

# **The Inspection Panel**

## **Report and Recommendation**

**on**

## **Request for Inspection**

### **Kenya: Lake Victoria Environmental Management Project**

**(IDA Credit 2907-KE) (GEF TF 23819)**

1. On October 12, 1999, the Inspection Panel (the “Panel”) received a Request for Inspection (the “Request”) related to the Kenya: Lake Victoria Environmental Management Project. (Annex 1). On November 9, 1999 the Requesters, at the request of the Chairman of the Panel, clarified some points surrounding the delivery of the Request. On November 22, 1999 the Panel notified the Executive Directors and Bank President of receipt of the Request (meaning “Registration” under the Panel’s *Operating Procedures*).<sup>1</sup>

#### **A. THE LOAN**

2. The Lake Victoria Environmental Management Project is financed by International Development Association (IDA) Credits and Global Environmental Facility (GEF) Trust Fund Grants. The Board of Executive Directors on July 30, 1996 approved an IDA Credit for an amount equivalent to US\$12.8 million and a GEF Grant of US\$11.5 million equivalent to the Republic of Kenya. Similar financing for the Project has been provided to the United Republic of Tanzania and the Republic of Uganda.

#### **B. THE PROJECT**

3. The objectives of the project are to: (i) maximize the sustainable benefits to riparian communities of the Lake Victoria basin to generate food, employment and income, supply safe water and sustain a disease-free environment; and (ii) conserve biodiversity and genetic resources for the benefit of the riparian countries in particular and the global community in general. The Project consists of a number of parts. The Requesters are concerned only with Part B, namely the water hyacinth control component in Kenya.

4. Schedule 1 to the Project Agreement between the Republic of Kenya and IDA provides that the water hyacinth control component is to establish “sustainable long-term capacity for maintaining control of water hyacinth and other invasive weeds in Lake Victoria Basin, through an integrated effort involving, *inter alia*, intensified publicity, enactment of relevant legislation and integrated pest management, all with community involvement.”

5. The Staff Appraisal Report (SAR) elaborates on methods to be used to control the water hyacinth: “the program will rely on mechanical methods and limited chemical interventions for

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<sup>1</sup> See The Inspection Panel, *Operating Procedures* (August 1994) at paragraph 36.

rapid short term control in restricted areas, and biological agents for longer term control.” It does not elaborate further on the type of mechanical interventions envisaged.

6. Under Schedule 2 of the Project Agreement each borrower must ensure: “that environmental impact assessments, including public comments thereon, are carried out prior to introducing any new interventions likely to have a negative impact on fish ecology.”

7. The SAR states that National Water Hyacinth Steering Committees will be established in each country to oversee and coordinate the program, and to ensure the involvement of local communities and NGOs.

### **C. THE REQUEST**

8. The Request was submitted by RECONCILE (Resources Conflict Institute), a Kenyan non- governmental organization, acting for and on behalf of persons in the area known as the Nyanza Gulf of Lake Victoria within the Republic of Kenya (the Requesters). RECONCILE is also authorized to represent OSIENALA (Friends of Lake Victoria) an NGO located in Kisumu, and the Kenya Chapter of Ecovic (the East African Communities Organization for Management of Lake Victoria Resources) who represent communities living along the Kenya side of Lake Victoria.

9. The Requesters claim that the communities they represent are likely to suffer harm as a result of failures and omissions of IDA and the International Bank for Reconstruction and Development (the Bank)--the implementing agency of the GEF--in the design and implementation of the water hyacinth management component (Part B) of the Project in Kenya.

10. Specifically, the Requesters claim that the proposed use of a mechanical method of shredding water hyacinth and letting it sink to the bottom of the Lake will result in ecological decay and environmental degradation that, in turn, will adversely affect communities living on the shores at the Nyanza Gulf. These communities depend directly on the Lake for their livelihoods, since the Gulf is home to fresh water fish and the source of water for domestic use and these, and the ecosystem, will be endangered by the resulting pollution.

11. They claim that the method was selected without a prior Environmental Impact Assessment (EA) or appropriate community consultation, as required by the loan documents.

12. The Requesters’ allegations could constitute violations of *inter alia* the following Bank Policies and Procedures:

- OD 4.01 on Environmental Assessment;
- OD 4.15 on Poverty Alleviation;
- OP 10.04 on Economic Evaluation of Investment Projects; and
- OD 13.05 on Project Supervision.

#### **D. THE MANAGEMENT RESPONSE**

13. On December 20, 1999 the Panel received Management's Response to the Request (the "Response"). (Annex 2)

14. Noting the wider context of the LVEMP, Management explains that it is designed to collect baseline data, identify and prioritize problems and to experiment with possible solutions to these problems through a series of experimental pilots. In this context, all of the possible methods of controlling water hyacinth are by definition experimental pilots to determine their practicality and their economic and financial suitability for large scale use on the Lake. The three borrowing Governments have decided, however, to drop one method, the trial use of herbicides, from the Project. So far the Project supports the piloting of mechanical harvesting/removal to land disposal in Uganda, the mechanical shredding trial in Kenya, and biological control in all three countries. In addition, limited Project funds have been used for the manual removal of hyacinth by local communities at selected sites though the Bank discourages use of project funds to remunerate local voluntary, self-help contributions. Moreover, it is concerned about hazards to laborers such as bilharzia, malaria, and snakes associated with extensive exposure to Lake waters.

15. The Response explains that both mechanical trials are small scale, covering a tiny part of the Lake. Owing to the prohibitive cost of mechanical harvesting with removal to land disposal, Management claims it is important to test the shredding method as one possible tool for local riparian communities to fund and use for fast removal to alleviate the problems associated with hyacinth blockage of ports, fish landing sites and other sensitive areas. Before accepting its use as a pilot, the Bank considered technical issues and consulted experienced scientists, practitioners and experts. The GEF employed its own review process. Based on this, Management concluded that the method holds sufficient promise to justify the pilot.

16. Regarding the environmental concerns, the Response explains that the water hyacinth shredding pilot is, in itself, essentially the core of a detailed evaluation of the environmental impact of the shredding methodology. Management claims it was necessary to do this rather than doing a detailed EA as part of Project preparation because of the absence of sufficient baseline data, and data describing analogous activities in other similar environments. For this reason there was virtually no chance of preparing a meaningful and useful EA. The largest component of the LVEMP is designed to collect sufficient water quality and limnology data from the Lake to create a reasonable scientific baseline, which would enable environmental assessment of development and management actions in the future.

17. Management does not consider it surprising that the groups have submitted the Request for Inspection, alleging that the Government, many NGOs and individuals are under the misunderstanding that the tender (for the mechanical shredder) is in itself intended as a solution to the water hyacinth problem in Lake Victoria. Management takes responsibility for this misunderstanding. A more thorough job of informing the public of the purpose of the trial nature of the shredding tender could have been made. Additional steps are underway to improve public involvement. So, while Management does not agree with the Requesters' allegations, they understand and sympathize with their frustrations.

18. For the above reasons, Management believes that the design and execution of the water hyacinth chopping/shredding pilot is completely acceptable, and that the Bank has complied with all relevant policies and procedures.

## **E. ELIGIBILITY**

19. For purposes of determining the eligibility of the Request and the Requesters, the Panel reviewed the evidence submitted by the Requesters and Management, and visited Nairobi and the relevant Project area. The Panel consulted with the Executive Director representing Kenya and his staff.<sup>2</sup>

20. During the field visit, Panel Members (Edward S. Ayensu, Leader, and Maartje van Putten) met with officials of RECONCILE who represent the Requesters, and other NGOs<sup>3</sup> in Nairobi. In Kisumu, they met with a number of the Lake's community-based associations and fishermen and fishmongers. They also met with individuals residing along the banks of the Lake whose livelihoods are directly tied to lake fishing and subsistence agriculture.

21. The Panel members also met with Bank staff in Nairobi and Washington and exchanged views with Kenya Government and Project officials in Nairobi and Kisumu.<sup>4</sup>

22. Discussions held with the local people at the landing areas of the Lake during the Panel's visits to various localities at the Project sites do confirm that local people supported the Request and that RECONCILE was authorised to represent OSIENALA, the principal NGO in Kisumu, and Ecovic who represent communities living along the Kenya side of Lake Victoria.

23. Paragraph 9 of the 1999 Clarifications mentions certain "technical eligibility criteria" that must be met, and the Panel concludes as follows:

- (a) The Panel is satisfied that the affected party consists of two or more persons with common interests or concerns and who are in the borrower's territory.
- (b) The Request does assert in substance that a serious violation by the Bank and IDA of their operational policies and procedures has or is likely to have a material adverse effect on the Requesters.
- (c) The Request does assert that its subject matter has been brought to Management's attention and that, in the Requesters' view, Management has failed to respond adequately to it, thus demonstrating that it has followed or is taking steps to follow the Bank's policies and procedures.
- (d) The matter is not related to procurement.

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<sup>2</sup> The Panel wishes to thank the Executive Director and his staff for their comments and guidance. It also wishes to thank the Government officials who met with the Panel Members in Nairobi and Kisumu and RECONCILE, the NGOs represented by it and the other NGOs and local people who took time to meet with the Panel. Finally, it would like to thank Bank staff in Nairobi and Washington for facilitating the work of the Panel.

<sup>3</sup> Scientists and Technologists with expertise on insect physiology and ecology and the Association of Food and Agriculture Journalists. They also met with two members of the Kenya Parliament.

<sup>4</sup> These officials included the Provincial Commissioner of Kisumu, two deputy Secretaries of the Ministry of Environment and Natural Resources, the National Executive Secretary of the Lake Victoria Environmental Management Project, the Task Co-ordinator of Wetlands Management, Members of the Water Hyacinth Control and Monitoring Committee, and other operational officers.

- (e) The related Credit and Grant have not been closed or substantially disbursed.
- (f) The Panel has not previously made a recommendation on the subject matter.

## **F. CONCLUSION**

24. The Request and Management Response contain conflicting assertions and interpretations about the issues, the underlying assumptions, the facts, compliance with Bank policies and procedures and harm. The Panel is neither able to address these conflicting statements in the period available to it to prepare and submit this report on eligibility to the Board, nor is allowed to do so pursuant to the 1999 Clarifications of the Resolution<sup>5</sup>. The Panel can only address these issues during the course of an investigation.

## **G. RECOMMENDATION**

25. In the light of the foregoing, the Panel recommends an investigation into the matters alleged in the Request.

Attachments

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<sup>5</sup> The 1999 Clarifications to the Resolution that established the Panel are contained in the “Conclusions of the Board’s Second Review of the Inspection Panel” dated April 20, 1999.

## **Annex 1**

### **Request for Inspection**

**RECONCILE**  
Resources Conflict Institute

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28<sup>th</sup> September, 1999

Mr. Harold E. Wackman  
Country Director  
The World Bank  
P O Box 30577  
NAIROBI

Dear Mr. Wackman,

**LVEMP - Mechanical Removal of Water Hyacinth at the Nyanza Gulf Request for Inspection**

We have addressed a Request for Inspection to the Inspection Panel of the World Bank in the envelope accompanying this letter.

Pursuant to paragraph 14 of the Inspection Panel's Operating Procedures, we wish to deliver the Request to the Panel through your office.

Kindly issue a receipt for the Request as stipulated in the said paragraph 14 of the Operating Procedures, and transmit the Request to the Panel in the manner provided.

Yours Sincerely,

Michael Ochieng Odhiambo  
Executive Director

C.C. Executive Secretary  
Inspection Panel  
Fax No. 202 - 477 - 6391

**RECONCILE**  
Resources Conflict Institute

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27th September, 1999

The Inspection Panel  
1818 H Street, NW  
Washington, DC 20433 USA

We, the Resources Conflict Institute (RECONCILE), acting for and on behalf of persons in the area known as the Nyanza Gulf of Lake Victoria within the Republic of Kenya, do present this request for inspection.

1. The communities and individuals we represent are likely to suffer harm as a result of failures or omissions in the design or implementation by the Bank of the water hyacinth management component of the Lake Victoria Environmental Management Project (LVEMP) in Kenya.

Following are the failures or omissions that we believe are the responsibility of the Bank:

- i) No Environmental Impact Assessment (EIA) has been done on the likely impact of the method adopted by the Project for the mechanical removal of the water hyacinth, to wit, the shredding and sinking of the weed to the bottom of the lake.
- ii) The tendering procedure was not sufficiently transparent and serious concerns raised about how the tender was awarded have not been addressed sufficiently or at all.
- iii) Serious concerns raised by the communities around the lake, whose livelihoods depend directly on the lake as well as other informed persons about the likely ecological impact of shredding and sinking the water hyacinth to the bottom of the lake have not been answered sufficiently or at all.
- iv) Little or no regard has been had to the sustainable management of the water hyacinth in using this method of mechanical removal, as it does not involve the local communities in its design or implementation.
- v) The stated participatory approaches and stakeholder involvement in the design and management of the project have been totally ignored as the Project proceeds with this method of removal of the water hyacinth in the face

of and without any regard to the concerns and objections of the affected communities.

2. We fear that these failures and omissions shall result in the following damage or harm:

- i) The Nyanza Gulf is home to fresh water fish and the source of water for domestic use for these communities, and these will be endangered by the pollution caused by dumping the weed to the bottom of the lake, thereby putting at risk the livelihoods of the people who depend on the lake. In this connection, it is noteworthy that the lake is already heavily polluted by raw waste discharged into it by neighbouring industries; and further that it is shallower at the Nyanza Gulf than elsewhere.
- ii) In its decomposition, the weed, being an organic material shall make use of oxygen from the lake, thus reducing or depleting the concentration of dissolved oxygen in the water. This will endanger the lives of the species of fish that have little tolerance for reduced oxygen levels. Such fish include the Nileperch, Tilapia and Dagaa, which are major sources of food for local communities, as well as the basis of a major export trade of great importance to the national economy. In this connection, it should be noted that the Tilapia, Dagaa and *haplochromine* species of fish breed and nest largely on the shoreline, which is the area most infested by water hyacinth. Thus, sinking the weed shall seriously impact on the livelihoods of the local communities.
- iii) There is scientific evidence that the water hyacinth is capable of accumulating heavy metals, phenols, and toxic substances. Thus, sinking and eventual degradation of the weed shall result in an abrupt increase of toxic chemicals in the lake, which shall play havoc with the ecosystem.
- iv) The decomposition of the water hyacinth will enhance the eutrophication of the lake at the Nyanza Gulf with serious consequences for the ecosystem, in addition to the increased likelihood of the regeneration of the water hyacinth. Moreover, the likely increase of nitrate levels along the shoreline will in turn increase the likelihood of babies below 5 years of age developing the *Blue Baby Syndrome*.

3. We make this request on behalf of the communities living on the shores of Lake Victoria at the Nyanza Gulf and who depend directly on the lake for their livelihoods, feeding and trading in its fresh water fish species and using its water for domestic purposes. These are communities whose livelihoods and well-being shall be directly affected by the aforementioned impacts.

4. These concerns have been raised with the Bank staff in Nairobi by various people on behalf of these communities, with little or no adequate response. For our part, we

wrote a Demand letter to the Project Director of LVEMP on 26<sup>th</sup> July, 1999 requiring him to address these concerns. We informed him that in the absence of an appropriate response we would file a case in the High Court to obtain an injunction to restrain LVEMP and Aquarius Systems from shredding and sinking the weed to the bottom of the lake unless these concerns are addressed and the alternative methods for the removal and disposal of the weed are taken into account. We copied the letter to the Bank's Country Director.

We have never received any response from the LVEMP, Aquarius Systems or the Bank. Instead, the Bank on 13th August, 1999 convened a 3 - hour meeting at Nairobi which turned out to be a forum for the Bank, LVEMP and Aquarius Systems to justify their chosen method of removal of the water hyacinth. At the end of the meeting the Bank proposed the formation of a Monitoring Group, without any specification as to who would form or constitute the Monitoring Group nor what its Terms of Reference would be. In the aftermath of the meeting, the LVEMP, Aquarius Systems and the Bank have continued with arrangements to do exactly what the communities are so strenuously opposed to. Clearly therefore, the Bank's response has been inadequate and has not addressed the concerns of the communities.

5. In view of this inadequate response, we are still considering the possibility of filing suit against the Project, the Bank and Aquarius Systems. In the meantime, we are consulting with stakeholders with a view to ensuring that the project is implemented in a manner that does not compromise the sustainable management of this important resource or the livelihoods of these communities.

We believe that the above actions and omissions which are contrary to the Banks policies or procedures have materially and adversely affected the rights and interests of the communities on whose behalf we present this request. We therefore request the Panel to recommend to the Bank's Executive Directors that an investigation be carried out in order to resolve the problem.

We have made this Request for Inspection briefly in accordance with your Operating Procedures. We are however able to provide you with more particulars on request.

Yours Sincerely,

Michael Ochieng Odhiambo  
Executive Director

We authorize you to make this Request public.

## THE EAST AFRICAN COMMUNITIES ORGANIZATION FOR MANAGEMENT OF LAKE VICTORIA RESOURCES

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Kenya Chapter  
P.O. Box 68, Homa Bay, Tel: 0385-22029  
Telefax: 0385-22160/22055  
Email: ecovic-kenya@munglu.africaonline.com

23<sup>rd</sup> September, 1999

RECONCILE  
ATT: Mr. Michael Ochieng Odhiambo

Executive Director  
Box 7150  
Telephone 254-37-44940  
Fax 254-37-212865 NAKAR-KENYA  
Email: RECONCILE@netke.com

Dear Sir,

### **RE: REMOVAL OF WATER HYACINTH AT LAKE VICTORIA**

This is to register the dispute between the communities living along Lake Victoria and LVEMP, World Bank and acquarius systems on the intended use of shedding and sinking method of removal of the water hyacinth from Lake Victoria. Members of the communities living along the aforesaid Lake are totally opposed to the suggested method of shedding and sinking and strongly advocates for the weeds to be removed manually.

It is on this note that my organization is being a representative of these communities would wish to show commitment with them by mandating you to take up the matter for their benefit.

Ecovic strongly feels that it should not be left out of the inspection team and I don't mind being listed in the team. Enclosed please find a photocopy of the letter my executive committee had written to the Executive Director OSIENALA affirming the same.

Your quick response towards this effort will be highly appreciated. Please kindly acknowledge receipt.

Your sincerely,

Mary Atieno Amwata  
Chairperson Ecovic Kenya Chapter

**OSIENALA**  
(Friends of Lake Victoria)  
ENVIRONMENTAL RESTORATION PROGRAMME  
P.O.Box 4580, KISUMU, KENYA

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September 28, 1999

Executive Director  
RECONCILE  
Resource Conflict Institute  
P O Box 7150  
Nakuru, Kenya

Subject: Demand Notice to LVEMP and (World Bank and Aquarius Systems)

OSIENALA ( Friends of Lake Victoria), is a community based organization representing interest of over 4 million Lake Victoria riparian communities/stakeholders residing on the Kenya side. OSIENALA was formed with the main objective or restoring Lake Victoria to its former glory. As you are aware we are opposed to the proposed shredding and sinking of water hyacinth in Lake Victoria by LVEMP, the World Bank and the Aquarius systems, and our position on this issue has not changed.

As stakeholder organization, we fully support you for the proposed actions:

- 1) Demand Notice to LVEMP and (World Bank & Aquarius Systems) and
- 2) Request for Inspection with the Inspection Panel with World Bank in Washington, D.C.

This letter, is therefore, to request your organization (RECONCILE) to take up the above actions without delay for the benefit of the communities who live and benefit from the lake.

We also request that the organization may list our name in the Request for Inspection.

Please, act with haste as they (LVEMP *et.al*) are determined to get ahead with the proposed shredding and sinking of the water hyacinth.

Your sincerely,

Kinya Muniyirwa  
For Executive Director  
OSIENALA (friends of Earth)

**OSIENALA**  
(Friends of Lake Victoria)  
ENVIRONMENTAL RESTORATION PROGRAMME  
P.O.Box 4580, KISUMU, KENYA

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September 7<sup>th</sup> 1999.

**ENVIRONMENTAL EFFECTS OF SHREDDING AND SINKING OF WATER  
HYACINTH IN LAKE VICTORIA:**

OSIENALA, a National NGO based in Kisumu once again wishes to emphasize its stand on the implication of the proposed shredding and sinking of water hyacinth in Lake Victoria. As you may be aware, an American firm, Aquarius Systems, won a tender for the mechanical removal of the hyacinth weed from Lake Victoria. The activity is set to start this week, despite protests from scientists and some local leaders that the contract terms be reviewed to include assurance that the weed will be removed and dumped outside the lake. The proposed shredding and sinking of water hyacinth into the lake will have untold ecological decay and environmental degradation that must not be allowed in any civilised society. The following are some of the possible ultimate effects of such an activity: dissolved oxygen deficiency; eutrophication and toxic chemical threat.

**Dissolved Oxygen Deficiency**

Being an organic material, the sunk water hyacinth will undergo bacterial decomposition. Since the bacteria involved require oxygen during decomposition, this oxygen must be obtained from water. This will lead to the depletion of dissolved oxygen concentration. Fish species are less tolerant to reduced oxygen level. E.g. Tilapia, Nileperch, Dagaa, *haplochloramine* spp. will therefore decline since they depend on this oxygen. Other species that will manage to survive will have their composition changed as a result of this reduced oxygen level. It should be noted that Tilapia, Dagaa, and *haplochloramine* species have their breeding and nesting grounds in the shoreline. These species are also the main source of food for the local community since Nileperch is mainly for export. Water hyacinth mostly infest the shoreline and therefore sinking the weed will severely affect the most important fish species for the local community, a situation that may worsen the already serious food insecurity in the region, due to the globalization of Lake Victoria Fisheries.

### **Possible Toxic Chemical Threat:**

Available scientific evidence shows that water hyacinth has the capacity to accumulate heavy metals and phenols. The plant can retain within hours for every gram of dry matter the following amount of substances: Cadmium- 0.67mg, Nickel-0.50mg, Lead-0.176mg, Magnesium-0.15mg(McDonald, 1975).

It also accumulates the following toxic substances: Tannin-1% in dry matter and 2% in leaves, Oxalate 0.8%-3.3% in dry matter (Loreo and Bressani, 1982). It is no doubt therefore the sinking and eventual degradation of the hyacinth en-masse will result to an abrupt increase of the toxic chemicals in the aquatic environment, a scenario that can crush the aquatic ecosystem.

### **Eutrophication**

Decomposition of the sunk water hyacinth will increase the nutrient load in the Winam Gulf of Lake Victoria, which is a very rich fish breeding and spawning area. Such an increase will stimulate algal growth. As more and more salts of nitrogen and phosphorous increase, more is taken up by both epiphytic and planktonic algae in the aquatic ecosystem. This will result in an increase in their mean biomass and productivity, but with a decline in diversity of species intolerant to low light, higher dissolved solids or competition. This effect will completely alter the aquatic ecosystem leading to a complete disruption of the otherwise natural life. The consequences of this may be short-term or long term far reaching. Due to this kind of magnitude of eutrophication and given the fact that seeds of water hyacinth can survive for several years, it will not be a matter of time for the water hyacinth to rejuvenate even more. Further more, if nitrate levels in the shorelines could increase considerably, then babies below 5 years of age using such water can develop a condition referred to as a Blue Baby Syndrome.

Recent scientific evidence on effects of water hyacinth on phico-chemical characteristics in the lake indicates that standing water hyacinth in the lake adversely alters phico-chemical characteristics of the water, how about if the weed was to be shredded and dumped in to the lake to decay? The following would happen: Hypolimnetic oxygen would be nil, higher amounts of ammonia nitrogen would be released into the water in the ensuing reactions, addition of soluble organic matter to water would increase levels of electrical conductivity, total dissolved solids, calcium hardness, magnesium concentration, phosphate concentration and reduced pH. All these would have untold deleterious effect on the biodiversity in the lake not to mention its effect on the water quality for domestic and livestock purposes.

It is for this reason that OSIENALA wishes to let scientists and environmentalists know that by allowing the planned shredding and sinking of water hyacinth, they are showing total disregard to the ecology and hence the people who depend on this lake for their livelihood. We hope the American Company ( Aquarius Systems) knows well the

consequences of eutrophication for cases of Lake Moss and Lake Washington which occurred in America not too long ago are still very fresh in our minds. It is also clear that in the United States, Environmental Protection Agency (EPA) would not allow such an ecologically disastrous activity to be undertaken in their water bodies. We also doubt whether the World Bank and GEF managers would sponsor such an activity “ in their respective countries”. One therefore fails to understand why these well- informed institutions should support this unorthodox activity, in a poor country that will not be able to handle the consequences. Let us not commit a mistake, which the future generation will find hard to forgive.

**In conclusion**, we would like to make the following recommendations: **First**, we demand that an Environmental Impact Assessment (EIA) for the proposed activity be released to all stakeholders. **Second**, for sometime now, water hyacinth has been subjected to a biological control using weevils and so far a significant degree of success has been achieved. Shredding and sinking the water hyacinth will also destroy the weevils. OSIENALA believes that the biological control though results into the sinking of the weed, is a much slower process that allows a natural re-adjustment of ecological system and is therefore more environmentally friendly. It should be given a chance. Further more this methodology has been successful in other countries such as Sri Lanka, Australia, Namibia, Botswana, New Guinea, so why should we now doubt its success in Lake Victoria. **Third**, water hyacinth is a symptom to the problem of pollution. Pollution control measures should therefore be put in place as a long-term solution. While as a short-term measure economic utilization of water hyacinth should be promoted.

Yours sincerely,

Obiero Ong'ang'a  
Executive Director

26<sup>th</sup> July, 1999

Dr. J. B. Ojiambo  
Project Co-ordinator  
Lake Victoria Environmental Management Programme  
P. O. Box 30126  
NAIROBI

Dear Sir,

**Removal of Water Hyacinth**

We write to you in connection with the planned mechanical removal of the water hyacinth from Lake Victoria, on the Kenyan side. We have read the article by Hon. Peter Anyang Nyong'o (*Sunday Nation, July 25, 1999*) raising concerns about the planned dropping of the weed at the bottom of the lake. We think his concerns are serious, and his arguments sufficiently weighty to warrant serious consideration.

We are a public interest environmental law organisation, and one of our objectives is to use the legal process and the legal system in Kenya to protect the environment and promote the sustainable management of natural resources. It is clear to us that the concerns raised by Hon. Nyong'o touch on the sustainable management of Lake Victoria and its resources; a matter that is central to the survival of the people who depend on the lake and its resources for their livelihoods.

In the premises, we should like to add our voice to that of Hon. Nyong'o and to demand an assurance from the LVEMP and all concerned that the concerns raised shall receive due consideration and alternative methods of disposal of the weed shall be looked into. We are copying this letter to the World Bank's Country Director as well as the Inspection Unit in Washington, and to the concerned ministries of the Kenya government. We request for a copy of the environmental impact assessment report on this project so that we too can verify the process followed in determining the best method for removing and disposing of the weed.

We put you on notice that unless we receive an appropriate response within 10 days hereof that the matters raised herein are being given due consideration, then we shall take legal action to restrain you from your intended course of action. In this connection we hasten to draw your attention to the fact that the Environmental Management and Co-ordination Bill currently before Parliament recognizes the precautionary principle which is defined by section 2 thereof as "the principle that where there are threats of damage to the environment whether serious or irreversible, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation".

This is a tacit recognition by the government of a major principle of sustainable development that seeks to ensure that we are better safe than sorry.

Yours faithfully,

Michael Ochieng Odhiambo  
Executive Director

The Permanent Secretary  
Ministry of Environmental Conservation  
P.O. Box 67839  
NAIROBI

The Permanent Secretary  
Ministry of Natural Resources  
P.O. Box 30126  
NAIROBI

The Country Director  
The World Bank  
P.O. Box 30577  
NAIROBI

The World Bank Inspection Unit  
World Bank Headquarters 1818, H Street NW  
Washington DC 20433  
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The Provincial Commissioner  
Nyanza Province  
P.O. Box 1814 KISUMU

Hon. Peter Anyang Nyong'o  
P.O. Box 57103  
NAIROBI

The Executive Director  
UNEP  
P.O. Box 30552  
NAIROBI

The Press NAKURU

## **Annex 2**

# **Management Response**

**Request for Inspection- Kenya Lake Victoria Environmental  
Management Project  
(IDA Credit 2907-KE & GEF TF 23819)**

Response to the Inspection Panel  
December 20, 1999

**1.0 Introduction**

This document was prepared in response to a communication from the Inspection Panel for information regarding a “Request” to the Panel from RECONCILE, OSIENALA and ECOVIC (Kenyan Chapter) to review a specific component of the Kenya Lake Victoria Project, dated November 23, 1999. The response is divided into the following sections:

Section One: Introduction

Section Two: Our understanding of the allegations

Section Three: A brief description of Lake Victoria Environmental Management Project (LVEMP) that is relevant to the Allegations

Section Four: A brief discussion of the Water Hyacinth Shredding tender (the object of the allegations) and response to the allegations that were made regarding its preparation and implementation

Section Five: Summary.

**2.0 Our Understanding of the Allegations**

The letter from the Inspection Panel suggests that the complaints against the Water Hyacinth Shredding Tender fall under four Bank policy instruments. These are OD 4.01 (Environmental Assessment); OD 4.15 (Poverty Alleviation); OP 10.04 (Economic Evaluation of Investment Projects); and OD 13.05 (Project Supervision). The letter does not spell out which article/paragraph of these policy documents the Project is alleged to have violated. To facilitate and structure the response, we have assigned allegations made by the named groups (as per the letters attached by the Inspection Panel) to each of these policy documents.

It is our understanding that the allegations communicated to us through the Inspection Panel relate only to the Water Hyacinth Shredding Tender, not to the Project itself. This is an important point as the Water Hyacinth Control Component is but one of 14 separate parts of the LVEMP in Kenya. More specifically, the Water Hyacinth Control Component of the LVEMP comprises approximately 11% of the total Project cost, and the Water Hyacinth Shredding tender is only about 20% of this amount.

**2.1 Allegation Number 1- That the preparation/implementation of the water hyacinth shredding tender was in violation of Bank OD 4.01 (Environmental Assessment)**

We understand the following references in the letters from Reconcile, Osienala and Ecovic (Kenya) to pertain to this part of the allegation contained in the Inspection Panel's letter:

Letter by Reconcile of September 27, 1999

- Paragraph 1(i) (“No Environmental Impact Assessment has been done on the impact of the method adopted by the Project for the mechanical removal of the water hyacinth, to wit, the shredding and sinking of the weed to the bottom of the lake”)

Letter by ECOVIC of September 23, 1999

- No reference made to the issue of Environmental Impact assessment. The third paragraph refers to ECOVIC's desire to be included in the “Inspection Team” (presumably, the independent monitoring group formed to oversee the scientific monitoring program for the water hyacinth shredding tender);

Letter by Osienala of September 28, 1999

- The only direct reference related to environmental impact reporting is made in the “Conclusions” and consists of a demand that an environmental impact assessment of the proposed activity be released to all stakeholders (echoing a letter to the Project Secretariat of July 26, 1999);

## **2.2 Allegation Number 2- That the preparation/implementation of the water hyacinth shredding tender was in violation of Bank OD 4.15 (Poverty Alleviation)**

This allegation is somewhat more difficult to associate with material in the letters sent to the Inspection Panel. The letters do not mention the existing impact of water hyacinth on poverty around the Lake (the justification for the Water Hyacinth Control Component of the LVEMP), and make only indirect reference to the water hyacinth shredding tender's effects on livelihood. Specifically:

Letter from Reconcile of September 27, 1999

- Paragraph 2(i)- concern regarding impact of tender on Nyanza Gulf fishery and water supply;
- Paragraph 2(ii)- concern regarding tender impact on dissolved oxygen concentrations in the Lake and on the life-history of fish in the Lake;
- Paragraph 2(iii)- concern regarding tender impact on concentration of heavy metals, phenols, and other toxic substances in the Lake;
- Paragraph 2(iv)- concern regarding tender impact on eutrophication and nitrogen levels in the lake leading to increased incidence of “blue baby” disease.

Letter from Osienala of September 7, 1999

- Concerns under section on “Dissolved Oxygen Deficiency” that the tender will “worsen the already serious food insecurity in the region, due to the globalization of Lake Victoria Fisheries”;

- Concerns under section on “Possible Toxic Chemical Threat” that the tender will result in an abrupt increase of toxic chemicals in the aquatic environment, a scenario that can crush the aquatic ecosystem and presumably lead to increased poverty among direct users of the resource;
- Concerns under section on “Eutrophication” that the tender will increase nitrogen levels in the water leading to increased “blue baby” disease, and negatively affect human water supply;

**2.3 Allegation Number 3- That the preparation/implementation of the water hyacinth shredding tender was in violation of Bank OP 10.04 (Economic Assessment of Investment Projects)**

Attributing anything in the letters from Reconcile, Osienala and Ecovic (Kenya) to lack of due diligence in the economic assessment of the water hyacinth component of the Project in general, or the shredding tender in particular, is almost impossible. Allegations made by these groups have little or nothing to do with economic justification. However, economic/financial justification of available control methods for managing the water hyacinth problem in Lake Victoria is an important part of the approach being taken by the LVEMP. As such we agree that the question of economic/financial viability is relevant (regardless of who raises the question), and will present a discussion of it in this response.

**2.4 Allegation Number 4- That the preparation/implementation of the water hyacinth shredding tender was in violation of Bank OD 13.05 (Project Supervision)**

We assume that this section of the allegation relates to the following comments:

Letter from Reconcile of September 27, 1999

- Paragraph 1(iv)- Management of water hyacinth under the Project does not involve the local community;
- Paragraph 1(v)- There has been no community involvement or participation in the design and management of this part of the Water Hyacinth Control Component of the LVEMP;
- Paragraph 4- The Bank has consistently ignored approaches by Reconcile and Osienala for information/action regarding their concern over the water hyacinth shredding tender;

There were no direct references in letters from Osienala or Ecovic to this aspect of the allegation.

**3.0 Brief Discussion of the LVEMP (and Water Hyacinth Tender)**

**3.1 Background to the Project**

Lake Victoria is the second largest freshwater lake in the world and has the largest freshwater fishery in the world, largely based on the introduced Nile perch which supports an important export fishery for Kenya, Tanzania and Uganda (the three riparian countries bordering the Lake). The Lake has experienced a serious decline in water quality since the 1960s.

Phosphorus concentrations have risen by a factor of two, algal biomasses have increased by a factor of 8 to 10, the deep waters of the lake are more depleted in oxygen for longer periods of time each year, and filamentous and colonial blue-green algae now dominate the algal community. In addition, water hyacinth has invaded the lake, reducing the operational efficiency of the Falls hydroelectric plant and blocking access to ports, fisherfolk community fish landings and watering points. This makes the water hyacinth infestation a major economic problem for the region.

These changes are evidence for a profound eutrophication<sup>6</sup> of this great lake, and the continuing eutrophication is a concern for the many domestic, agricultural and industrial uses of the Lake. There is also evidence that these water quality changes have favored the success of the Nile perch and contributed to the extinction of endemic fish species. Although the water quality changes may have favored the establishment of the Nile perch, reports of more frequent fish kills in recent years have raised questions on the sustainability of the fishery. While ecosystemic changes are well documented, the causes for these changes are uncertain because basic data have not been acquired over time on the quantity and quality of water input from rivers and the atmosphere, the lake-wide concentrations of nutrients, the internal circulation of waters and the exchange of nutrients between different water layers and between sediments, the factors which may be limiting algal growth, and the relative importance of different human activities in causing these changes.

The three riparian countries around Lake Victoria, Kenya, Uganda and Tanzania, are responding to these issues and other fisheries, land use and socioeconomic issues of concern on Lake Victoria through the Lake Victoria Environmental Management Project (LVEMP). This Project is financed by the Global Environmental Facility (GEF) and the International Development Agency (IDA), while complementary investment through complementary projects was provided by bilateral donors, the European Union, the UNDP, and the FAO. The project was approved by the GEF Council in April 1996, and by the World Bank Board on July 30, 1996. The project was declared effective on March 31, 1997.

The three riparian countries have recognized that Lake Victoria is a single ecosystem and that its problems cannot be addressed by national activities alone to achieve adequate management over the resources of Lake Victoria and its basin.

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<sup>6</sup> Definition- Pertaining to a lake or other body of water characterized by large nutrient concentrations such as nitrogen and phosphorous and resulting high productivity. Such waters can support regular algal blooms and periods of oxygen deficiency under specific weather conditions. Slightly or moderately eutrophic water can be healthful and support a complex web of plant and animal life. Degrees of *Eutrophication* typically range from *Oligotrophic* water (maximum transparency, minimum chlorophyll-a, minimum phosphorus) through *Mesotrophic*, *Eutrophic*, to *Hypereutrophic* water (minimum transparency, maximum chlorophyll-a, maximum phosphorus). Generally, the possibility and frequency of environmental problems (including fish kills) in a Lake tends to increase as the degree of eutrophication of its waters increase.. However, the physico-chemical characteristics of the Lake and the implication of the resultant trophic status of the Lake Victoria on the economy and biodiversity of the region is more complicated than can be explained in this short response.

### 3.2 Objective and Scope of the LVEMP

IDA and the GEF are providing funds to support the foreign currency costs of the Project. Project costs are approximately US \$26.9 million (with about \$2.5 million equivalent of this coming from local sources), each, in Kenya, Tanzania and Uganda (total cost of about \$75 million). The Project in Kenya and the other two riparian countries consists of a number of components, including:

	<u>Total Project</u>	<u>Kenya Project</u>
Fisheries Management	US\$2.3 million <sup>7</sup>	
Fisheries Research	US\$13.3 million	\$4.7 million
Fish biology/biodiversity Conservation	(\$6.6 million)	\$2.2 million
Aquaculture	(\$3.1 million)	\$1.1 million
Socio-economics/database creation	(\$3.7 million)	\$1.4 million
Fisheries Extension/policy & enforcement	US\$14.1 million	\$4.5 million
Fish Levy Trust	US\$2 million	\$0.7 million
Water Hyacinth Control	US\$8.3 million	\$2.8 million
Water Quality & Ecosystem Management	US\$9.6 million	\$3.2 million
Industrial & Municipal Waste Management	US\$9.9 million	\$4.2 million
Land Use and Wetland Management	US\$14.05 million	\$5.4 million
Institutional Strengthening	<u>US\$4 million</u>	<u>\$1.4 million</u>
TOTAL	\$77.6 million	\$26.9 million

The water hyacinth control component of the Project, although extremely important, is actually one of the smaller parts of the LVEMP. The water hyacinth shredding tender is about 20% of the total Water Hyacinth Component of the entire Project.

The LVEMP is not a "stand alone" project. Rather, it is seen as the first phase of a long-term, programmatic, approach to sustainable management of the resources of the Lake and its catchment. The programmatic approach recognizes that the environmental problems of Lake Victoria and its basin have taken decades or longer to become evident and cannot be solved in a single, five-year project. The LVEMP implementation therefore focuses on identifying priority management activities and piloting possible management measures that could be expanded through later interventions. The rationale during the initial phase is as follows:

- The LVEMP was not intended, nor could it ever be, the "savior" of Lake Victoria. It took decades for the problems of the Lake and its catchment to manifest themselves, and it will take as long or longer for these problems to be addressed;
- The LVEMP is the first step in a long process that leads to a clearly identifiable improvement in sustainable use (including in some specific instances, limited and non-use) of the natural resources of the Lake. From this perspective, the LVEMP has the objective of

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<sup>7</sup> This component supports creation of the Lake Victoria Fisheries Organization- a Lake-wide clearing house and advocate for fisheries and related issues in and around the Lake (the LVFO is located in Uganda and supported under the Uganda LVEMP)

issue/identification and prioritization, and presents an opportunity to pilot potential solutions to identified problems;

- The LVEMP will result in an improved ability in the riparian governments to embark on a long-term program of resource management and environmental improvement (through equipment purchase and training).

For solutions to be found to the problems of the Lake area, the riparian governments and their bilateral/multilateral donors need to make a longer-term commitment to addressing these problems--initially, for at least 10-15 years, judging by experience with similar water bodies. The LVEMP and all its parts are designed to lay the groundwork for this longer-term commitment.

#### **4.0 Discussion of the Water Hyacinth Shredding Tender and Allegations Contained in the Inspection Panel Letter**

##### **4.1 Background**

Water hyacinth (*Eichhornia crassipes*) is a flowering plant, whose origin is thought to be the Amazon areas of Brazil. It appeared in Lake Naivasha in Kenya in 1982, and in Lake Kyoga in Uganda in 1988. In Tanzania, it was first reported in 1990. Its first recorded appearance in Lake Victoria was in Ugandan waters in 1988. Since then it has been reported in many locations, all around the lake, in the waters of all three riparian countries. At the time of appraisal of the Lake Victoria Environmental Management Project (LVEMP), it was especially concentrated in Ugandan waters, possibly because the prevailing southerly winds blew mats of the weed all the way from the headwaters of the Kagera in Rwanda and Burundi. The hyacinth also flourishes in nutrient-rich waters, as those along the Uganda shoreline of the lake are believed to be. At the outset of the LVEMP, the area between Entebbe and the Uganda/Kenya border had numerous floating mats of water hyacinth, and some bays were completely filled with the densely packed weed. Behind the Owen Falls dam, the hyacinth was backed up to the railway bridge over the Nile. In early 1997 the estimated area of hyacinth in Ugandan waters was 3,870 hectares, of which about 2,200 hectares was stationary (anchored along the shoreline) and 1,670 hectares mobile.<sup>8</sup> This is 0.06% of the total surface area of Lake Victoria (68,800 km<sup>2</sup>, or 6.88 million hectares). Since Uganda controls 45% of the lake surface, the water hyacinth was estimated to cover about 0.125% of Uganda's waters.

##### **4.2 Allegation Number 1- That the preparation/implementation of the water hyacinth shredding tender was in violation of Bank OD 4.01 (Environmental Assessment).**

*Summary: Although Government project management has made an effort to introduce transparency into the Project, it could have done a more thorough job of informing the public of the purpose of the shredding tender. The complaints made by Reconcile, Osienala and*

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<sup>8</sup> Timothy Twongo and Hannington Ochieng, *Water Hyacinth in Uganda: Distribution Cover and Movement*, National Agricultural Research Organisation, Fisheries Research Institute, May 1997. The authors noted that invasion of the stationary water hyacinth by other vegetation, notably hippo grass, had reduced the "clean stands" of stationary hyacinth to an estimated 1,100 hectares.

*Ecovic (Kenya) are understandable in this context, but they are not correct in substance. The LVEMP was rated as a category “B” under OD 4.01. A broad-based environmental review was done by the preparation team as part of its project preparation for the LVEMP, and this document is in the project files. A summary of this review is contained in Section 5 (page 44) of the combined Project Staff Appraisal Report and President’s Report (for the GEF), which became a public document upon Board approval. Further, the water hyacinth shredding tender is, in itself, essentially the core of a detailed evaluation of the environmental impact of the shredding methodology. The tender that is the focus of this allegation is only a pilot of the chopping/shredding process, and as such has the limited objectives of testing physical, economic and environmental sustainability, and the conditions under which the method would be appropriate for use.*

There is a general misunderstanding on both the side of the Government and those making this allegation regarding the true nature of the Water Hyacinth Shredding Tender. We are not surprised that the groups submitting these allegations about the tender have taken these positions. Both the Government and many NGOs and individuals believe that the tender is itself a solution to the water hyacinth problem in Lake Victoria. In fact, the water hyacinth shredding tender is a pilot to determine the environmental and economic feasibility of shredding as one method of managing the water hyacinth problem in Lake Victoria. Although Kenya, Uganda and Tanzania each have an LVEMP, there is only a single lake. All three countries and the Bank Task Team view the LVEMP as an integrated project. We can therefore pilot activities in any country, and if the action proves environmentally, socially and economically feasible, we can apply it to the other countries. For example, the Project has been approached to pilot mechanical removal in Uganda, it is supporting the hyacinth shredding tender in Kenya, and is also piloting several types of biological control in all three countries.

That the LVEMP and the scientific staff participating in its implementation have not been sufficiently proactive in explaining the objectives of the LVEMP in general, and this tender specifically, is an indication of weakness in this aspect of Project implementation. Although the Project and the Task Team have made what we believe is significant progress with public involvement, ownership, and easy accessibility to the Project, we have some distance to go in this regard.

Additional steps are underway to make the improvements necessary (see Section 4.4, below). Although we do not agree with the allegations made by Osienala, Reconcile and ECOVIC (Kenya), we do understand and sympathize with their frustration.

#### **4.2.1 Description of the Water Hyacinth Control Component of the LVEMP**

The Lake Victoria Environmental Management Project allocated US\$8.31 million (10.7% of a total project cost of US\$77.58 million) for the water hyacinth control program, spread among

the three countries. Kenya's share was US\$2.8 million. The Staff Appraisal Report described the component as follows (pp. 18-19):

“The aim of the program is to establish sustainable long-term capacity for maintaining control of water hyacinth and other invasive weeds in the Lake Victoria Basin. This will be achieved by an integrated effort involving intensified publicity, legislation, and integrated pest management with community involvement. The control program will rely on mechanical methods and limited chemical interventions for rapid short-term control in restricted areas, and biological agents for longer-term control<sup>9</sup>. Reducing nutrient inflows into the lake will be a vital element in long term approaches to dealing with the problem. The biological control program will rely initially on multiplication and release of two weevil species that have been used and found effective world-wide, and have already been imported, reared and released in Kenya and Uganda. The species are the chevroned water hyacinth weevil (*Neochetina bruchi* Hystache) and the water hyacinth weevil (*Neochetina eichhorniae* Warner). These two species are complementary in their action. The possibilities will be explored for supplementing the weevils by later releases of the moth *Sameodes albiguttalis*. The main elements of the biological control program will be establishment of mass rearing capacity in units around the shores of the lake as rapidly as possible, a coordinated field release program involving local community participation, monitoring performance of biological control agents in the field, and development of a monitoring and evaluation protocol and training program.”

“Implementation of the water hyacinth control program will be led by the agricultural research organizations of the three countries, namely the Kenya Agricultural Research Institute (KARI) in the Ministry of Research, Technical Training and Technology, the Uganda National Agricultural Research Organization (NARO) in the Ministry of Agriculture, Animal Industry and Fisheries, and the Tanzania Department of Research and Training in the Ministry of Agriculture, Livestock, Cooperatives and Development. The agricultural research institutions will be responsible, in particular, for the program to multiply and disperse the biological control agents. National Water Hyacinth Steering Committees will be established in each country to oversee and coordinate the program, and to ensure the involvement of local communities and NGOs. The program will be financed by GEF (54%) and IDA (36%).

#### **4.2.2 The Objective and Scope of the Water Hyacinth Shredding Tender**

##### Project-Level Environmental Analysis

The Project was rated as category “B” under OD 4.01. This OD required “something less” than a full Environmental Assessment as would have been required had the Project been classified as “A”. On the basis of this requirement, and clearance of the Project rating by the African Regional Environmental Department, an environmental analysis was prepared as part of project preparation in November 1995. The Project also underwent full evaluation by the Africa Regional Environmental Department at Appraisal and SAR Yellow Cover review, as required

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<sup>9</sup> The implication in the SAR is that the three riparian governments would have to agree to trial use of herbicides and that any trial use would be in compliance with IDA guidelines. In fact, the three governments, through the East African Community, have taken the position that herbicides will not be used in Lake Victoria, and the Bank has supported that view.

under OD 4.01. The Staff Appraisal Report (June 1996) summarized the 30-page environmental analysis as follows:

“The [Lake Victoria Environmental Management Project] is in effect a regional environmental action plan for Lake Victoria, having as its central objective improving the environmental conditions of Lake Victoria and its catchment. However, the program will encompass a wide range of different interventions and investments, and has been designated as Category B for environmental analysis to ensure that adequate attention will be given to the many overall positive impacts as well as to individual components which might have adverse local environmental effects.”

The SAR described the positive impacts of the project, concluding with the observation that “the area in which the project would make the most economic difference would be in heading off developing instability and possible serious collapse of the valuable lake fisheries.” The SAR also identified and described five main areas of possible negative impacts, and described how they would be addressed. Among them were the following two risks relating to water hyacinth control:

(a) biological agents used as the main line of long term control of water hyacinth might have unforeseen effects on other parts of the ecosystem and the catchment; and

(b) herbicides used to control water hyacinth might damage other crops, add to water pollution, kill fish, and themselves contribute to anoxia in the lake, especially in littoral areas.

The SAR described the following steps that would be taken during project implementation, to minimize the possibilities of these negative impacts arising, or mitigate their effects:

- “*biological control agents* - all biological control agents under consideration have been subjected to exhaustive field testing over twenty years in several countries. For all three control agents, the conclusion was: “there is no doubt that [the agent] is restricted to water hyacinth and that it may be introduced into regions infested with this weed without risk of damage to other plant species.”<sup>10</sup> The two species of weevils have been tested extensively in Kenya and Uganda, and released in both countries in lakes other than Lake Victoria. The testing protocols have been satisfactory, and no results different from those observed elsewhere have been noted. Any additional biological control agents available during project implementation will be subjected to similar testing protocols.”
- *herbicides* – If herbicides were to be used at all, their use would be in accordance with IDA guidelines. As mentioned earlier in footnote 4, the riparian countries eventually decided that herbicides would not be used in Lake Victoria for the foreseeable future. IDA supports this decision.

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<sup>10</sup> Harley, K.L.S., “The Role of Biological Control in the Management of Water Hyacinth, *Eichhornia crassipes*,” Biocontrol News and Information, Vol 11, No. 1, 1990, 11-22.

In Kenya, the political pressure was so intense, and the economic damage to fishing villages so compelling, that the Ministry of Environment and Natural Resources decided to seek a supplementary solution to the biological control already underway in all three riparian countries, the timing and level of whose impact was still uncertain at that stage. Having learned of a chopping machine that had been developed in the USA, the Permanent Secretary of the Ministry, and the Head of the Kenya National Secretariat of the LVEMP visited the USA in October 1997 to see the machine in action. They were impressed with what they saw, and decided to proceed with procurement. During the preparation of the tender, four technical issues were considered:

- (a) whether or not, following chopping, the hyacinth would regenerate, either vegetatively or from seeds;
- (b) whether or not the process of the hyacinth disintegrating in the lake would cause undue de-oxygenation of the water;
- (c) whether or not the hyacinth had formed a sufficient protective shelter for smaller cichlid fish to help their revival in the lake by slowing down predation by Nile Perch, so that removing the hyacinth would now reverse that process; and
- (d) whether or not it was disadvantageous to return to the lake the nutrients that the hyacinth had taken up (hyacinths are like any plant, they remove nutrients from the water column, building mass. When plants die, the decomposition process usually results in the remobilization of these nutrients back into the water column from which they came).

After consulting with scientists and practitioners about these technical issues, it was accepted by the Government and the Bank that:

- (a) regeneration was unlikely because the chopping would destroy the flotation devices of the hyacinth, leading to their sinking below the water surface; the specification in the tender document that the machine be able to chop to less than a specified size was a precaution aimed at ensuring that the plants would be incapable of regeneration;
- (b) the hyacinth was likely to disintegrate relatively rapidly in the tropical conditions of Lake Victoria, and was unlikely to de-oxygenate or pollute the water significantly more than it had done already by covering the water surface with huge tight mats and producing from its root systems substantial amounts of organic debris; it was also foreseen that the stirring action of the chopping machine itself would add oxygen to the water as it chopped the hyacinth;
- (c) it was considered that the de-oxygenation effects of debris dropped continuously from established hyacinth plants were already inimical to fish life underneath the hyacinth mats; furthermore, careful survey work between 1991 and 1995 along rocky shorelines of Lake Victoria in Tanzanian waters documented the presence of 163 species of haplochromine

fish, of which 102 species were previously unknown;<sup>11</sup> these discoveries along hyacinth-free rocky shores indicated that it was unlikely that the hyacinth was playing any significant role in the survival of cichlid fish species. On the other hand, the hyacinth was implicated in increases in dangerous diseases such as bilharzia and malaria, and its negative economic effects were large; and

(d) the proportion of the nutrients in their vicinity taken up by the hyacinth was unknown, but the fact that hyacinth covered a very tiny proportion of the lake surface, and that nutrients were entering the lake in substantial amounts from other sources, implied that the effect of “returning” to the lake those nutrients in the hyacinth plants would make only a negligible difference to overall nutrient balances.

The Borrower’s request for inclusion of the hyacinth shredding work into the LVEMP came late in Project preparation. As was the case for all other pilots of hyacinth control methods included in the Project, the scope of chopping/shredding proposed for inclusion was limited to pilot studies. The question faced by the preparation team was whether or not chopping/shredding held promise as an environmentally and socially sustainable tool for management of the hyacinth infestation in Lake Victoria. To answer this question, the team approached scientists and practitioners (including recognized experts in water hyacinth control and on the ecology of Lake Victoria) for advice. These experts included:

- Ken L.S. Harley, Wendy Forno, and Michael Julien (Commonwealth Scientific and Industrial Research Organization, Australia)
- Professor Randall K. Stocker, Director, Center for Aquatic and Invasive Plants, University of Florida
- Dr. Jeffrey Waage, Director, International Institute of Biological Control (an Institute of the Commonwealth Agricultural Bureaux, International)
- Dr. Hans Herren, Director General, International Center of Insect Physiology and Ecology (ICIPE)
- Dr. Robert Hecky, National Water Research Institute, Canada
- Dr. John Okedi, Executive Director, National Environmental Management Authority, Uganda
- Dr. Geoffrey Howard, IUCN Regional Office, Nairobi (head of the East African Wetlands Program)

The LVEMP is also funded by the GEF, which has its own project review process, including peer review of technical issues. GEF and other reviewers of the LVEMP included:

- Dr. Edwin D. Ongley, National Water Research Institute, Canada - official reviewer for the GEF Scientific and Technical Advisory Panel (STAP)
- Dr. Pier Vellinga, Institute for Environmental Studies, Vrije University, Netherlands - Chairman of the STAP. He led a group of STAP scientists to the region in April 1997, who reviewed the entire project, including water hyacinth, and inspected water hyacinth work in the field.

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<sup>11</sup> Seehausen, O., F. Witte, E.F. Katunzi, J. Smits, and N. Bouton, “Patterns of the Remnant Cichlid Fauna in Southern Lake Victoria,” *Conservation Biology* 11.4 (1997): 890-904.

- Professor Jerome Nriagu, Department of Environmental and Industrial Health, School of Public Health, University of Michigan - international member of the Panel of Scientists reviewing and advising the project
- Robin Welcomme and Wulf Klohn (both FAO)
- Professor Charles Okidi - then a consultant for the UNEP regional project on harmonization of environmental law.

Finally, technical members of the Bank's Project Preparation Team included: Graeme Donovan, Lars Vidaeus, David Hanrahan (Environmental Analysis and Economics), Radha Singh, Robert Hecky (consultant), Craig Harris (U. Michigan - consultant), Lars Linnemann (UNDP), Gerhard Schneider (UNEP), John Latham and Michael Andjelic (both FAO). The appraisal report had five internal reviewers: Stephen Lintner (water), Andrew Bond (biodiversity), Ernst Lutz (environmental economics), Robert Robelus (environmental assessment and analysis), and Cynthia Cook (community participation). Robert (Gus) Tillman also advised on the environmental analysis.

Having accepted the views of experienced scientists and practitioners, the Bank supported the mechanical chopping tender, viewing it as a pilot intervention that would round out testing of the other hyacinth control methods already under way around the lake, namely: biological control, manual removal, mechanical removal in two different situations (in Uganda), and the testing of one industrial use – production of bio-gas. Early indications were that the chopping method had the potential to become competitive in cost with chemical control in the medium term. It was accepted that mechanical removal was too costly to make most of the water hyacinth “use” approaches economically viable. The tender was limited to 1,500 hectares with the understanding that if it was successful and cost-effective, it could supplement biological control where the latter had weakened the hyacinth, and reduced its bio-mass, but had not got rid of it completely.

#### *The Concept of Piloting as the Basis of an EA for the Shredding Method*

As mentioned earlier, the Project is piloting a number of different management actions. It has indicated its willingness to support mechanical harvesting/removal in Uganda on a cost-sharing basis with the Uganda Electricity Board (upstream of the Owen Falls Dam), the mechanical shredding trial in Kenya, and biological control in all three countries. Project funds were also used, in a limited way in all three countries at selected sites, for manual removal of hyacinth by local communities. Funds were used for purchase of wheelbarrows, hand tools, and protective gear. However, the Bank discouraged use of project funds to pay local community members for removing the hyacinth, which was consistent with the principle adopted elsewhere in the project (especially in the micro-projects component) that local communities not be remunerated for their voluntary, self-help contributions. The Bank supported manual removal, but was concerned about the hazards to laborers associated with extensive exposure to lake waters – bilharzia, malaria, and snakes.<sup>12</sup>

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<sup>12</sup> For example, in the letter from Harold Wackman to Professor P. Anyang' Nyong'o, January 28 1998.

The LVEMP originally included trials to assess the environmental and economic usefulness of chemical control of the hyacinth, but these trials were abandoned as being too socially, economically and environmentally risky.

Why was it necessary to use the hyacinth shredding tender as the core of a detailed evaluation of the environmental impact *of the shredding/chopping method of control*, instead of doing a detailed EA as part of project preparation? In the absence of sufficient baseline data, and data describing analogous activities in other similar environments, there is virtually no chance of preparing a meaningful and useful EA. There are not sufficient data on the water quality or physical limnology of the Lake to be able to accurately describe either the current situation, or any large-scale changes in the Lake likely to result from shredding, or any other intervention in the Lake or its catchment. The largest component of the LVEMP is designed to collect sufficient water quality and limnology data from the Lake to create a reasonable scientific baseline, which would enable environmental assessment of development and management actions in the future.

*The Scope and Design of the Pilot (as basis of an ongoing EA)*

The LVEMP is designed to collect baseline data, identify and prioritize problems and to experiment with possible solutions to these problems through a series of experimental pilots. The tender to shred water hyacinth was prepared in keeping with the experimental approach. It is not large enough to cause significant impact on the ecology of Lake Victoria, but of sufficient size (shredding up to 1500 ha of floating water hyacinth mats) to allow water quality monitoring to pick up changes in surrounding Biological Oxygen Demand (BOD), phytoplankton abundance/species composition, conductivity etc, that might be indicative of the impact of this method of control, should it have widespread use in the Lake at some point in the future.

More particularly, the water hyacinth shredding pilot is important because traditional harvesting/removal of weed to dry land disposal is much more expensive (prohibitively so for the riparian communities of the Lake in all but the most restrictive areas in which wind patterns help to move weed to the harvester) than would be in-situ shredding and disposal. In fact, both in-situ and land disposal of water hyacinth carries environmental risk, and the riparian countries will never have a completely risk-free method of hyacinth control available to them. The objective of the LVEMP is to determine the practicality of ALL available methods of control and their economic and financial suitability for large-scale use on the Lake.

It must be emphasized that both the mechanical removal trial in Uganda and the shredding tender in Kenya are very small scale when compared to the problems that water hyacinth pose to the livelihood of local fishing communities, free movement of freight across the Lake, power generation, etc. To put the size of the hyacinth shredding tender into perspective, below is a comparison with comparable areas with which a resident of Washington DC might be more familiar:

<u>Comparable Areas</u>	<u>Approximate Area (km<sup>2</sup>)</u>
Lake Victoria	69,000
Ireland	70,000
Kenya Lake Victoria	4,200
Area inside the Capital Beltway	1,900
Area covered by the water hyacinth shredding tender	15
The Lake Victoria catchment (excluding the Lake)	190,000
Area of Maryland, DC, Virginia and Delaware combined	150,000

One final comparison of water bodies might be useful. The maximum length of the Chesapeake Bay (the largest estuary in the United States) is 200 miles (330 km), and its maximum width is 25 miles (40 km), giving a maximum total area of less than 13,000 km<sup>2</sup>. This makes the Chesapeake Bay about 3 times the size of the Kenya portion of Lake Victoria, but only 20% of the total area of Lake Victoria. The water hyacinth shredding machine itself is not very large, being about the size of an American Minivan passenger car. Several pictures of the shredding machine follow (these pictures are taken in the United States, which effectively refutes the claim made in the allegations that Kenya is the only place in the world in which this technology is used is incorrect):



#### Implementation of the Hyacinth Shredding Pilot

To ensure that the shredding pilot results in data useful to interpreting potential environmental impact of the method on Lake water quality, the LVEMP provides for a water quality monitoring program within and around the area in which the hyacinth shredding will be undertaken. This monitoring program was in place long before Osienala, Reconcile or any other group complained. However, these groups did bring to the Task Team’s attention the fact that the monitoring group’s activities were insufficiently transparent, and needed to involve the Kenyan scientific community to a larger degree than originally envisaged. As a result, a teleconference was held in the World Bank’s Resident Mission in Nairobi on August 13 1999, and the monitoring group was expanded to include impartial scientific advisors. The oversight committee, as it now exists, includes impartial university scientists and the NGO community. Osienala was invited to participate and even attended the first meeting of the committee before withdrawing.

The purpose of the new monitoring program is to ensure that the shredding pilot results in data that will help interpret potential environmental impact of the method on Lake water quality. It also has the objective of making the monitoring program and its results transparent to the outside community of scientists and stakeholders. The monitoring program was therefore expanded as the result of a teleconference held on August 13, 1999. The monitoring now has two parts. The first part is the scientific water quality monitoring program within and around the area in which the hyacinth shredding will be undertaken. This part of the work will be the responsibility of government scientists. The second tier of the management program is an independent group of scientists that will review the design and implementation of the monitoring program to insure its impartiality and scientific rigor.

The area to be monitored by this impartial group of scientists, with the assistance of the ministries responsible for managing water quality of the Lake, is restricted to 1500 ha, which is only a small part of the area affected by hyacinths within the Kenyan part of Lake Victoria. The actual shredding process of 1500 ha is to occur over a 12 month period, as specified in the tender (a draft 12 month workplan from Aquarius is on file). So, the implication in the allegations from Reconcile, Osiendela and Ecovic (Kenya) that the tender will result in 1500 ha of weed being killed and this mass of organic matter becoming available to decomposition in the Lake *instantaneously* is not correct.

Any changes in water quality resulting from the shredding work would be in proportion to the amount of weed shredded, which will be progressive from “0” ha to 1500 ha over the course of 12 months. If localized changes in water quality become apparent during this period, work would not be so fast that the process could not be stopped, moved to a new location or otherwise modified. Although manpower and equipment resources in Kenya to conduct water quality monitoring are very limited (the Project is supporting more than 35 staff from implementing agencies of the LVEMP for MSc and PhD training in Kenya and abroad) there is still the ability to concentrate meager resources into a monitoring program around the limited area affected by the shredding tender.

#### Rationale for Piloting the Shredding Method

If the shredding method works, it is likely to be substantially less costly (perhaps one-tenth as costly) than mechanical harvesting with removal to land disposal (and without the impact associated with landfills). Shredding would then be a tool that could be used (and funded by) local groups and organizations to open landing beaches, clear paths to ferry and cargo terminals so ships could dock and open access to the Lake for fishermen to get their fishing sites easily and quickly. However, it would be only one of a set of management tools that the riparian countries would have at their disposal to deal with this important pest.

The independent monitoring panel formed as a result of the August 13 1999 teleconference with NGO's in Nairobi has met several times and drafted a workplan to be followed by the scientists actually undertaking the work. Sampling has begun and periodic meetings with the monitoring group held.

## ALTERNATIVES TO THE APPROACH TAKEN IN REGARD TO THE SHREDDING TENDER

The water hyacinth is a reflection of the wider problem of eutrophication of Lake Victoria. Water hyacinth can be found in most African Great Lakes. For example, one can see individual hyacinth plants in Lake Malawi, and it is likely that the hyacinth has been present in Lake Malawi at least as long as it has in Lake Victoria. Yet there are no mats of hyacinth in Lake Malawi, and it is not a major problem there. The difference is in the quality of lake water. Lake Victoria is eutrophic and Lake Malawi is oligotrophic. If the water hyacinth were not present in Lake Victoria, then the nutrient bound in the hyacinth mats would, in all likelihood be tied up in phytoplankton or other plants living in the Lake. *The hyacinth do not ADD nutrients as implied in the complaints, they only make use of the nutrients already in the water. The sources of the nutrients in the Lake are surface runoff from the catchment and atmospheric deposition. Control of the eutrophication process has little or nothing to do with water hyacinths, which are really only a symptom of the “illness” (i.e. nutrient enrichment of the Lake) rather than the “illness” itself.*

Given that it would be impossible to do a thorough EA in anything less than 3-5 years or more (the time it would take to collect the minimum amount of baseline data, assuming that the LVEMP suffers from no additional delays), what should be done about the water hyacinth problem in the interim? There appear to be only two possibilities (given that any type of effective, sustainable, control of the hyacinth requires that the method inevitably causes large amounts of the weed to sink into the Lake):

- Possibility One: No management of the water hyacinth problem would be undertaken until sufficient data are available to undertake an EA of the impact of in-situ disposal of hyacinth in the Lake (hyacinth mats sinking into the Lake and decomposing through natural processes). The financial and economic impacts of this inaction would fall squarely on the shoulders of the community that could tolerate this the least. That is, the subsistence fishermen, people working at landing sites, those that depend on fish as the main source of protein in their diet, etc... i.e. the poorest of the poor.
- Possibility Two: A strictly controlled, pilot-level, implementation of different types of control methods is undertaken (including shredding/chopping) along with detailed monitoring of the impact of these methods on the environment. The pilots are kept small enough that even if impact becomes evident (and we monitor closely to detect impact as early as possible), the pilot can be stopped or modified so that the impact never becomes large enough to be evident.

The second option was chosen by the Government of Kenya in regard to water hyacinth control using the shredding method. This decision was based on the need to address obvious direct and indirect impacts on the local population (30 million people within the total catchment), and the economy of the region. But Kenya, Tanzania and Uganda are poor countries and their ability to respond sustainably is directly proportional to the cost of the control methods employed.

The most economic methods of water hyacinth control (be they biological, chemical or mechanical) inevitably result in large amounts of water hyacinth being submerged in the Lake. In fact, the pilot biological control supported by the Project in Tanzania and Uganda appear to have caused the catastrophic death (by submergence) of most of the water hyacinth mats in the territorial waters of these two countries (an area likely to be hundreds of times larger than that involved in the shredding tender in Kenya). This phenomenon has received much public acclaim, and the relief that the problem has temporarily abated is apparent in the attitudes of everyone from politicians and the press to local fishermen and the NGO community around the Lake in these two countries.

#### **4.3 Allegation Number 2- That the preparation/implementation of the Tender was in violation of Bank OD 4.15 (Poverty Alleviation)**

*Summary: This allegation assumes either that i): the Water Hyacinth is a beneficial addition, or at least causes no significant harm, to the economy of the Lake and its people, or ii) that the water hyacinth does cause negative economic impacts, but that the shredding tender either aggravates these negative economic impacts or causes greater negative economic impact than the hyacinth infestation itself. Since the tender is but a controlled pilot, and covers only a very small area in relation to both the size of the Lake and the magnitude of the hyacinth infestation in the Lake, and because the shredding method is but another “in-situ” method of control (similar to biological- the most cost effective and widely supported method of control by riparian governments), it is hard to see any validity in the assertion that the tender our poverty alleviation mandate. When seen from the perspective of poverty, the shredding tender can have only two results- namely, that the method is not economically or environmentally sustainable and as a result will be dropped from the list of “options” that the Bank is willing to support in the Lake, or that the shredding proves to be a suitable option for control of hyacinths in specific areas/circumstances and is in fact a cheaper method of control than more traditional methods of mechanical removal of weed. Both of these results have positive implications for poverty alleviation and do not therefore violate our OD 4.15.*

##### **4.3.1 General Issues of Poverty Associated with Water Hyacinth Infestation of Lake Victoria**

The main detrimental effects of the spreading mats of water hyacinth, as identified during project preparation, are as follows:

- (a) reduction of fish in the lake through de-oxygenation of water, increased turbidity, and reduction of nutrients in sheltered bays which are breeding and nursery grounds for fish, particularly tilapia;
- (b) physical interference with fishing operations, especially in the bays where fish are brought ashore to piers or landing beaches;

- (c) physical interference with commercial transportation services for people and goods on the lake;
- (d) physical interference with access to water supply from the lake, for both urban and rural communities, together with additions to the cost of purifying water with higher concentrations of suspended, decaying organic matter as a result of the hyacinth presence;
- (e) threats to the intakes at the Owen Falls hydroelectric power station in Uganda; and
- (f) provision of a preferred breeding habitat for the alternative host for Schistosomiasis (bilharzia), namely the *Biomphalaria* snail,<sup>13</sup> a home for the vector mosquito for malaria, and a haven for snakes.

These observations in the Project documents are reinforced by the following selected quotes from various newspapers and magazines:

- Time Magazine, 1999- “By the mid-1990’s, the weed’s tangled, floating leaves were blocking harbors in Uganda, Kenya and Tanzania, the countries that border the lake. In Uganda the plant even trapped navy ships! The plant threatened fishing, a big source of food and money for the area’s people. ‘The hyacinth is like a huge carpet,’ says Nelson Ochien Otieno, a Kenyan fisherman. ‘No boat could move to go fishing’;



- People and the Plant (article reprinted from Worldwatch Institute), 1995- “A more recent threat to the lake is the water hyacinth. With deceptive appearance of a lush, green carpet, the hyacinth is a merciless, free-floating weed, reproducing rapidly and covering any uncovered territory... It forms a dense mat, blocking sunlight for organisms below, depleting the low concentration of oxygen and trapping fishing boats and nets of all sizes. The hyacinth is an ideal habitat for snails that cause bilharzia and for snakes.”
- One World News Service, 1997- “The reality is that hyacinth is actively spreading due to the ever increasing level of nutrients within the water... Many soil nutrients are dissolved into the run-off water and this water then flows into the lake which consequently is able to support the massive growth of water hyacinth.”;

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<sup>13</sup> Mary L. Plummer, “The Impact of Water Hyacinth (*Eichhornia crassipes*) on the Snails *Biomphalaria sudanica* and *B. choanomphala*, Intermediate Hosts of *Schistosoma mansoni*”, Field Naturalist Program, Department of Botany, University of Vermont, January 1997. This report documented research carried out in Tanzanian waters of Lake Victoria during 1996.

- Report from National Environmental Management Agency of Uganda, 1997- “The lake in any case already faces a number of problems including over-fishing and use of illegal fishing gear, proliferation of the water hyacinth, pollution of the lake, reduction in the size of habitable lake area due to oxygen depletion, and extermination of valuable fish species particularly the cichlids.”
- The Worldpaper Online (report from Kenya), 1997- “The water hyacinth’s beauty obscures an ugly truth; it thrives best in heavily polluted water. The weed forms a dense mat, blocking sunlight from organisms below, depleting the low concentrations of oxygen and trapping fishing boats and nets of all sizes. It has clogged landing beaches and severely curtailed boat traffic on the lake... In all three countries that share the lake- Kenya, Uganda and Tanzania- the lifestyles of traditional communities that depend on Lake Victoria are crumbling. In Kenya, for instance, the normally sedentary Luo fishermen are turning nomadic, scouring the lake shore for landing beaches and fishing grounds free of hyacinth.”;
- Earth Times News Service, 1997- “Pollution (of Lake Victoria) is only part of the problem. Water hyacinth—a floating weed—has spread all over the lake, trapping small boats and blocking the vital sunlight from reaching submarine organisms while providing an ideal habitat for snakes and snails that cause bilharzia. And that is not all. A few weeks ago, a ship could not dock because the pier at one of the lake ports on the Kenyan side had been sealed off by weed. Five Kenyan village women who went to the lake to draw water for home use could not, and each earned a snake bite.”;
- The Daily Nation (a Kenyan daily newspaper), 1998- “the weed has the following effects on the people (surrounding Lake Victoria): It has inhibited navigation, clogs up irrigation canals, its roots and canopy are breeding grounds for snakes, mosquitoes and snails, prevents fishing, has high evapotranspiration rates, depletes oxygen and nutrients, has led to the death and disappearance of aquatic flora and fauna.”

To help visualize the severity of the problem, the following two pictures are of Port Bell, one of the largest commercial ports in Uganda on Lake Victoria. When the hyacinth reach this level of coverage, ferry and commercial transport vessels are not able to dock and must lay offshore generally until wind clears the harbor of weed.



A description of how serious the water hyacinth problem has become is contained in the introduction to the environmental analysis undertaken on behalf of the Government of Uganda for chemical control of hyacinths. This report (Aquatics Unlimited, USA, 1998) suggests that "...up to 80% of the Uganda shoreline was infested at the time by a permanent fringe of water hyacinth extending out to 10 meters, and beyond in many cases... Large pure stands of free floating water hyacinth up to 600 ha in area have been documented in the northern bays of Lake Victoria". This report further documents the impact to economic life around the Lake:

- "The inability to gain access to some landing sites has caused fish to be brought to boat landings in poor condition and to be rejected by fish buyers. Fishermen working under these conditions take longer to land and use more fuel per catch of fish";
- "docking of ferries at ports is hampered by the compression of water hyacinth between the ferry and pier...". The turn around time of the ferries has increased... At Port Bell for example, the turnaround time on some days has increased by 6-12 hours since the

infestation of the weed, and that more than 1000 liters of fuel may be used for a wagon ferry to break through the weed (Ogenga-Latigo, 1997<sup>14</sup>)... A 1997 United Nations-Department of Humanitarian Affairs brief available over the internet reported that water hyacinth brought Kisumu Port (Kenya) activity to a stand still, leaving rail goods stranded. A World Food Program food consignment destined for Rwanda was reported to have been held up for over a week.”

It is obvious that the water hyacinth infestation of Lake Victoria is a major contributor to poverty in and around the Lake. The LVEMP is an attempt by the riparian governments of the Lake, with the help of the Bank, to begin a process that they hope will alleviate poverty. Particularly, the shredding tender would have the following beneficial impacts on poverty IF the pilot work being supported under the LVEMP identifies suitable applications for the method, and determines its environmental and economic feasibility:

- Bring a mobile, rapid response to heavy infestations by water hyacinths of fish landing beaches, water supply and power intakes, ports and ferry. It should be mentioned that shredding is a much quicker process than mechanical harvesting, and time needed to clear channels to ferries and landing beaches would be much less than with harvesting;
- That this response would be far cheaper and more environmentally sustainable than mechanical harvesting, transport of the weed to an offloading facility on shore (that might require the construction of such a facility, along with roads and other infrastructure), transport of wet and decaying water hyacinth by a large number of truck-trips over public roads, to a land disposal site.

It must be emphasized that, at present, only biological control holds significant hope of large-scale management of water hyacinth in the Lake. Mechanical control of any nature only has relevance for localized problems.

### **4.3.2 Specific Poverty Issues Related to the Allegations**

Several specific and scientifically unusual issues are raised in the allegations by Reconcile, Osienala and ECOVIC (Kenya) regarding design/implementation of the water hyacinth shredding tender and Bank policy regarding poverty alleviation. While we understand the concern of local groups regarding the impact of the tender on water quality, and appreciate that the Project has not communicated adequately with stakeholders regarding both the nature of the shredding tender and the current scientific thinking regarding the limnology and ecology of the Lake, the issues raised have no basis in science.

#### **Bioaccumulation of Toxins**

First, concern is raised regarding bioaccumulation of “toxins” by water hyacinths. The argument is that water hyacinths in Lake Victoria contain hazardous levels of heavy metals and

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<sup>14</sup> Ogenga-Latigo, 1997. Potential for using Water Hyacinth as Mulch and Soil Amendments in Uganda. Paper presented at the water hyacinth utilization workshop organized by the Association of Professional Engineers of Uganda, 20 January 1997.

organic compounds associated with herbicide and pesticide use in the catchment of the Lake, and that chopping will eventually result in “toxic” elements and compounds being released back into the water of the Lake. Research is cited in Osienala’s letter (with no reference as to the actual paper, who the author was, or in what context the research was undertaken) indicating that water hyacinths can accumulate heavy metals and other elements/compounds. That plants accumulate toxic materials of all sorts is a concept that has long been accepted. What is absent from this paragraph of the allegation is an indication that there is something in the water that water hyacinths are indeed accumulating.

All available information on the Lake suggests that heavy metals and potentially toxic organics (herbicides/pesticides and the like) are not currently present in Lake Victoria in levels that are of concern. These materials must come from somewhere, and existing data suggest that agricultural inputs are very low in East Africa compared to elsewhere in the developing world. Those industries of any size that exist in the Catchment are almost exclusively agriculture based, with effluents that are high in BOD, but contain little or no heavy metals. This situation could change, particularly if the economies and the investment climate in these riparian countries were to improve. However, heavy metals and herbicide/pesticide pollution are not a major problem in the Lake at present.

#### Increased Likelihood of Blue Baby Disease

The complaint also mentions the increased likelihood of nitrate related “blue baby” disease occurring around the Lake, presumably because of the decomposition of the protein portion of water hyacinths killed by the shredding process. This allegation is patently ridiculous. Blue baby disease is associated with infants usually under the age of 6 weeks (infant digestive physiology changes after 6 weeks, resulting in limited ability to absorb nitrates) consume fluids containing high levels of free nitrates. For such high concentrations to be possible, the Lake would have to be a cesspit of untreated organic waste of a type very high in nitrogen (human waste, poultry/pig farm ponds, etc). Blue Baby disease might be a consideration when discussing the groundwater under a megacity of more than 11 million people or more, in which 90% of the human waste is disposed of in leaching pits or directly to water courses (such as Jakarta), but Lake Victoria is not such a case.

While Lake Victoria is eutrophic, nitrate levels in its waters would be about 100 times less than the nitrate levels established in the United States (a conservative 10 mg/l) to protect consumers against nitrate-related “illnesses”<sup>15</sup>. Potential impact on livestock is even more remote. The suggested standard to protect livestock against nitrate related illness is 100 mg/l.

In fact, it is difficult to identify any source of nitrogen large enough to result in the catastrophic increase in nitrate levels presumed in the complaints. Specifically, water hyacinth plants are 95% water. For every 1000 kg of water hyacinths shredded, no more than 50 kg dry matter would fall to the bottom of the lake. Since most of the nitrogen in plants is in the form of protein, and protein probably represents no more than 10% of the dry weight of the water hyacinth plant, one would therefore get only about 5 kg of nitrogen-bearing protein for every

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<sup>15</sup> The World Lakes Database reports data from 1985 suggesting that nitrate levels in Wynam Gulf are 0.1-0.2 mg/l

1000 kg of water hyacinth shredded. But the actual amount of nitrogen in protein is but a very small part of the whole protein molecule (the rest made up mainly of carbon, hydrogen, oxygen and some sulfur), so the actual amount of nitrogen involved is very very small.

Nitrogen is a necessary macronutrient of plants (whether those plants grow on land or in the water), and as such is in high demand. It is likely that even the small amount of nitrogen liberated by the shredding process would be quickly removed from the water column by phytoplankton and other plants.

### Increased Likelihood of Eutrophication

The allegations suggest that there is likely to be an increase in eutrophication resulting from decomposition of the 1500 ha of water hyacinth to be shredded under this tender. While this issue is more relevant than that of “toxic material” and nitrate pollution discussed above, it is unrealistic to believe that the impacts mentioned in the letters from Reconcile and Osienala would occur. The tender is a pilot, and while there may be some change in water quality in the immediate vicinity of the shredding, the pilot was designed to be large enough to bring about water quality changes as a test of environmental acceptability, if such are really likely to occur, but small enough that any such changes would not have a significant impact on the environment. The area involved in the tender is not sufficiently large to cause any significant change in trophic levels in the Lake.

Oxidation of organic waste in a well-mixed water body results in a slow, steady, release of nutrients. Reduction of waste (as occurs below a strong thermocline that mixes with oxygenated surface waters only irregularly) can result in an “oxygen debt” in lower layers of a lake, and in the case of rapid turnover (i.e. mixing), can reduce oxygen levels in the whole water column to a concentration potentially lethal to aquatic organisms. The questions that are relevant are, i) will decomposition of shredded water hyacinths occur in a well oxygenated environment relatively free of strong vertical temperature stratification, or ii) will decomposition be in a reducing, anoxic, environment below a strong thermocline? The following facts point to the former (no increase):

- The area involved in the hyacinth shredding tender is not large enough to affect the general water quality of the Lake (the area involved, 15 km<sup>2</sup>, is less than 0.4% of the area of the Kenyan portion of Lake Victoria);
- Water hyacinths only take advantage of their environment to grow and multiply. Hyacinths do not add nutrients to the Lake. Death and decomposition of hyacinths in an oxygenated environment would lead to a gradual remobilization of the nutrients that were in the Lake in the first place- minus nutrients that are tied up with bottom mud and that require much longer periods to be re-mobilized into the water column.
- Remobilization of nutrients from hyacinths killed in the shredding process is likely to be gradual, as the Kenyan portion of the Lake is relatively shallower than the rest of Lake (as pointed out in the letters from Osienala and Reconcile) and relatively well oxygenated.

### **4.3 Allegation Number 3- That the preparation/implementation of the water hyacinth shredding tender was in violation of Bank OP 10.04 (Economic Assessment of Investment Projects)**

*Summary: The LVEMP Water Hyacinth Control component was prepared in response to perceived negative economic impact of the water hyacinth infestation on the economic welfare of local people (and the national economy). The preparation team verified a direct cost of the hyacinth infestation of US\$25-40 million, present value. The cost of the component is only 10% of this amount, spread over a 5-year implementation period, during which time the cost to the local and national economy of the hyacinth infestation is also increasing. The preparation team also investigated the cost of the various control methodologies. This work is continuing, as the LVEMP is supporting a series of pilots testing control methodologies. Preliminary work suggests the following costs of the various methods currently being used in the riparian countries to control the weed-\$3,000/ha for mechanical removal, \$1,000/ha for shredding, \$100-300/ha for chemical control, and \$30-\$50/ha for biological control. The allegation that the preparation and supervision team did not exercise due diligence in regard to the economic assessment of the water hyacinth component of the LVEMP, and the economic costs and benefits of the water hyacinth shredding tender, is not correct in substance or fact.*

#### **4.3.1 Background to the Economic Analysis**

The following events were relevant to progress on the water hyacinth control program:

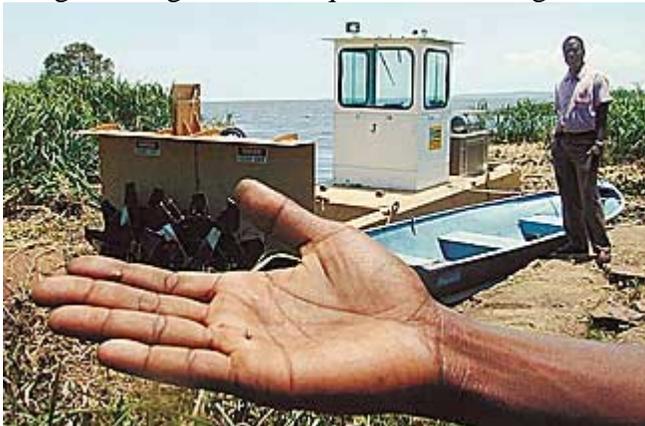
(a) in Uganda, an Emergency Control Program was under way, with funding from various donors, before the project was declared effective. Under the Emergency Control Program, two different mechanical methods of hyacinth removal went forward: first, at the Owen Falls hydro-electric dam, with stationary harvesters to which small pusher boats brought the hyacinth, with all equipment supplied by the Netherlands Government; and second, at Port Bell, with an active floating harvester, containers, barges, and a heavy wharf-side crane to lift containers on to trucks, which dumped the hyacinth along a road close to the lake shore; with all equipment supplied by the Government of Japan. The stationary harvesting method used at Owen Falls was technically efficient because the moving waters of the Nile River brought the floating hyacinth to the dam face and compacted it there, where it could be removed. The heavy harvesting equipment at Port Bell was also technically efficient, eventually clearing the area around the port, although the costs of operating the equipment were very high – estimated at more than US\$3,000 per hectare of hyacinth removed<sup>16</sup> – and there were doubts about the financial sustainability of this approach.

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<sup>16</sup> Estimates based on data gathered in the field during September 1998, and those presented in an internal memo of the Uganda Ministry of Agriculture, Animal Industry and Fisheries, Eng. B.N.K. Wadda to Commissioner of Fisheries, "Operation of the Integrated Japanese Water Hyacinth Harvester, Port Bell," 19 August, 1998.

(b) in Uganda, under the Emergency Control Program, an Environmental Impact Assessment (EIA) that reported results of trials on two herbicides (2,4-D and glyphosate) used on water hyacinth was published in June 1997, and discussed at a public hearing on July 30 1997. The EIA was subsequently deemed to fall short of what was required, and was rejected by the National Environment Management Authority (NEMA) in early September 1997. That led to a public disagreement between NEMA and the Ministry of Agriculture, Animal Industry and Fisheries over use of herbicides, but the outcome of the debates and discussions is that to date, none of the three countries implementing the Lake Victoria Environmental Management Project has yet proceeded with chemical control methods, although they have investigated them on several occasions. The EIA estimated the costs of herbicidal control of water hyacinth to be in the range of US\$100-300 per hectare, in line with experience in the USA.

(c) All three countries proceeded with multiplication and release of the two species of weevils. In the preparation phase of the LVEMP, all three countries had tested weevil releases to ensure that they would not spread to crops. In Uganda, releases in Lake Victoria took place as early as December 1995, and as a result they had a longer time to have an impact in the Uganda waters of the Lake than in the waters of the other two countries. Although water hyacinth was widely observed to be bearing leaf lesions characteristic of weevil attack by late 1997 and early 1998, there were few signs yet of the significant reduction in hyacinth biomass hoped for under the weevil release program. The situation changed dramatically in Uganda by early 1999, when the weed had become so weakened by the weevil infestation that large mats of hyacinth sank into the lake, assisted by wave action and other physical conditions. A substantial portion of the Uganda shoreline has remained clear of water hyacinth since, although it is uncertain what its future development will be. The above-mentioned EIA estimated the cost of biological control at US\$28 per hectare, but detailed calculations have yet to be made based on the operational experience so far in the lake (the following picture compares a weevil sitting on the hand in the foreground against the Aquarius shredding machine- from a Time Magazine article).



(d) In November 1996, the Bank supported a proposal, financed by a Danish Trust Fund, to test out the manufacture of biogas from a combination of water hyacinth and sugar cane tops. It was initiated in Uganda, near the Owen Falls dam, where enough hyacinth was being removed from the Nile river (by the Netherlands-financed harvesters), there were extensive sugar cane plantations nearby, and the Nile Breweries company close to the dam was a convenient venue for testing generation and use of bio-gas on an industrial scale.

(e) Project funds were also used, in a limited way in all three countries at selected sites, particularly fish landings, for manual removal of hyacinth by local communities. Funds were used to purchase of wheelbarrows, hand tools, and protective gear, but using project funds to pay local community members to remove the hyacinth was discouraged, as described earlier.

(f) The weevil release program was slower to begin in Kenyan waters of Lake Victoria. During 1997, the Government came under attack from persons claiming to speak for lake shore communities, who accused the Government of failing to deal with the water hyacinth problem that was of overwhelming economic importance for those who earned their livelihoods from fishing and freight activities on the lake. The relevant issue to the complaint is that managers need a number of different tools to control the hyacinth infestation of the Lake. While biological control is the cheapest and probably most effective method of managing the impact of water hyacinths, it is a very slow method of control. Other methods, that can be employed in limited areas like landing beaches and ship docking terminals, and that can be applied with immediate results, are needed. These tend to be the high-cost, mechanical methods, including chopping/shredding.

#### **4.3.2 Estimates of Economic Impact by Water Hyacinths**

At the time of appraisal, in late 1995, the following estimates were made of the direct costs of the detrimental effects imposed on the lake communities by the water hyacinth infestation:<sup>17</sup>

- (a) maintaining a clear passage for ships to dock at Port Bell in Uganda: US\$3-5 million p.a.;<sup>18</sup>
- (b) cleaning intake screens at the Owen Falls hydroelectric power plant at Jinja in Uganda: \$1 million p.a.;
- (c) losses in local fisheries from accumulation of water hyacinth at fishing beaches and landing sites around the lake making it difficult or impossible for fishing boats to be launched or recovered: US\$0.2 million p.a. but with a very serious local impact;
- (d) loss of the beaches as a water supply for domestic, stock and agricultural purposes: US\$0.35 million p.a.;
- (e) loss of supply or increased maintenance costs in urban water supply schemes because of blockages of the water intakes by water hyacinth: US\$1.5 million p.a.;
- (f) small-scale horticultural irrigation schemes rendered useless because of blockages of channels and pipes with hyacinth: no costs were attributed to these losses but they were regarded as important from a distributional viewpoint since such schemes were being developed to help women in the poorer lakeshore areas.

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<sup>17</sup> Global Environment Facility and World Bank, *Kenya, Tanzania, Uganda, Lake Victoria Environmental Management Project*, Project Document (Report No. 15541-AFR), June 1996, Technical Annex, pp. 41-42.

<sup>18</sup> For the six months June-December 1995, accounts of the Uganda Railways Corporation recorded water hyacinth-related expenses at Port Bell amounting to US\$2,349 million (US\$2.3 million equivalent). Uganda, Transport Rehabilitation Project (Cr. 2587-UG), (Railway Component), World Bank Supervision Mission February 1996, Annex to the Aide-Memoire.

The total of these direct costs attributable to the water hyacinth (*at levels present at the time of appraisal*) was estimated to be **US\$6-10 million p.a.**, with a present value of **US\$25-40 million**. Assessment of the costs of the various methods of water hyacinth control is an ongoing process.

It is clear that the analysis of the economic and financial cost of the water hyacinth infestation of Lake Victoria justified the intervention requested by the Governments of Kenya, Tanzania and Uganda. The cost of the water hyacinth control component of the LVEMP in Kenya is less than 10% of the total, present value, cost of the hyacinth damage ALREADY incurred. A review of the cost of mechanical removal of weed in Port Bell (\$3,000/ha) and the cost of chopping/shredding water hyacinths in Kenya (\$1,000/ha) provides *clear justification for undertaking a pilot-level assessment of the physical and environmental feasibility of using this method in Lake Victoria*.

#### **4.4 Allegation Number 4- That the preparation/implementation of the water hyacinth shredding tender was in violation of Bank OD 13.05 (Project Supervision)**

*Summary: The core of this allegation is that the task team did not ensure, through its supervision, an adequate level of transparency regarding the objectives and implementation of the water hyacinth shredding tender. Although the government managers of the Project need to be more open, significant progress is being made, and the Bank is taking steps to help the Government achieve an appropriate level of transparency. Steps taken by the Bank include responding to queries about the tender made by NGO's, holding of a 3 hour teleconference with stakeholders, and open discussion with local communities and NGO's during supervision mission. However, achieving the desired level of transparency will take time, particularly given the difficult task of bringing the NGO community and the Government together.*

The letters from Osienala and Reconcile complain that the Bank has not adequately responded to questions raised by them in previous correspondence. The Bank has written to Professor P. Anyang' Nyong'o (who has links to both Reconcile and Osienala) on January 28 1998 and September 11, 1998, in response to queries that are strikingly similar to those in the letter to the Inspection Panel (letters are available on file). Our responses reflect the best available technical input the Bank could offer on this point.

The Bank also hosted a 3-hour teleconference with NGO's, the Project scientific and management staff, the Task Team in Washington, members of the Aquarius team involved in the shredding, and the Country Office staff on August 13, 1999. The proposal to include an impartial oversight group in the monitoring program was made during this teleconference and accepted by the Meeting (there were no dissenting voices raised to this proposal during the meeting, which was attended by Mr. Odhiambo of Reconcile, and Prof. Anyang' Nyong'o, author of the letter to the Bank that led to the teleconference. Osienala was invited but did not attend). A copy of the minutes of the teleconference is attached.

The current Bank supervision team has been in place since June 1998, and has been on mission to Kenya twice since that time. On each occasion, the team has met with local NGOs to discuss Project implementation, including Osienala. We also have regular telephone and email communication with Osienala and Reconcile. We recognized fairly early on that this was probably not going to be enough (particularly in Kenya where issues can easily move from substance to political). Since supervision budgets are very limited, the initial response of the Task Team was to field “mini-supervision missions” by the NGO-Coordinators in our Resident Missions in Tanzania, Kenya and Uganda. Unfortunately, shortly after we initiated these socially/public participation-oriented missions, the NGO-Coordinator position in Tanzania was made redundant.

We are still running “mini-missions” between our full supervision missions (supervision budgets allow one, two-week mission by the Washington members of the Task Team to each of the three countries participating in the LVEMP each year) in all countries, including Tanzania. These mini-missions are made by our NGO Coordinators in the Kenya and Uganda Resident Missions. In general, the benefits of these mini-missions to Project implementation in Tanzania and Uganda are fairly obvious. However, this type of supervision in Kenya, particularly in regard to the water hyacinth shredding tender, is more problematic. Consequently, together with a general realization that more input will be needed to define the scope of future interventions in Lake Victoria, the Task Team is encouraging the development of a common “vision” of local needs and expectations by stakeholders regarding resource management in the Lake and its catchment.

The current plan is that the vision statement will be developed as part of the ongoing LVEMP. It is to be sponsored by the Government (with Bank support) and has the objective of reaching consensus on needs and expectations that would be shared by all local residents, NGOs, and political leaders having an interest in, or responsibility over, Lake Victoria and its catchment. Identification of the realistic aspirations of the stakeholders will allow this Project (and more importantly, future activities) to respond to a universally accepted vision. It is currently planned that consultants would work with communities to develop this long-term vision over the next 12 months.

## Section 5 Summary

While the Task Team appreciates the concern expressed to the Inspection Panel by Reconcile, Osienala and Ecovic (Kenya), we do not believe that the Task Team has violated any operational or policy directive of the Bank. Specifically:

- OD 4.01 (Environmental Assessment): A Project-level environmental analysis, as required by OD 4.01 for category “B” projects, was undertaken as part of project appraisal. A summary of this Environmental Analysis is contained in the Staff Appraisal Report, which became a public document on Board approval. The water hyacinth shredding tender is at the heart of a detailed evaluation of the environmental impact of the *method* of shredding. A common way of undertaking an EA is to try the method through controlled experimentation. The size of the shredding tender is such that the chance of significant impact is minimized, but large enough that a detailed water quality/limnology monitoring program around the area

of weed shredded would detect any changes associated with the activity. This is in full compliance with the letter and spirit of OD 4.01.

- OD 4.15 (Poverty Alleviation): That the water hyacinth infestation of the Lake is a major environmental and economic calamity is indisputable (verifiable by economic analysis, articles in scientific and public journals and newspapers and in person by visiting fishermen who have not been able to exercise their occupation for months because the hyacinth mats are preventing them from getting to the open Lake). The LVEMP is a direct positive response to a significant negative impact on the economic well-being of people living around the Lake and in its catchment.
- OP 10.04 (Economic Assessment): There are no “good” solutions to management of the water hyacinth problems of Lake Victoria. The hyacinth infestation is a reflection of the problem of eutrophication of the Lake, and not the source of eutrophication. As such, whatever is done to minimize impacts of the water hyacinth will only be transient solutions, as the source of the problem (nutrient enrichment) will always be in place, and the hyacinths will always be a menace. Since the problems are chronic, economic viability of methods used to manage the infestation become paramount. The shredding, in-situ disposal, method costs one-third as much as traditional harvesting and removal of water hyacinths, and has the potential to be much lower still in cost. If the method proves to be environmentally acceptable, it would be a useful tool in the war against the hyacinth in Lake Victoria.
- OD 13.05 (Supervision): Although there is obvious room for improving openness by the Government project managers, the task team is exploring ways in which improvement can be made, and has itself tried to be as open to stakeholders as possible. Letters written to the Bank have always been answered to the very best of our ability, and the supervision mission always make every effort to meet with affected communities and local NGOs.

Appendix One: Minutes of the Teleconference of August 13, 1999

**Kenya  
Lake Victoria Environmental Management Project  
Water Hyacinth Control Component**

**MINUTES OF MEETING WITH STAKEHOLDERS ON THE MECHANICAL  
SHREDDING AND CHOPPING OF WATER HYACINTH IN LAKE VICTORIA**

A meeting was held on Friday, August 13, 1999 to listen to concerns expressed by various stakeholders on the environmental, economic and social impact of the mechanical shredding and chopping of water hyacinth in Lake Victoria. A list of attendees is attached.

Mr. Bill Lane from the World Bank began the meeting, explaining the philosophy and integrated nature of LVEMP. He described the root causes of the hyacinth infestation and the need to address those, as the weed was only a symptom of the eutrophication of the lake. He also said that the chopping tender was just one of the methods in the toolbox needed to address the problems of the lake.

Professor Orata described studies, which showed that the decomposition of weed would not endanger life forms of the lake, as continuous replenishment of oxygen occurs. He said that the decay of the weed would have no lasting effect, and that the system of the lake would equilibrate. Dr. Ochiel mentioned that the weevil was also having an impact on the weed, and that large mats of weed which have sunk on the Uganda coast have not had an adverse effect on the environment. Oxygen levels had not been depleted.

Hon. Nyong'o said his concerns were two. First, that the job of eradicating the weed be well done. Secondly, that the operation be in the long-term interest of the lake. Why not rely on the biological control? Has there been systematic analysis comparing the various options for control of the weed? Why hadn't locally developed methods been considered? If the people wanted the weed disposed of onshore, why not do it? What are the arguments?

Mr. Lane described the costs and problems of removal to shore.

Prof. T. Odhiambo expressed his opinion that the chopping and dropping would be harmful to the lake, and that removal options had not been fully explored. Mr. M. Odhiambo asked for an analysis of dumping on shore versus chopping and dropping. Mr. Kaane asked that local expertise be involved in the operation, and that there be an integrated approach. Local capacity should be built during the operation. Mr. Ong'wen felt that the myriad uses for the weed had not been explored and that economic growth could be encouraged by removal and utilization.

Mr. Robertson explained that the technology being brought into Kenya was tested all around the world. The operation would be combination of chopping and harvesting, suited to local needs. Prof. J. Ojiambo added that the tendering was done carefully and thoroughly, and that monitoring would be constant. He asked for a chance to try the technology with fine tuning of the process as it proceeded.

The meeting requested that the level of public information and transparency of the operation, and of the project in general be increased. It was proposed that joint monitoring and supervision of the contract be conducted, by an independent technical review panel in addition to and independent from the project monitoring team. This team would participate fully in field supervision and technical review of monitoring data.

#### Meeting Attendees

Prof. Thomas R. Odhiambo	Hon. President, African Academy of Sciences
Harry L. Kaane	Director, KIRDI
Gerald R.S. Ochiel	KARI/LVEMP Water Hyacinth Component, Kisumu
Waweru Gitonga	KARI Water Hyacinth Control Component, Muguga
Willy Mutunga	Kenya Human Rights Commission
Francis Oguya	Information Officer, LVEMP Secretariat
Odour Ong'wen	EcoNews Africa
Ngogu Barua	EcoNews Africa
Kassim Owango	Kenya Chamber of Commerce
Reuben Chirchir	Operations Officer, LVEMP Secretariat
Prof. J.B. Ojiambo	Project Coordinator, LVEMP Secretariat
Prof. Duke Orata	Dept. of Chemistry, U. of Nairobi
Neil Robertson	Project Manager, Aquarius Systems
David Dauffenbach	Aquarius Systems
Charles M.M. Ondieki	Imatech Int. Co. Ltd.

Anyang' Nyong'o

Private Enterprises Resource Services

Michael Ochieng Odhiambo

Reconcile

Harold Wackman

Kenya Country Director, World Bank

Richard Kaguamba

Natural Resource Mgmt. Specialist, World Bank

Christine Cornelius

Senior Operations Officer, World Bank

On Teleconference from Washington:

Bill Lane

Task Team Leader, LVEMP, World Bank

Francisco Pichon

Natural Resource Mgmt. Specialist, World Bank

Philippa Amiri

Programme Assistant for Kenya, World Bank