 58 references have been received since IJC inception. The first, was in 1912 arising from major concerns about pollution in the boundary waters to the most recent was given to the Commission this year to investigate phosphorus load reductions into the Mississquoi Bay watershed.

Reasons/Elements of the IJC's success:

1) Contextual (beyond IJC's control):

- nature of water (the reason for the IJC's success is the nature of water itself. Water sustains life, and therefore essential, hence the resilience of the Boundary Waters Treaty of 1909 and the success of IJC can in some measure be credited to nature of water itself.)
- quantity of water: volume of the Great Lakes is in excess of six quadrillion gallons. Yet, even with the seeming abundance of water, reaching final agreement on a management regime for using or diverting Great Lakes water has still proven elusive – and only one percent of GL water is renewable
- Geography: The nature of being downstream (both Canada and US are upstream or downstream on different rivers between countries. "Geography makes good neighbors"
- Success: Both Canada and the US have been successful economically, which means that they can afford to invest in a wide range of measures to improve transboundary management and conservation of the transboundary environment.
- Stewardship abilities (e.g. Cuyahoga River Fire created national scandal and a challenge to clean up polluted urban rivers.
- Social, cultural, economic ties: US and Canada share these ties and relate to each other more than differ. Bi-national commission ties and trade.
- Fairness and equality: general thoughts on this, with only 2 countries it is easier to come to consensus.
- Boundary Waters Treaty: The IJC's success is rooted in commonality of interests in shared waters, and these are explicitly stated in the Treaty.

2) Procedural (within IJC's control):

- Consensus building: common procedure is not to vote on an issue but to collect information on the subject and build consensus

- Joint Fact Finding: based on science, as part of the process before a study begins what needs to be measured, how and for how long is established
- Public involvement: public meetings to engage the community
- IJC works on partnership principle, where both partners are allies
- Independent of influence: both countries have equal representation in terms of equal number of commissioners and all the commissioners have equal voting powers.
- Capacity to depoliticize issues:
- Experts: using boards, task forces, and study teams to guide policies
- Evolving Integrated Management Techniques – IJC is trying watershed approach as a new way for dispute prevention.

Question: Is the IJC model transferable to other transboundary watersheds?

Answer: It is not a model for everyone and needs the right conditions to be successful, however the process can work under right circumstances.

**Management of Alewife using Pacific Salmon in the Great Lakes:
Whether to manage for economics or ecosystems?
John Dettmers**

Historically, the food webs of the Laurentian Great Lakes derived from pelagic sources of energy. Specifically, pelagic phytoplankton were grazed by the primary consumers, zooplankton, *Mysis*, and *Diporeia*. In turn, secondary consumers fed on these invertebrates. Yellow perch and lake whitefish were the dominant nearshore secondary consumers whereas an evolutionarily unique group of deepwater ciscoes were dominant offshore. At the top of the food web was the lake trout. By 1950s, lake trout and deepwater ciscoes were declining due to overfishing, sea lamprey and alewife. As a result, by 1960 sea lamprey was the apex predator in the system. Alewife, bloater, and rainbow smelt (alewife and rainbow smelt are invaders) replaced the ciscoes. However, there was no top predator to eat them. The alewife, with no top predator, exceeded its carrying capacity in the lakes and died en masse in large fish kills.

Fishery managers came to the rescue from 1965-1985 with a primary goal of reducing alewife abundance. This was accomplished by stocking Pacific salmon. The goal of this program was to build a predator fish population to decrease alewife and other low value species as forage. In the Great Lakes, fishery management occurs in a cooperative manner as specified in *A Joint Strategic Plan for Great Lakes Fishery Management*. Part of this cooperative process includes annual public meetings of lake committees. Lake committees include the agencies with management authority on each lake. They meet annually to evaluate progress toward their Fish Community Objectives, using the best available science to inform management decisions.

- Lake Committees have an indicator system (ten red flags in Lake Michigan). e.g. no alewife can hurt the recreational fishery. Managing for the recreational fishery.

Between 1965 and 1990, stocking of Pacific salmon in Lake Michigan increased from about 1 million to close to 8 million annually. As a result of the activities of fishery managers, Pacific salmon replaced lake trout at the top of the food web by the mid- 1980s, with alewife, bloater and rainbow smelt the dominant secondary consumers, but alewife and rainbow smelt populations were more in control.

Just as managers thought they had figured out the system, a series of ecosystem changes began in 1985 that altered the opportunities for fishery managers. These changes continue to the present day. Since the mid-1980s, Pacific salmon have been increasingly naturally produced. The scientific community also has learned that alewife carry high levels of an enzyme called thiaminase. Low levels of thiamine in salmon and trout eggs can cause reduced survival of early life stages. This is especially true for lake trout, the native top predator. In addition, several important invasions occurred by dreissenid mussels and the round goby that are altering the energy flow and the food web structure of the lakes. These changes are especially problematic for fishery managers because the ongoing changes to the Great Lakes favor production of native species. Thus, fishery managers were increasingly reliant on a non-native prey base whose productive capacity was reduced by ecosystem changes to support an increasingly naturalized population of introduced predators. To compensate, managers sought to balance the level of prey abundance with predator stocking to retain catch rates and large size of individual fish.

However, in Lake Huron, 80 – 90 % of Chinook salmon were naturally produced during 2000-2004. This large pulse of naturally produced fish consumed essentially all alewives in the lake, resulting in a marked reduction in Chinook salmon size and condition. Overnight, Lake Huron went from a system dominated by Chinook salmon to one that produced increasing numbers of invasive species. Similar ecosystem changes appear to be occurring in Lake Michigan and, to a lesser extent, Lake Ontario. Thus managers now face an interesting dilemma about whether to manage in the short-term for an economically valuable and politically popular sport fishery sustained by non-native species or to manage so as to encourage the rehabilitation of native fishes.

Failure to deal effectively with aquatic invasive species

Marc Gaden

The Laurentian Great Lakes face tremendous threats ranging from pollution and habitat destruction to loss of species diversity. One particularly troubling problem is the influx of aquatic invasive species. The possibility of more invasive species entering the Great Lakes continues to rise as globalization increases. Invasive enter the lakes through various pathways including (1) ballast water discharged by large cargo ships; (2) live bait (either discarding unused bait or contamination of “native” bait with invasive species); (3) trade of live organisms for food, ornamental purposes, or pets; and (4) canals and waterways which connect once-distinct ecosystems. Today there are more than 180 non-native species in the Laurentian Great Lakes, many of which cause significant economic and ecological damage.

Accidental introductions of invasive species remains the foremost threat to the value of the Great Lakes fishery and to the future sustainability of the resource. Some of the more notorious invaders include the **sea lamprey**, which entered the Great Lakes in the mid-1800s through shipping canals and decimated the fishery; **alewife**, which entered the Great Lakes in the late 1800s through shipping canals and displaced native forage fish; **dreissenid mussels**, which entered the Great Lakes in the 1980s through ship ballast and, as filter feeders, have consumed vast quantities of phytoplankton and zooplankton; **round goby**, which entered the lakes in the early 1990s through ship ballast and have proliferated in great numbers and displaced native forage fish; and **Bythotrephes**, a small zooplankter that entered the Great Lakes through ballast water and has disrupted the low end of the food web.

Invasive species can have many impacts. Recreational fisheries can be directly impacted through predation by sea lamprey, ecosystem disruption by zebra mussels, competition with native fish by alewife, or acting as a nuisance as with spiny water fleas. Extirpation of species in either entire lakes or the Great Lakes

as a whole has also occurred. Food web disruptions have been precipitated by invasive species. For example, whitefish eat *Diaporeia* and with healthy populations of *Diaporeia*, you have healthy whitefish. Zebra mussels likely filter the water column that affect the *Diaporeia* and therefore the food source of white fish, and thus a reduction of white fish health and populations.

Unfortunately, few control programs exist to combat invasive species once the species enters the system. Invasive species reproduce and spread, undermining efforts to control or eradicate; scientists note that control or eradication is often physically, scientifically, and environmentally impossible, let alone cost-effective. However, two major invasive species in the Great Lakes—sea lamprey and alewife—can be managed effectively; sea lamprey through a comprehensive program involving lampricides and other methods and alewife through the stocking of predators.

No single agency is responsible for the control of invasive species, with the exception of sea lamprey, which is the responsibility of the Great Lakes Fishery Commission. Problems with establishing such control include disagreements over the basic approach, lack of political will with affected constituencies not vocal enough, lack of conclusive science or technology, and lack of funding for technology development, monitoring, etc. Moreover, neither Canada nor the United States have enacted meaningful measures to prevent the introduction of new invasive species. Ballast water from foreign ships continues to be discharged without treatment, canals and waterways (with the exception of the Chicago Sanitary and Ship Canal) still crisscross the region unimpeded, and no regime exists to screen live exotic organisms before they are imported into North America. Until the Canada and the United States redouble their prevention efforts with legislation and enforcement, the Great Lakes region can expect a continuous, unabated influx of invasive species.

Basin wide management of cormorant in the North American Great Lakes **Gary Isbell**

Double-crested cormorants (*Phalacrocorax auritus*; hereafter, cormorants) represent a serious challenge to fishery managers in the Laurentian Great Lakes.

Cormorant issues:

- High, unchecked populations which are affecting the ecosystem (including fish population).
- Populations are exploding all over the Great Lakes, there has been recent population decreases, but the populations are still high.
- Large colonies of cormorants cause lasting damage to terrestrial vegetation important to other water birds
- Habitat destruction – an island in 2002 had lush vegetation and in 2005 destruction of the trees leading to ecosystem destruction.
- In aquaculture the cormorant negatively affect catfish populations. In the public resource they eat bass and yellow perch.
- Population growth, from 1980 (population of nesting individuals there were below 10,000 in Lake Erie and Ontario, from 85-2005 population exploded to over 100,000

Why are there so many cormorants? Cormorants are protected species. In the past, their populations declined due to contaminants in the ecosystem. Once the use of these contaminants ended, the cormorant

populations increased. Fish populations were also on the increase providing food for the growing cormorant population. In summer, cormorants, live in Great Lakes. In winter they go south to where the catfish farms don't freeze and have abundant food source. Low natural seasonal die-offs.

Management of cormorants include tools and techniques such as culling (shooting them), egg oiling so eggs don't hatch, hazing (scare birds with pyrotechnics). All have only a temporary effect. All management efforts are based on a local level, not Great Lakes region-wide. Regional management will provide more effective and efficient protection of local fishery resources and aquaculture. The current governance and policies are different between the US and Canada: the US Fish and Wildlife Service has the migratory bird treaty act and in Canada they have the migratory birds convention act. A regional plan would provide regional objectives, guide assessment and monitoring on a regional scale, provide best management practices that dictate safe, effective, controlled practices, and facilitate, coordinate and communication of populations and efforts

Challenges:

- Science credibility – There is a general lack of confidence in the data supporting claims of fisheries damages associated with cormorant predation. There are some excellent studies from the Great Lakes area, but they are few and perceived to be very specific to the location and the fish species investigated.
- Social tensions – Change to existing policies is stifled by significant tensions between factions that favor protection of cormorants and those that share concerns about public resource and private property damages.
- Governance issues – across the region there is currently a mosaic of authorities related to the management of cormorants. As with many such issues, governments (local or federal) are reluctant or unable to give up sovereignty.

Overcoming the challenges

- Published studies, direct research, and modeling of population dynamics of both cormorants and fish populations.
- There needs to be stakeholder involvement with awareness of the science and management, as well as efforts and problems. Communications need to be efficient between communities and management
- Some regulations and policies, and laws might need to be modified and/or changed for this to be effective.

Discussion and questions for Theme 1, part 1 and 2:

1. Knowledge of the problem and approaches are sometimes just as important as the end result.

a. What will the IJC take away from this conference as it has 100 years of experience? Can it learn from the younger commissions?

IJC uses unique approaches, multi-disciplinary teams as approaches to new problems. Now we are working on integrated watershed initiatives. As cultures and issues change, IJC tries to adapt to the changing environment.

As to learning from newer commissions, Dick Nyeko was quoted, "parents can learnt from kids" but obvious things include exchange of scientific information, and with climate change impacting both sets of great lakes there is an opportunity to learn from each other.

2. *The concept of consensus is a challenge when you begin to increase the number of countries.*
 - a. *The IJC has commissioners that do not represent their countries and are interested in the resource, explain some of the dynamics.*

- b. *What are some of the failures of the IJC?*

Consensus is a goal. During contentious issues, when consensus isn't met decisions are delayed.

Failures of the IJC – it is mainly when IJC is not able to address issues in timely fashion. For example, it took six years to address the issue of low water levels.

If you start with the premise of working toward a common goal and common good, then that is a good start to multi-country collaboration.

Dick Nyeko commented on commissioner's responsibility to their countries, their interest and separation between state and resource.

If Alewife die, why could you not collect them and feed them to poultry farms? Can exotic species be seen or used as a resource? Dick Nyeko helped establish the water hyacinth program – some people began using the hyacinth as furniture – dichotomy now between control and use.

3. *Why does the LVFO (or EAC) not actively stock Nile Perch?*
 - a. *Dagaa is the fish for food security, but it is small and bony – why does LV “sustain itself” on dagaa, and Europe is “sustained” on huge fillets?*

Capture based aquaculture (Lacustrine Protected Area (LPA)). Aquaculture terrestrially, could be a new and helpful protein source and export.

\$70 billion is the worldwide aquaculture benefit – no one wants to miss that growing opportunity.

There is unwillingness to pay for expensive Nile perch which drives people away. However, there is no incentive to manage a cheap resource so perch management dominates thinking. Stocking to sustain a fishery can lead to genetic pollution and decrease in fitness.

The public views stocking as a panacea – perceived as government helping them whether it does or not.

4. *How can scientists change policies? To convince managers and governors and even the people – when people do not believe the science.*

Our training is such that we do not have the strong background (that of a statistician) to communicate the importance of something. In short, it appears that Nyeko is putting a lot of value on statistics, as if they are fact. Statistics will change congress' mind about invasive species. (Chris Goddard, responding – statistics are important and we must use them. We have established a quantitative fisheries center at MSU (funded through states, tribes, etc through the GLFC)).

5. *Wetlands help protect the lake from pollutants, but on the ground, the actions people are to take are to get rid of the wetlands.*

6. *What are the economic impacts of the cormorant? What data do we have? How do we quantify a management plan?*

September 25th , Day 2

Theme 2: Using Science to Guide Management and Policy

Chair: Jim Houston and David Stower
Rapporteur: John Gannon and Eng Mugisha Shillingi;
additional meeting notes provided by Ted Lawrence

Metrics of ecosystem health: Comparing the African and Laurentian Great Lakes ***Bob Hecky and Norine Dobiesz***

The Great Lakes Fishery Commission through its Board of Technical Experts is conducting a series of workshops on ecosystem health of the large lakes of the world with emphasis on the North American and African Great Lakes. The workshop themes are as follows:

- Biodiversity (2006)
- Nutrient Management (2007)
- Fisheries Management (2008)
- Socio-economic considerations (2009)

The term “Ecosystem Health” is well used and understood qualitatively, but the challenge is how to measure ecosystem health in ways that is useful for resource management and policy? Metrics (25) on ecosystem health were developed based on the first workshop on biodiversity that were common to large lakes ecosystems across boreal, temperate and tropical zones. Monitoring these metrics which are expected to be useful as indicators of ecosystem change and the response of ecosystems to stress.

Metrics especially useful for detecting trends included: trophic structure, exploited species, habitat alterations, and catchment changes. Identifying metrics of ecosystem change and measuring if they are changing, not identifying if the change is “good” or “bad”, but rather that there is not homeostasis, also identifying that some of the metrics are changing slowly or quickly (or little or a lot). Local, regional and global metrics were measured.

Lakes Ontario, Erie and Victoria with the smallest volume and greatest population pressure had metrics changing the most. Lake Erie and Victoria with the highest productivity and economically valuable fisheries had the most similar metrics. The ecosystem health metrics appear to be worth pursuing further as an approach to using science to guide management and policy across large lakes ecosystems. Challenges remain, including: determining the appropriate scale for measurement; cross-lake differences in monitoring methods and frequency; large lakes require a high level of assessment; trends look backward not forward, and such broad assessment of ecosystem health may not meet many management needs.

**Public participation and public expectations in resource management in
North American and African Great Lakes**
Irene Brooks

International Joint Commission: “Pursue the common good of both countries”

The International Joint Commission (IJC) was established by the Boundary Waters Treaty of 1909 as an institutional arrangement for resolving boundary waters (water quantity and water quality) between Great Britain (now Canada) and the United States. Public participation has always been a cornerstone of IJC activities and is based on Article 12 of the Treaty that states that “all parties shall be heard”. A variety of methods of public involvement are employed on IJC reference groups and study boards, including public members serving on boards, creating public interest advisory boards, developing a shared vision model of goals and anticipated outcomes among the public and technical advisors, public hearings, stakeholder forums and information sharing and communications through websites and reports. The strong emphasis on public participation in the activities of the IJC provides for transparency of discussions on resource problems and garners public support for science-based resource management decisions.

**Public participation and public expectations in resource management in
North American and African Great Lakes**
Tom Okurut and Matano Ally Saidi

The East African Community (EAC) recognizes the Lake Victoria basin as a “Regional Economic Growth Zone (REGZ)”. Over 35 million people depend on the lake and its catchment for their well being. The Lake Victoria Basin Commission (LVBC) in responding to EAC requirements developed a shared vision for the Lake Victoria basin in January, 2004. The vision document was developed in consultation with people in villages from all three counties sharing shoreline on Lake Victoria – Kenya, Tanzania and Uganda. Five policy areas in the vision include: ecosystem, production and income, living conditions and quality of life, population and demography, and governance, institutions and policy. To implement the shared vision there are EAC (2006-2010) and LVBC (2007-2010) development strategies.

Challenges of public participation include poverty, illiteracy, culture/local values, dominance by interest groups, and proponent confidentiality. The way forward requires that the correct information is provided to stakeholders, that there is an appropriate means for stakeholder involvement, that we respond to issues and concerns, and feed back the results of public input.

Benefit sharing methodology for effective fisheries management: the east African experience
Constantine Odongkara

This is a social and political issue with potential conflict issue over benefit sharing of resources on Lake Victoria. Lake Victoria Fisheries Organization (LVFO) does not agree yet on how benefits will be shared.

Many challenges face the lake including reduced catches, incomes, revenues; low support for fisheries management and inadequate funding; and a lack of a proper benefit sharing systems will provide incentive to manage and will provide resources for management.

Key Benefits of Lake Victoria are food, jobs/incomes, public revenues, and foreign exchange. The beneficiaries are MBUs, industrial processors, service providers, consumers, and governments.

The Lake Victoria fishery is one of the most productive in the world. About one third of the value of the Nile perch fishery stays in Africa while about two thirds is exported to Europe. Of the value that remains in Africa, most of the economic benefit goes to the male boat owners. Lesser amounts go to the male crew members and women who are mostly involved in fish processing and local trading. Fundamental problems include low support for fishery management and inadequate funding.

Economics of the fishery

- Fishers income shares by target species: fishers of Nile perch-motorized (\$24), Nile perch-manual (\$11) dagaa (\$14) tilapia (\$6) per fisher per day.
- Boat owners vs. crew members:
 - Kenya: Owner \$9.1 – crews \$3.5
 - Tanzania: owner \$22 crew \$3.5
 - Uganda: owner \$42 crew \$14.6
- Individual shares are affected by technology, investments, choice of species, and socio-cultural practices
- Global value of Nile perch: Africa gets 33% of value and Europe gets 67%
 - Africa is in charge of implementation of the management and Europe is giving a lot of funding for the management, and therefore might make up for some of the amount of fish value they receive.

There is need for a strategy to promote the shared economic benefits and incentives to manage fishery resources. Such measures are affected by, portion of lake, species, stocks, econ policies, infrastructure, facilities and services. For the future, there is a need to improve economic environment for fisheries development, Improve the market for fish, develop targeted technologies, improve socio-cultural practices, and improve revenue collection.

Adaptive management: Challenges and opportunities for water resource management *Gail Krantzberg*

The traditional approach to water resources management is command and control, but this only works when the ecosystem is predictable and well understood. This is rarely the case which has given rise to an adaptive management approach that accepts uncertainties and uses such uncertainties as an opportunity to learn and adapt management decisions. The six steps in an adaptive management approach include: 1) assess the problem, 2) design the solution, 3) implement the solution, 4) monitor for the affects, 5) evaluate the results, and 6) adjust management approach as needed.

Adaptive management identifies key uncertainties, get feedback info, and reduce uncertainties. Uncertainty is essentially embraced and tested, treating management as an experiment. The link between science and management has traditionally been weak, in adaptive management there is a direct link and it is accepted. Implementation with adaptive management uses controls and/or treatments in the implementation of its management programs. The focus of adaptive management is using policy as hypotheses and management as experiment as an analogy.

A case study was presented using the U.S. Geological Survey's Grand Canyon Center where learning was the key to the programmatic, adaptive management approach. It was noted that an independent, peer

review is an essential feature of successful adaptive management and the North American and East African Transboundary commissions are poised to serve this function.

Lake Victoria Environmental Management Plan *Christian Severin*

The Global Environment and Facility (GEF) currently has four strategies in its GEF-4 International Waters Focal Strategic Program include:

- 1) Restoring and sustaining coastal and marine fish stock and associated biological diversity;
- 2) Reducing nutrient over-enrichment and oxygen depletion from land-based pollution of coastal waters (mostly in the Mediterranean basin);
- 3) Balancing overuse and conflicting uses of water resources in surface and groundwater transboundary basins, and
- 4) Reducing persistent toxic substances and testing adaptive management of waters with melting ice.

This twinning project is included under third strategic program (above). Specifically, this program addresses political and legal commitment to use integrated water resources management (IWRM) practices and institutional arrangements to catalyze implementation of basin-scale policies. The Lake Victoria Environmental Management Plan also addresses elements of the third strategic GEF program. In 1.5 years the new strategic initiative (GEF-5) will be initiated and it may be a funding source for future twinning endeavors.

Discussion of Theme 2

1. *How might the metrics be used to set thresholds?*

As with the Millennium Ecosystem Assessment indicators, it is difficult to set thresholds with these ecosystem health metrics. There was also uncertainty whether the metrics could be used as a measure or indicate resilience to change. The trick is to look at trend rather than just at data.

2. *Marc – embarrassment factor from both the public and the government due to failed policy or management. How does one overcome the embarrassment factor? How do you get past that especially from an organization that is new?*

It was suggested that adaptive management be included in the institution's mission statement with a clear link to evaluation. Adaptive management is not necessary for standard technology and regulations because learning is not necessary. The higher the level of uncertainty, the more learning and adjustment is useful via adaptive management. Moreover, the higher the risk, the more adaptive management is needed. Therefore, adaptive management is compatible with the precautionary principle.

3. *How does the government (of Canada and US) move from static policy development to adaptive?*

4. *How do you include the communities within the adaptive management regime? It becomes complicated to the communities if you ask them to test and experiment with their management and policy.*

This is a governmental responsibility with experimental design built into programs, not a local responsibility. Evaluation is a key component of adaptive management; consequently, it requires a

substantial investment in monitoring to have the data to detect changes sooner and respond more confidently with adjusted programs.

5. Precautionary management: does this fit into adaptive management?
6. Odankara – Uganda is paying back World Bank loans.
7. Joyce Nyeko – adaptive management taking place unknowingly.
8. Christian – acknowledging overall water quality and lake-side issues that will affect fishery populations, a need of inclusion into this workshop. LVEMP II approved 23rd September.
9. Chris Goddard – well established monitoring system, though it takes at least a 20-30% change to detect a change in population or ecosystem. We will have difficulty detecting if we do not implement a significant experiment within adaptive management.
10. C. Goddard: “It is remarkable on Lake Victoria that because the countries cannot allocate the resource in a quantitative way – they are forced to undertake the more difficult role of allocating benefits.”

General Comments – to better link science to management and policy, more use of modeling (simulation and forecasting) is required. There is an urgent need to better integrate water quality, water quantity, wastewater treatment, human and ecosystem health, and watershed issues. Moreover, the fishery should not be addressed in absence of environmental quality considerations.

Theme 3: Governance structure

Panel: Bob Hecky, Marc Gaden, John Gannon, Gail Krantzberg, Tom Okurut, Henry Mwima

Moderated by: Zafar Adeel and Sinankwakure Fabien

Meeting notes provided by Martin van der Knaap, Ted Lawrence

This theme was divided into three parts as follows:

Part 1: Analyze the governance structures in the existing commissions for commonalities and differences. How these (commonalities and differences) have affected policy delivery in the different commissions to achieve their objectives UNU-INWEH.

Part 2: Ecosystem/watershed approach – struggle from concept to practice, how to work into governance structure. Under this theme, the Nile Basin project could be a good case on how to transition from ecosystem to watershed approach.

Part 3: LVBC: a review paper on governance structure in EAC with regard to watershed management – the influence of National Integrated Water Resources Management (NIWRM), AMCOW, the African Water Vision 2025, et cetera.

Part 1: Analyze the governance structures

Governance Structure of the LVBC & Service Delivery

Tom Okurut

LVBC established under the treaty for the establishment of the EAC of 1999. It is an institution of the East African Community that promotes

- Equitable economic growth
 - Measures aimed at eradicating poverty
 - Sustainable utilization and management of natural resources
 - Protection of the environment within the LVB
 - Compliance on safety of navigation
- through six program areas.

Challenges LVBC faces include:

- Many areas /sectors of cooperation
- Decision making process is long
- Communication and responses time is sometimes too long
- Sovereignty issues when at cross roads
- Budgets controlled and determined by Partner States within the EAC overall framework

Lake Victoria transportation laws would trump all national transportation regulations. LVBC hopes to facilitate, at least in part, turning boating into more of a tourist destination spot in the world.

Governance Structures of the Lake Tanganyika Commission

Henry Mwima

LTA's organizational structure has conference of Ministers (consists of Ministers of water and environment of the parent countries), management committee (scientific and technical committee, advisory committee with people from environment, water, fisheries and finance from each Ministry). LTA has one chairperson and chairs are selected by rotation from each country. The executive secretariat consists of 5 people:

1. Executive Director
2. Director of environment
3. Director of fisheries
4. Director of monitoring and evaluation
5. Director of finance and administration

National Coordinating Unit from each country and is headed by a coordinator and linked to the relevant ministry of their country (e.g. minister of water).

Nile Basin Initiative: Roles, Functions, and Governance Structure

Tom Waako

The resource is the River Nile bounded by 10 countries including Burundi, DRC, Egypt, Eritrea, Ethiopia (Source Blue Nile) Kenya, Rwanda, Sudan, Tanzania, and Uganda (Source White Nile). There are both challenges and opportunities for this transboundary resource:

- Challenges
 - History of how the resource has been used and violence in the region
 - There are about 300 m people (600m by 2025)
 - Extreme poverty: 4 of 10 poorest countries in World
 - Extreme climate variability
 - Extreme landscape vulnerability & degradation
 - Very limited infrastructure....
 - Low Economic Integration
- Opportunities
 - Transboundary resource offers a win win cooperative & sustainable development
 - Resource can also be used as a means for regional integration
 - Water can be used for coordinated development
 - And it can also be use to promote peace and reduce conflict in the region

Objectives of NBI are to:

- Develop water resources
- Manage water resources
- Cooperative & joint action
- Target poverty eradication & economic integration
- Move from planning to action

Strategic Action Program

- Shared Vision Program to create an environment for effective cooperation

- Subsidiary Action Program to promote shared vision through sub-regional investment projects
- One example is the Eastern Nile Subsidiary Action Program, which includes irrigation and drainage, flood preparedness, Ethiopia Sudan transmission interconnection, and watershed management

The general direction is to contribute to peace and security through regional cooperation; efficient transboundary management and optimal use of Nile Basin water and water related resources; implementing harmonized institutional strengthening of NBI.

How is “optimal” use of Nile Basin water defined? There must be a variety of measures that help dictate what this means, as “optimal” is not necessarily sustainable or equitable, either for the longevity of the resource or for the benefit of those most in need of the resource (e.g. the communities who rely on the resource).

Part 2: Ecosystem and watershed approaches

Ecosystem and watershed approaches *Eng. Mugisha-Shillingi*

Watershed definition – area of land of which surface and ground water flows from higher level down to a common body of water. Landscape is integral in watersheds. Deterioration leads to erosion of landscape and the runoff of soils and other pollutants, negatively affecting the water body. Effects of this deterioration includes: landslides and soil erosion, water quality deterioration, reduced rainfall, drought, flooding, siltation and outbreak of water borne diseases.

National Integrated Water Resources Management (NIWRM) – mechanism designed to manage on a watershed level. NIWRM consists of:

- Stakeholder forum
- Water user association
- Water users association
- Water user groups
- Other water related stakeholders

This framework is being used in Uganda to bring together different players in the watershed management with the aim of ensuring that the degradation of the watershed is minimized. A pilot was launched in one catchment area to learn the process and the scale it up at the national level.

Governing mechanisms for the NIWRM include:

- Ministry of water and environment
- Water policy committee
- DWRM
- Water and Sanitation sector working group
- Regional Water management Zone (WMZ) advisory committees
- Regional WMZ management
- Catchment management
- Catchment advisory committees

Some of the challenges and constraints include: donor dependence in environmental management, limited funding by local Governments to sustain established initiatives, political interventions constrain law

enforcement and limited awareness on linkage between, land, environmental and water resources management, limited attention on protection of catchments, un-harmonised sector plans with NGOs and other development partners and limited staff to champion environmental concerns.

African Ministries Council on Water (AMCOW)

The mission of the AMCOW is to provide political leadership and advocacy in the provision, use and management of water resources. The major functions are to facilitate cooperation and coordination of policies and actions regarding water resources issues and mobilize additional financing for the water sector in Africa. The main objective of the AMCOW is to assist African States to achieve the MDG goals WSSD targets with respect with water and sanitation.

African Water Vision for 2025

- Based on equitable and sustainable use and management – for poverty alleviation, socioeconomic development, regional cooperation, and the environment
- The FFA consists of actions under the categories - strengthening governance of water resources, improving water wisdom, meeting urgent water needs, strengthening financial base for the desired water future.

Kenya's Governance Structure for Watershed management

Fred Mwangi

Past national water master plan study identified gaps in country's water sector. The plan called for separate strategies for water and sewerage. Challenges faced included a lack written policy, and needs to shift from water supply and sewage to all issues. New water act (2002) provides legal basis for water management with adoption of IWRM principles

2002 water act

- allows for separation of roles for various water sector players, bringing on board the participation of all stakeholders and virtually consolidating water management under one lead player, reducing conflict of roles and overlaps.
- Includes irrigation sub sector delinked from the Ministry of Agriculture
- From these efforts came water service regulatory board (WSRB) and Resources Management authority (WRMA)
- Water resources management regions were created on the basis of drainage basins. WRMA allocates water to the water services providers on demand basis.
- Water providers are supervised by the Water Services Boards, themselves supervised by the Water Services Regulatory Board.
- The Water Act 2002 also shaped a new institutional framework for the management and protection of Kenya's water resources at national, catchment and sub-catchment levels.
- There is a significant influence of the African Ministerial Council on Water AMCOW / Global Water Partnership GWP African Development Bank ADB. The partnership provides support in the preparation and implementation of National IWRM plan as required by the National Water Policy and the Water Act 2002 and strong stakeholder involvement groups with whom we can work to implement IWRM.
- The Africa Water Vision 2025 inspires the Kenyan reformed water sector as it is a vision intended to move a sustainable and adequate water availability in terms of quantity and quality to meet competing demands in the long term and hence the necessity of the new governance structures

Institutions and their charge of water management

- Ministry of Water and irrigation
- Water resources management authority
- Catchments area advisory committees
- Water resource users associations

BURUNDI

Burundi has many Ministries dealing with water issues such as Ministry of Environment, land management, agriculture and livestock, energy and water. However at this stage the Ministries are undergoing change and Burundi is also in the process of setting up national committees for water management as supported by GWP.

Tanzania – Water Resources Management Governance Structure Washington Mutayoba

The institutional framework for water resources management in Tanzania is provided by the National Water Policy (NAWAP) July 2002 that recognizes five levels of management: national, basin, catchment, district and community level. Tanzania is endowed with more transboundary waters than any country in Africa. Tanzania has twelve international lakes and rivers with other nations including the three East African Great Lakes (Victoria, Tanganyika and Nyasa), Lakes Chala, Jipe, Natron system; and Rivers Kagera, Mara, Pangani, Uмба, Ruvuma and Songwe. Some wetlands as well as productive aquifers are also transboundary.

Governance Structure for Watershed Management: MOWI has responsibility for Integrated Water Resources Management, including water resources conservation and protection, but the management of catchments that control the quantity and quality of that water falls under many jurisdictions. The Ministry of Natural Resources and Tourism has broad responsibility for land resources, grouped under three departments; forestry and beekeeping; wildlife, and tourism. Forestry management is seen as the major component of watershed management often linked to water runoff from catchments. The Ministry of Agriculture and Food Security is responsible for agricultural land and advises farmers on how best to use the land for cultivation so that soil is conserved and the watershed is not degraded. The Division of the Environment in the Vice-President's Office, and the National Environmental Management Council are responsible for environmental management, providing umbrella policy and legislation, and EIA procedures and guidelines.

The framework is guided by African Water Vision, AMCOW's mission and NEPAD. The African Water Facility (AWF) is an initiative led by AMCOW to mobilize and apply resources for the financing of water infrastructure and other water related investment activities in Africa assists Regional Member Countries to meet the targets and goals for the water sector that were established by the African Water Vision and the Millennium Development Goals. NEPAD provides a framework through which the African Water Facility is being implemented. The NEPAD's short term Action Plan for water and sanitation emphasizes the application of IWRM approaches; effective management of shared river basins, mitigation of floods and droughts, and meeting basin needs in water and sanitation.

It was concluded that the Lake Basin Management provides the opportunity for communities and stakeholders to develop an integrated management process, which takes cognizance of their spiritual, ethical, social, economic and environmental value systems, and addresses their desires and needs, within the context

of sustainable water resources management and use; and for improved governance of Lake Basins we need to build capacities at all levels: community/local, district, provincial/regional, national and global;

Discussion Panel

The following persons formed the panel during the plenary session on 25th September 2008: Bob Hecky, Marc Gaden, John Gannon, Tom Okurut, Henry Mwima, Dick Nyeko, and Yunus Mgaya.

Part 1 – Panel introduction and review of key issues

The panellists were requested to provide the audience with a number of issues in three minutes' time. The issues ranged from transboundary management to shared fish stocks, from watershed management to exotic species and from academia to government institutions.

Bob Hecky:

Emphasis needs to be placed on effective management, which requires monitoring of behaviour and change. Lake Basin commissions, whether young (Lake Tanganyika) or old (Laurentian Lakes), need to adopt the Integrated Water Resource Management approach. For the International Joint Commission there is a role to manage transboundary rivers also.

There should be political motivation to move from science to policy (despite some frustrations) and to address overarching issues in order to realise substantial changes. It is time for the water and fisheries commissions to improve their communication. These challenges are identical for the African as well as North American Great Lakes.

Marc Gaden:

Institutional side of IWRM was highlighted. It is important to realise that in North America reaching a consensus is aimed at, when making decisions. These decisions are not binding (which would require a higher profile than non-binding). When applying the non-binding approach one can be less ambitious. In case of the IJC the two Governments need to provide **reference** points, whereas the GLFC has the obligation to **advise** the respective Governments. With the shared goals and objectives, as well as shared fish stocks, agreements need to be arrived at in the region. New water regulation addresses needs of fish. There should be specific objectives for fisheries vis-à-vis environmental issues. A clear difference between the African Great Lakes and the Laurentian ones appeared to be the level of empowerment of fisheries officers. In Africa high level discussions may be held in order to make management decisions.

Yunus Mgaya

Academic institutions: Lack of research in ministries, but capacity exists at universities. For instance the University of Dar es Salaam is a strong institution. More focus needs to be centred on capacitating universities. Links have to be established between ministries and university so that the former do not need to experience lack of research capacity

Climate change:

- Are people ready to deal with effects of climate change? Capacity building is required to develop strategies. Dramatic decreases in water levels were experienced on the Great Lakes, but also on smaller ones. Water quantity is a big issue.
- Conflicting debate in different ministries in order to obtain authority over water resources. A disadvantage is that not all ministries are mainstreamed in IWRM

- Roles of LVFO and LVBC require clear definition.
- How effective are protocols to deal with clashes over shared resources?
- Capacity building is an issue from grass root to apex.

Dick Nyeko:

All state partners subscribe to conventions; the convention on biological diversity is a binding one and as such the cornerstone for cooperation. The role of science has to become clear, particularly regarding the accuracy of biomass estimations.

In the two regions (North America and Africa) the role of the fisheries commissions is to facilitate discussions among stakeholders. Communication: people should talk vertically and horizontally: from apex to grass roots as well as intercontinental.

Exotic species is a big issue on Lake Victoria, but even a bigger one on the Laurentian Lakes. About 100 invading aquatic species are known, and only few of them have entered the African Great Lakes. A database of invasive species should be established.

Ecosystem Approach to Fisheries management: synergies for the good of all.

Collaboration was emphasized between the North American and African Great Lakes Commissions for further exchange of information and expertise

John Gannon:

Responsibility versus authority: International commissions have lots of responsibilities but few authorities. Under such circumstances, , how can things get done? Commissions are good at planning; the challenge is to translate plans into actual work on the ground. A key element is top-down and bottom-up connectivity from ministers to local community.

Surface water and groundwater experts and fisheries specialists need to be integrated and have synergy with one another. Interface between land and water (nearshore) hardly receives attention from researchers; yet, nearshore waters are where most of the productivity and fish spawning and nursery grounds are located There is a lot of variability in limnological parameters in nearshore waters and emperature and oxygen profiles are generally taken in the middle of the lake where variability is less. Fisheries people mostly sample fish offshore also. Dramatic changes in water quality and fish abundance may be observed earlier when the nearshore waters are studied more intensively.

Henry Mwima:

Areas of interest include:

- Political involvement in management: high turnover at high level hampers progress, particularly in the case of a newly established organization like the Lake Tanganyika Authority.
- How can domestic legislation be reconciled with regional or international one? The more countries the more complicated. In the case of LTA there are four countries around one lake.
- Guidelines for implementation of activities exist (like conventions and treaties). How flexible are they in the case of a changing environment?
- Secretariats of Authorities and Commissions are expected to make decisions. How ready and willing are Governments to implement the recommendations by Secretariats and Committees?
- How can science be simplified for policy formulation?
- Partnerships: in the case of the LTA there is a whole range of partners. Strings can be attached to partnerships (e.g. certain conditions for financing).

- Public involvement: if efforts can be made to generate wide involvement to have a large spectrum of interests covered.

Tom Okurut:

Institutions are nowadays in place for transboundary resource management, however, partner states still have sovereignty and may not follow up on recommendations of these regional institutions. Land-based activities continue to influence the lakes. New interventions should also address land-based issues. Community structures in North America and Africa are different. From science to policy is easier in North America than in Africa. It became clear that North American institutions had success. No translation of scientific research results into policy in Africa yet. A Science-Policy Platform should be created to facilitate that process. Water research required for IWRM is missing as there are insufficient trained researchers. Has any adaptive management been adopted applied in Africa or North America? Not yet.

Part 2: Panel question and answer

After the introduction of a wide range of issues the plenary discussion started. The panel took three questions, remarks and observations at a time.

Question 1: Keeping in mind that many refugees and Internally Displaced Persons return to the lake shores of Lake Tanganyika, and (over)exploit the lake's resources, the newly established LTA is faced with that situation. How can all present representatives of international organizations assist the LTA in getting up and running?

Question 2: Have the LVFO and LVBC prepared themselves for climate change on Lake Victoria?

Question 3: Groundwater is taken into consideration. Could private sector be involved in managing this resource?

Henry Mwima:

The LTA will have to explore with which organisations to work together in addressing the challenges. Special emphasis will be placed on strengthening the LTA's National Coordination Units that have been strategically located (one in each country and on the lake shore). Private sector involvement will form part of partnership.

John Gannon:

Human health takes prevalence over environmental health. Why not try to couple human and environmental health (e.g. There is a program where human health practitioners in Kenya counsel HIV/AIDS prevention at the village level; could it combine with environmental health education, such as, replacing wood fires with solar-powered stoves?).

Dick Nyeko:

Private sector is going its own way and Government has to catch up with the businessmen and women. Objectives of management have to be incorporated. Right to food is a human right but food aid would distort investments by small-scale investors. Incentive for farmers would disappear if food is made freely accessible. Relief aid has to be given without this form of distortion.

Yunus Mgya:

Research should be in the form of “Waternet”, i.e. a water-related network to serve countries in the region. Resources have to be channelled to universities to encourage Government to use the research results to develop policies.

Marc Gaden:

Private sector: in North America the private sector is concerned about working together with Government. Restoration of salmon coincides with wine consumption initiative (this is an example of indirect involvement of the private sector). Turmoil and environmental restoration: a crisis often triggers how to find solutions. Ballast water may cause crisis and only then action will be taken. An amount of 20 billion dollar was earmarked for restoration plans. Public appeared shocked about price tag.

Tom Okurut:

Climate change: In the Lake Victoria region drought occurred in the 2001-2005 period. A serious drop in lake level was observed. The question was whether this is part of normal cycles? Yes, according to hydrologists. The LVBC’s Council of Ministers proposed projects to address the issues.

Question 4: Human health has not been addressed in many an ecosystem agreement. Such agreements are not only meant for fish; human health and welfare should be addressed also.

Question 5: New authorities and commissions are coming up: what about their funding mechanisms? Regional institutions can obtain loans, but that is not without consequences. How can funding become sustainable?

Question 6: Can human behaviour be changed to deal with the environment sensibly in order to guarantee the sustainability of the natural resources? Stakeholders are not concerned about water and fisheries resources, although they should be. Plastic bags in BMUs end up in the lake, including nutrition load and other pollution. Awareness needs to be generated to assure sustainability. In the rural areas people cut trees and burn grass because they are used to it, while water supply is not in place. Projects are needed to for instance harvest rainwater to supply communities with clean water.

Tom Okurut:

The sustainability of funding is a concern. It should be realized that the returns are much more than the input. In 2010 a funding proposal has to be developed for the LV trust fund and LV development fund. The fish levy trust has been subject of discussion for many years. Beer companies are resource users and may have to contribute. The private sector is a driver. LVBC studied the telecommunication structure required around Lake Victoria. The private sector came in and came up with follow-up for investing in that infrastructure. Lake Victoria provides 90% of the water supply in the region at an estimated cost of 30 million dollar. Why can’t the private sector contribute? Formulas have to be found for their contribution.

Henry Mwima:

Other colleagues look at additional funding, while the LTA still has to start. Representatives of the Ministries of Finance are members of the Management Committee in order to get commitment from Governments to contribute nationally and annually. Awareness about funding such organizations is essential. Perhaps the user/polluter pays principle should be applied.

Dick Nyeko:

Water and Fisheries do not get the Government funding that they deserve. Fisheries and National Resource Management do not get sufficient support. Country contributions have been defined as per the convention. There should be programmes/actions to generate and attract funding. Convention allows borrowing money. Currently the horizon is limited to donors, but approaches of the organizations are not always compatible with donor requirements. The approach of dormant funds should be considered, but also projects are still required to carry out the relevant tasks of the organizations/commissions/authorities.

Question 7: Research is expensive. Donors have priorities which are not on our lists. Attention should be given to funding of research for management and policy formulation.

Question 8: Four African commissions are represented in this gathering. Could one commission versus multiple be considered, one that at the same time deals with multiple water bodies?

Question 9: Water Departments keep on shifting. The science in the region is not lacking, it is just not coordinated. A lot of research is carried out in Kenya. There is often no linkage between what research is aiming at and policy formulation.

Tom Okurut:

One versus more commissions: issue is that basin commissions are necessary as building blocks, which eventually may merge.

Marc Gaden:

One versus multiple: Perhaps it is better to have one institution, but will it have the complete picture? One commission will be accountable, one commission would be over-general, and not able to focus. If one goes wrong, things can get messed up. Sometimes different perspectives (from different organizations) facilitate to get the total picture.

John Gannon:

As regards one umbrella commission: the various commissions started in the North American Great Lakes for different reasons due to various crises. It is not practical to break them up to form one commission since they deal with different issues and constituencies. Most important thing is adding economics to environment. Environmentally sustainable economic development should be promoted. An amount of 28 billion (USD) is needed to remedy the problems of the Great Lakes. The public may ask what they get for it. Economic benefits need to be studied and economic arguments used to convince politicians.

Bob Hecky:

Reinforced John Gannon's point. North American commissions are against self-funding. Services that commissions provide are undervalued. A better job has to be done to convince Governments what these values are. Translate values to real dollars: Ecosystem and human health. climate change., and political awareness.