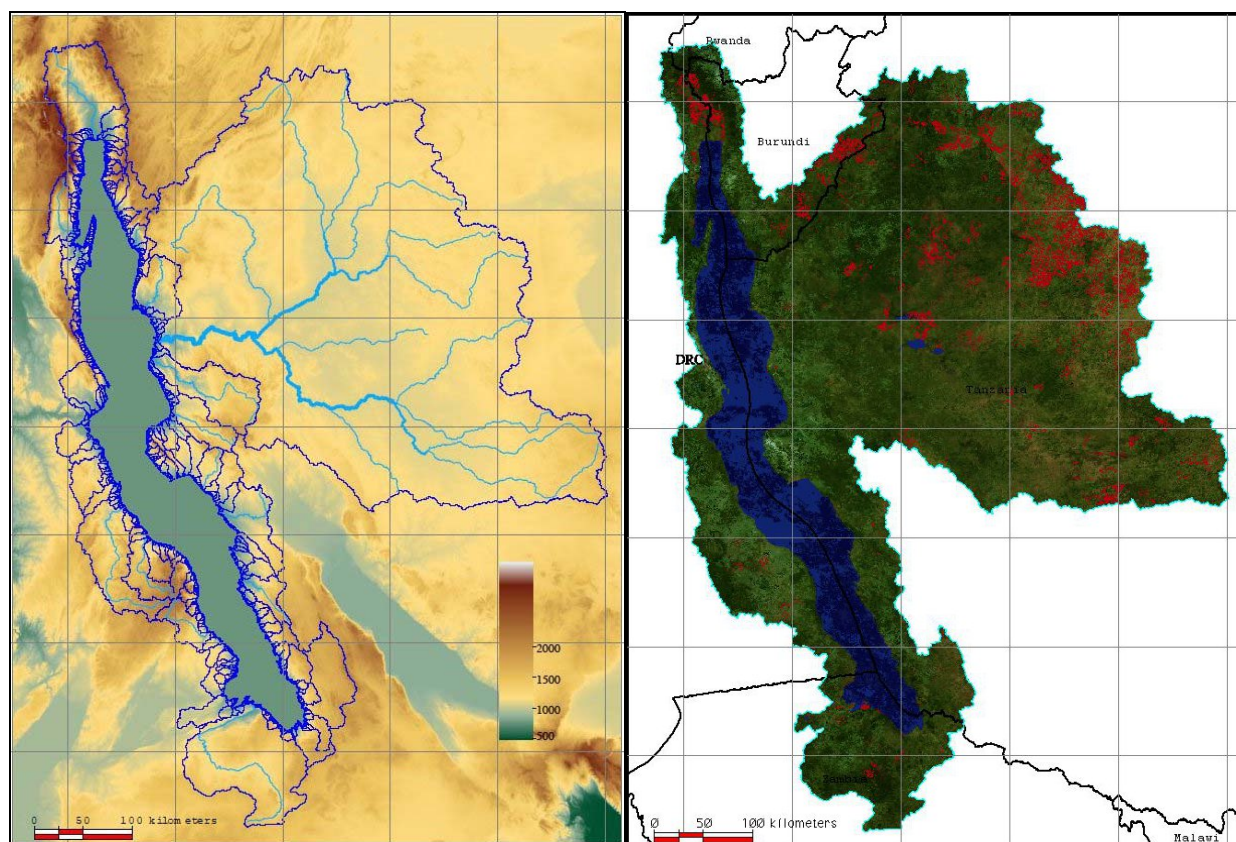




Regional Workshop Report



GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET



Lake Tanganyika Regional Workshop on Lake Basin Catchment Management

World Agroforestry Centre (ICRAF), Nairobi, Kenya
1st – 2nd July 2010

ACRONYMS

AfDB	African Development Bank
AfSIS	Africa Soils Information System
AHI	African Highlands Initiative
AVHRR	Advanced Very High Resolution Radiometer
CDM	Clean Development Mechanism
CES	Commoditised Environmental Services
COS	Opportunity Costs (in environmental services)
CIS	Co-Investment in environmental Services
CBP	Carbon Benefits Project
CoV	Coefficient of Variation
DRC	Democratic Republic of the Congo
ES	Environmental Services
EVI	Enhanced Vegetation Index
FT-NIR	Fourier Transformation Near Infrared Reflectance Spectroscopy
FT-MIR	Fourier Transformation Mid Infrared Reflectance Spectroscopy
GIS	Geographic Information System
GEF	Global Environment Facility
ICRAF	World Agroforestry Centre (International Centre for Research in Agroforestry)
IUCN	The World Conservation Union
LANAWRUA	LAke NAivasha Water Resource Users' Association
LBM	Lake Basin Management
LDPSA	Laser Diffraction Particle Size Analysis
LT	Lake Tanganyika
LTA	Lake Tanganyika Authority
LTB	Lake Tanganyika Basin
LVB	Lake Victoria Basin
MODIS	Moderate Resolution Image Spectrometer
MSc	Master of Science
N	Nitrogen
NCU	National Coordination Unit
NDVI	Normalised Difference Vegetation Index
NOAA	National Oceanic and Atmospheric Administration
NRM	Natural Resource Management
PES	Payment for Environmental Services
PRESA	Pro-poor Rewards for Environmental Services in Africa
PMU	Project Management Unit
R&D	Research and Development
RELMA	Regional Land Management Unit
RUPES	Rewards for, Use of and shared investment in Pro-poor Environmental Services
TB	Terabyte

ACRONYMS (Cont'd)

ToR	Terms of Reference
TXRF	Total X-Ray Fluorescence Spectroscopy
UNDP	United Nations Development Programme
USAF	United States Air Force
WRMA	Water Resources Management Authority
WRUA	Water Resource Users' Association
WWF	World Wildlife Fund
XRD	X-Ray Diffraction Spectroscopy

TABLE OF CONTENTS

ACRONYMS.....	2
TABLE OF CONTENTS	3
1. INTRODUCTION.....	4
2. PROCEEDINGS.....	4
2.1 DAY 1 Thursday 1 st July.....	4
2.2 DAY 2 Friday 2 nd July.....	12
3. CONCLUSIONS.....	15
ANNEX 1 – List of Participants and Workshop Programme.....	17
ANNEX 2 – Draft Papers and Slide Presentations.....	18
ANNEX 3 – ICRAF's Terms of ReferenceANNEX 4 – Participant's Workshop Evaluation	19
ANNEX 4 – Participant's Workshop Evaluation	20

1. INTRODUCTION

Lake Tanganyika is a globally significant hotspot of freshwater biodiversity, harbouring more than 1500 species of plants and animals, of which over 600 are endemic to the Tanganyika basin. The lake contains almost 17% of the world's surface freshwater and serves as an irreplaceable source of clean water, transportation, and economic opportunities for an estimated 10 million people in its riparian countries.

The Lake Tanganyika ecosystem and its economically important resources are increasingly threatened by environmental problems including pollution, unsustainable fishing, degradation of natural habitats and climate change effects. One of the most pervasive environmental problems is sedimentation related to unsustainable agricultural practices and watershed deforestation. Efforts to monitor deforestation-related sedimentation and improve catchment management in the Lake Tanganyika basin have thus far been very limited.

On behalf of its partners, UNDP/GEF invited ICRAF (The World Agroforestry Centre) to assist in providing advice and training through a series of workshops on sustainable catchment management and sediment control in the Lake Tanganyika catchment basin, in the framework of the UNDP/GEF Project on Partnership Interventions for the Implementation of the Strategic Action Programme for Lake Tanganyika (hereafter referred to as UNDP/GEF Project on Lake Tanganyika).

This Report summarises the proceedings, presentations, and discussions of the Lake Tanganyika Regional Workshop on Lake Basin Catchment Management held at the World Agroforestry Centre (ICRAF), Nairobi, Kenya from the 1st – 2nd July 2010. This was originally scheduled to take place in Burundi, but the location was changed due to national elections there, to Nairobi. This first workshop (in a series of nine) was a two-day regional workshop on lake basin catchment management for policy makers and managers from the riparian countries surrounding the lake. It included a situation analysis and quantification of impact of deforestation on the lake including novel historical trend data, analyses and images. It also focused on the transfer of experience and lessons from management of the Lake Victoria basin and other transboundary water bodies and experiences of landcare initiatives at a range of scales.

2. PROCEEDINGS

2.1 DAY 1 Thursday 1st July

0830 Welcome to ICRAF - August Temu (Director of Partnerships)

Prof. Temu, the Director of Partnerships at the World Agroforestry Centre welcomed the participants¹ on behalf of Dr. Dennis Garrity, the Director General. He noted the long genesis of the Lake Tanganyika Project, and the importance of the work. He mentioned starting with an inventory of both physical, social, and cultural factors, and the importance of local ownership.

¹ A list of workshop participants and the information pack including the Programme is attached as Annex 1.

Further he noted the importance of making problem solving and rehabilitation around the lake into business opportunities, and involving urban areas. Thirdly he mentioned the affordability of activities sustainably in the long term and the importance of its improving the welfare of local communities. He noted the holistic approach of the project, and the importance of good communications between different sectors, and the challenge of sustaining this beyond the project.

0845 Introduction to workshop - Fergus Sinclair

Dr. Fergus Sinclair reiterated the welcome to the participants, and highlighted the need for participatory involvement, starting with perceptions of land cover change in the Lake Tanganyika Basin. A brief survey was carried out, with participants asked to indicate on a form² percentage forest cover change in the catchment area of the riparian countries, and where these changes may have taken place.

The participants were then introduced themselves to the Plenary. French speakers were assured that translation of documentation would be made available in addition to the instantaneous translation taking place during the workshop.

0900 Land Cover Change and Degradation Hotspots in the Lake Tanganyika Basin – Thomas Gumbricht

Dr. Thomas Gumbricht presented his preliminary analysis³, noting that ground-truthing work along established research protocols is ongoing in Tanzania and Zambia by MSc degree fellows⁴ attached to ICRAF. Global data has been gathered concerning the Lake Tanganyika Basin for the purposes of this analysis; data sets are as assembled by country as they are several terabytes (TB) in size.

Starting with the Digital Elevation Model used to define the watershed boundaries, the spatial and temporal variation in rainfall based on USAF acquired data and two rainfall stations (large variation in years was noted). This rainfall data was normalized by comparing to the long term average, and country contributions. The changes in climate, particularly temperature rise over the last hundred years, were noted, with models conflicting, but largely indicating that conditions will get drier in the future.

Long term vegetation changes were shown, as indicated by available satellite data from two sources. Firstly, from 1981-2009, NDVI data which is of coarse 8 km resolution (NOAA-AVHRR) was used, and secondly, higher resolution 250m MODIS EVI data from 2000-2008. Annual variations in vegetative growth were taken into account, to show all vegetative growth at those resolutions. This data from both sources separately processed (to enable cross-checking): firstly they were normalized and the linear trend analyses indicated an overall decrease in vegetative cover over the last 28 years. A coefficient of variation (CoV) analysis was then carried out to measure the year to year stability of vegetative cover to further cross-check these findings. A further rain use efficiency analysis was considered, but over-wet years' data would have needed to be discarded. These were combined to highlight the 5% greatest degradation hot spots: the most significant of these in terms of likely

² Annex 2.1, attached

³ Annex 2.2, attached, with slide presentation.

⁴ It should be noted that these degree fellows are separately financed through ICRAF, and represent additional ICRAF support to this project.

sediment transport appear to be steep areas of DRC and Burundi which drain to the Rusizi River at the northern end of Lake Tanganyika. Greater areas of degradation were indicated in the north-western part of the Tanzanian catchment area, but far from the lake itself.

Landsat images at 30m resolution were then used to analyse the degraded areas, and the presentation focused on the northern part of the catchment in Burundi and DRC that feed the Rusizi River, when are indicates as targets for interventions to reduce sediment transport. The growth of the Rusizi Delta provides further evidence to support this. A spectral analysis of the soil of the delta was used to seek hot spot areas of origin of the delta soil in the catchment, and this provided further verification. Lastly protocols for field sampling and verification of findings were then outlined.

Questions and Comments:

1. Q: Random errors were shown at the lake shore, are these significant? A: These are due to coarse resolution NDVI data capturing reflectance from the lake as well as the land surface. These do not coincide with land degradation hot spots.
2. The effects of topography on rainfall use efficiency common to mountainous areas were not found in the catchment, but it was clarified that topography has a strong effect on erosion.
3. Q. Students work covering all the catchment area? A: This is randomized according to standardized protocols to ensure statistical validity and applicability across the wider area. It was clarified that they were not only collecting information on vegetation, but also in local perceptions of drivers of land use change, capturing local knowledge concerning appropriate interventions
4. It was clarified that an analysis on sediments and flows in rivers was not carried out, nor indeed is it part of ICRAF's ToR. Some suitable data to assist such an analysis is available from LTA.
5. Q. How can data being accessed? C. 2005 was indeed a drought year, and heavy rain in 2006 visibly carried away increased amounts of sediment (data from these 2 years was used for a tentative rain use efficiency analysis). A: It was noted that the vegetative response in 2006 was poor, and this would appear could be a result of such increased degradation. It was clarified that data will be distributed at the country level workshops on DVD.

There was an interesting difference between the recorded perceptions of vegetative changes from participants, and the analysis carried out by ICRAF and presented by Dr. Gumbrecht. In general, participants had focused on their country, and the significance of the changes close to the north of Lake Tanganyika was not as apparent. An analysis will now be carried out on the differences between these.

1020 Tour of soil laboratory (Mercy Nyambura)

Ms. Mercy Nyambura showed the participants around ICRAF's cutting-edge Soil-Plant Spectral Diagnostics Laboratory⁵. This aims to develop soil-plant spectral analytical methods and diagnostic tools for rapid, low-cost, high-throughput analysis – and demonstrate their application for evidence-based agroforestry and land management. These spectroscopic techniques have opened up analysis over spatial extents previously impossible. They provide evidence-based decision support at multiple scales, notably when coupled with GIS and remote sensing to enable science-based diagnostic surveillance approaches to agricultural and environmental management. The participants were briefed on technologies including Fourier Transformation (near- and mid-) Infrared Reflectance Spectroscopy (FT-NIR/MIR), Total X-Ray Fluorescence Spectroscopy (TXRF), X-Ray Diffraction

⁵ Information sheet attached as Annex 2.3

Spectroscopy (XRD), and Laser Diffraction Particle Size Analysis (LDPSA) – all of which require little or no sample preparation. The laboratory is an important part of ICRAF's involvement in Africa Soil Information Service (AFSIS) – which is developing an online, practical, timely, and cost-effective soil health surveillance service to map soil conditions, set a baseline for monitoring changes, and provide options for improved soil and land management across the whole of Sub-Saharan Africa.

1045 Governance issues, Landcare and Participatory Approaches - Delia Catacutan

Dr. Delia Catacutan's presentation⁶ then highlighted the aims of lake basin management, and three key challenges: appropriateness of technologies, the need to build social contracts, and governance deficits. She highlighted the need to use diagnostic questions and the legal framework, of which the Convention for Sustainable Management of Lake Tanganyika is a key part. It contains the relevant principles: 'precautionary', 'polluters pay', 'preventative', 'participation', 'fairness & equity', but the 'users pay' principle is vague or lacking (but is applicable at the local level). The convention has highlighted activities with adverse impacts, including conversion of forested and wetland areas – and areas of redress. What is the level of implementation of the Convention?

A matrix for analyzing land use and governance was shown and management paradigms for addressing issues: commoditised environmental services (CES), ES opportunity costs (COS), and co-investment in ES assets (CIS) and how they can be applied. Examples from the Landcare Programme were given as an attractive platform for natural resource management (NRM) in COS & CIS, and from RUPES & PRESA (CES & COS) in which ICRAF has extensive experience. Further experience was shown on CIS in East Africa on promulgation of local by-laws based on traditional cultural norms for effective local NRM – these have proven effective in Tanzania of the Lake Tanganyika riparian countries. In conclusion, a three-pronged approach is indicated for improved lake basin management under the Convention, through a local community-based approach, and to national programme and policy support.

Questions and Comments:

1. Q. Explain 'Diagnostic questions', and 'users pay' principle? A. Business taxes, for example: pay for the resource you extract) C. Level of implementation of convention is tricky, generally a lot, although little perhaps on the environment. Q. Rights to pollute? A: An economic perspective, and when countries set their standards – e.g. 1). Acceptable levels (limits) of discharge 2). Carbon offsets (reduce emission by certain amount).
2. C. Expected more information based on the 3 years of LT experience. We have a local level knowledge gap.
3. Q. Land tenure across catchment? A. We do not have data – Tanzania probably more advanced, and tenure is a very important element of governance arrangements. Other forms of tenure are also important, so all of regulatory framework around land and trees is relevant for consideration. We are very keen to pursue available data for the lake basin.
4. C. Before workshops at national level – contact institutions to help develop good national plan, and so that they can prepare data in advance of the workshops. LTA can shed light on the state of implementation of the convention. National legislation is also very relevant for addressing LBM in riparian countries in addition to the convention – although some specific policies, rules, and

⁶ Annex 2.4

regulations for the lake need to be developed. The convention was approved 10 years ago, and does need to be updated. Grass-root communities are very much involved in LTA activities. A. The importance of addressing data gaps after this workshop in preparation for the national workshops was acknowledged: we are at the beginning of the programme and will need help from LTA's national partners in gathering relevant data.

1145 Tools and approaches for selecting appropriate tree species – Fergus Sinclair

Dr. Sinclair's presentation⁷ began by emphasising that we are seeking appropriate agroforestry interventions to increase tree cover and reduce sediment flow – and using support tools for selecting relevant tree species. An overview was given of ICRAF's available toolkits⁸ including: Tree Seeds for Farmers toolkit (have printed, softcopy and web versions), the Tree Diversity Analysis, and Molecular Markers For Tropical Trees can be used at the high tech end to improve management strategies for certain species. We should not see trees as part of a one-off intervention, but as an on-going and evolving process. We also have a number of databases which can be accessed online⁹: the Agroforestry, tree seed suppliers, and wood densities, amongst others.

Vegetation maps help us understand natural tree speciation (and climax vegetation), which can also help selection for rehabilitation. At finer scales, vegetation maps become quite heterogeneous, and guide species selection closely. The context of climate change changes some of these considerations for the future (modeling species distribution), and further ecological 'filters' for suitable species apply. We can do lots of work with the bio-physical information, but need to combine this with a systematic collection of local knowledge in relation to tree suitability and use (including the classification systems they use): conventional wisdom is that farmers do not know causal effects (e.g. volatilisation – decrease in N of organic fertilizers over time), but often they do, and understanding what farmers do and do not know helps increase the knowledge base and adapt interventions appropriately. Scientists and farmers views and priorities do not necessarily coincide, and must be explored to understand appropriately. Appropriate methods also need to be used to develop local understanding of appropriate scientific measures (e.g. visual ways of showing nutrient leaching to promote adoption of appropriate interventions).

Questions and Comments:

1. C. Importance of livelihoods – if trees do not enhance them, then not sustainable. A. Farmers when they select species themselves tend to select species which perhaps lower ES but increase livelihoods. Tendency to select few species with fast above-ground growth in the past – long term considerations, such as better root growth are often better for ES.
2. Q. What about grasses? A. Trees will be in the landscape for decades, so important to select species. Grasses and other annuals are easier to select and adapt, as with other interventions.
3. Q. Knowledge gained over many years of Agroforestry – e.g. increasing soil fertility through nitrogen-fixing trees? A. Meta analyses from 90 trials indicate doubling of yields, but high variability, and many factors to take into account – careful not to over-generalise – phosphorus is also a limiting factor – trees can capture certain elements, and prevent them from being leached, and keep them in the system.

⁷ Annex 2.5

⁸ Copies of these were made available at the workshop to all participating national partners.

⁹ www.worldagroforestry.org

4. Q. High density systems? A. Databases can generate species selection to suit farmers needs. More than 50% agricultural land has 10% tree cover.
5. Q. Why carbon in 2012 at end of this project, why not sooner? A. In part, the CBP is developing a gold standard for measuring carbon sequestration on smallholder farms, so we need to wait. The CDM restrictions have meant that only 3 CDM projects have ever been approved in Africa to date.

1330 Agroforestry interventions for controlling sediment flow and enhancing livelihoods
(incorporating lessons from the African Highlands Initiative, AHI) – Jeremias Mowo

Dr. Mowo's presentation¹⁰ highlighted population and urban centres supported by the catchment, some of the resources extracted; the major threats including soil erosion and sedimentation, and effects of anthropogenic activities including sedimentation and climate change. Agricultural and livestock production have been important, but new players coming in include oil and gas prospecting. Appropriate interventions are possible if all stakeholders get involved.

AHI saw similar problems to those facing Lake Tanganyika: population pressure, land fragmentation, poor agricultural methods, low input levels, and limited adoption of proven technologies. Problems also resulted from inappropriate R&D approaches, and from poor institutional support – resulting in poor landscape management, erosion, siltation of valley floors and water bodies, declining yields, and increasing poverty.

NRM constraints transcend field boundaries and therefore landscape level solutions are needed. Other realizations of AHI on NRM include: It is labour and knowledge intensive, multi-sectoral, and multi-stakeholder (farmers are key), and multi-(research)-institutional. There is a need to recognize indigenous knowledge, and to keep farmers attracted to innovations with linked multi-beneficial technologies (e.g. tree fodder species to stabilize terraces, but also increases livestock, which provides manure, improves soil fertility, which increases production), and particularly links to markets – hence integrated solutions of sectors (technologies, social, policy, institutional, markets), and components (soil, crops, livestock, agroforestry).

AHI results: 20% of households adopted soil conservation, applying integrated approaches, farmers awareness increased, and improvements were seen in livelihoods and incomes.

Lessons for LTB Catchment: Aim to conserve soil and applied fertilizers in soil conservation measures of which agroforestry can be a major part. The benefits were outlined, as were applications, and suitable tree species (and mix over time, where appropriate). Lastly, how to measure progress was discussed – need to identify indicators of success, from baseline, monitoring, and household surveys.

Questions and comments:

1. Q. Pilot testing – how in project with short time frame? A: Yes, but important to base decisions on proper scientific evidence, and no matter how convinced that interventions are applicable, one must test any new interventions.
2. Q. ICRAF's policy on invasive species? A: We do have a policy on invasives; there has been criticism in the past, and we are well aware of the problem. Most crops are exotic, so one needs to

¹⁰ Annex 2.6

be explicit, clear, and careful; and in most agricultural uses, we are outside natural systems. A new change is that trees species diversity is higher in AF now, which is generally less risky. Even within species there is a need to manage genetic diversity which is important (e.g. Neem – *Azadirachta indica* population in Nigeria results from 2 or 3 trees introduced 200 years ago)

3. Q. Need ICRAF in Burundi to support interventions – landslides a real problem, and need scientific advice on tree-based solutions. A1 (JM): ICRAF active in E. Africa, recently reinforced office in Rwanda which we aim will also cover Burundi and E. Congo – currently have a project financed by Concern Worldwide. We can link up with government and donors on proposals for additional work. A2 (FS): This particular project is a limited contract, clearly specified. This activity falls under the LTA, and ToR do not presently include land-use work in Burundi, but they would be welcome to join the DRC workshop or other country workshops. ICRAF can backstop and provide materials and training, but do not have funding to spend large amounts of time in riparian countries presently. Significant that ICRAF does have other work going on in all countries concerned and which could assist this project. A3: (UNDP-GEF, SM): In developing UNDP-GEF support to the LTA, many were made aware of the project, and stakeholder consultations held where governments decided priorities. The Gov. of Burundi decided to prioritise pollution, but deforestation over time emerged as a major issue – hence invitation to Burundian delegation to benefit from benefit from knowledge generated. Burundi could also benefit from other donors including AfDB for additional project opportunities.

4. Q. Who approves ICRAF's workplan for implementation? A: ICRAF are not making any interventions whatever, and only advising PMUs and national programmes. ICRAF is not implementing, but is providing support – so these do not arise as issues.

5. Q. Participants lack background information on ICRAF. A: We had assumed that everyone was aware of the ToR of ICRAF's contract – these were circulated at Uvira Conference of Ministers in 2009, and recently at Conference of Ministers in Dar es Salaam this year. These communications problems can be rectified if we identify bottlenecks.

6. C: Could problem of communication, but people do not currently understand things in the same way. Need to make ToR available to participating countries¹¹.

1500 Depart ICRAF on Bus, on board talk on Naivasha and Sasumua catchments - Thomas Gumbricht

At the Rift Valley viewpoint, Dr. Gumbricht described the formation of the Rift Valley and how it has affected the flow of rivers in the region into the Naivasha and Sasumua Catchments.

1700 Arrival Naivasha

1930 Agroforestry for watershed management: lessons from the Lake Victoria Basin – Catherine Muthuri

Highlights of Dr. Muthuri's presentation and related draft paper¹² include:

- Rotational woodlots on degraded terraces proved to be effective in reducing soil loss.

¹¹ This was distributed to LTA and all stakeholders in English and French in 2009 prior to contractual agreement, a copy of ICRAF's ToR is attached as Annex 3.

¹² Both attached as Annex 2.7

- Participatory research – Agroforestry trials involved farmers and researchers.
- Technologies successful in one area may not be successful in another area due to climate and other environmental factors
- Studies showed that bushland has the lowest rate of soil loss, indicating that it might be better to leave bushland as it is.
- Restoring degraded grazing land is another high priority.
- Maintaining cover crop on degraded sites was effective in reducing runoff.
- *Tephrosia candida* produced higher biomass compared to other interventions
- Use of *Gliricidia* proved effective in keeping down *striga* weed.
- River bank erosion resulting in giant gulleys in lower Nyando basin. RELMA promoted the use of bamboo to protect riverbanks but no measurements were taken to gauge effectiveness. Bamboo planted in gulleys traps water and holds sediments.
- Improved fallows represent only a beginning in efforts to restore degraded lands in L. Victoria basin. A more sustained and patient approach needed to identify and test new agroforestry options and other land use for the systematic land degradation of the basin.

Questions, Comments and Discussion:

Dr. Muthuri invited the participants to compare LTB with LVB:

- Sedimentation was found to be an issue in common, especially due to steep slopes in LTB.
- HIV/Aids is a major issue affecting populations in both basins.
- LVB agroforestry interventions involved extension workers. In contrast, L. Tanganyika is surrounded by steep slopes, with few roads, thereby making it difficult for extension staff to access.
- Burundi lakeshore also has steep slopes, but compared to Tanzania, accessibility is easier due to presence of a good road. Initiatives so far in Burundi include planting of trees, setting up hedges and managing grazing land. Challenges: high birth rate and returning refugees result in over farming and could hinder adoption of agroforestry practices.
- DRC lakeshore varies from north to south but degradation is a major cause of concern. In the north, farming taking place on steep slopes resulting in sediments flowing into the lake. In the central area, around Kalemie, there is not enough land for agroforestry and there should be negotiations with communities for such interventions to take place. Traditional chiefs should be consulted as well as they allocate agricultural land. The southern parts are not very degraded.
- On the Tanzania side of L. Tanganyika, land disputes between communities results in unclear/insecure tenure meaning that no interventions can take place there. Demand for fuel wood to dry fish is another factor contributing to degradation.
- Soils in the LTB have a higher susceptibility to erosion compared to soils in LVB, though Thomas Gumbrecht said there wasn't enough data to prove this scientifically.

2.2 DAY 2 Friday 2nd July

0830 Paying for Catchment Environmental Services - Eugene Reeksting, Vice Chairman of L. Naivasha Water Resource Users' Association (LANAWRUA).

The main challenge in L. Naivasha basin was over abstraction of water. LANAWRUA got into the PES programme because they could see the benefits. WRUAs (Water Resource Users Associations) were formed to ensure proper management of water supplies. WRMA trained the people on the legal requirements of conducting the project. All 12 WRUAs in L. Naivasha basin now want to join similar schemes as the Wanjohi and Upper Turasha WRUAs that LANAWRUA works with. Erosion has stopped at the two areas where PES programme is taking place. Now, the intention is to encourage more people to join the programme.

Changes in land use, eg riverine grazing, were observable immediately. Removal of eucalyptus trees and replacement with other species, resulted in an increase in water flows from springs. It took about a year to see real benefits in the watershed.

Cash for paying farmers to come from water users at L. Naivasha. Many donors also want to join in. LANAWRUA provided the initial funds. However, the project is self sustaining as more people see the benefits of participating. The risk of farmers not living up to the terms of the contract is low.

As WRMAs tend to cover a large area, while each WRUA covers a small area, it might help to have an umbrella body of WRUAs in each basin for purposes of coherence.

If approved, the sub-catchment management plan will result in greater funds from water levies going back to LANAWRUA for tree planting.

Question from the audience: what has been done about people previously depending on firewood, grazing and riverine cultivation? Pilot project had 50 members, where it was explained that riverine grazing and cultivation will not be allowed. Inappropriate species, such as eucalyptus, will provide firewood in the short term while long term fuel wood supplies can come from trees currently being planted. Napier grass has been planted on riverine areas in order to provide fodder to livestock, therefore it's no longer necessary to send cows to the riverbanks for grazing.

Though LANAWRUA is the buyer, the project is run by CARE and WWF, who did the scientific research that culminated in the PES scheme.

0850 Paying for Catchment Environmental Services - Obadiah Ngigi, representative of CARE/WWF in Naivasha¹³.

Lake Naivasha is very important economically, hence the necessity to ensure sustainable use. Criteria for selection of target sub basins:

- Water yield
- Sediment yield

¹³ Slide presentation attached as Annex 2.8

- Population density
- Potential buyers and sellers
- Land use/land cover dynamics

Five areas initially selected. The two hotspot sites were at Wanjohi/Geta and Turasha. These two sites were found to contribute a lot of sediments into the lake.

Steps in setting up the Naivasha PES:

- Community mobilization
- Selection of hotspot farms through participatory methods.
- Mapping and marking of 360,000 square metres for intervention.
- Supplying planting material: napier grass (KK1 variety) to 565 farmers, 80,000 agroforestry seedlings, 10,000 seedlings (upfront costs).
- Issuing 470 farmers with vouchers worth US\$17 to be redeemed for agro-inputs.

Challenges: slow rate of adoption, high demand for change, complex land ownership, low buy-in from some potential buyers eg Kengen

0945 Depart Naivasha on bus, commentary on landscape – Thomas Gumbrecht / John Mwangi – stop at Turasha River

Thomas explained the differences in landscape between the areas around L. Naivasha and the areas consisting of the upper catchment. Most of the sediments come from the upper catchment due to intense agricultural activity. The lower catchment is mostly semi arid and agriculture is less intense.

During a stopover at Turasha River, Josephat Nyongesa and Obadiah Ngigi, both from CARE/WWF explained how the PES scheme has reduced sedimentation.

1145 Delivering Catchment Environmental Services – Representative for the Upper Turasha WRUA in Lake Naivasha catchment (sellers)

The chairman talked about how and why they joined the PES scheme. The WRUA has already received about US\$4,160 which will be passed on to farmers in form of vouchers. Each farmer participating in the PES scheme will get a US\$17 voucher that can be redeemed for agricultural inputs. The agreement between the sellers and Lake Naivasha buyers has scope for flexibility. For example, the volcanic ash cloud over Europe in 2010 stopped flights and caused heavy losses to horticultural growers at the lake. On water abstraction from upstream sources, the chairman said his WRUA is aware of all cases because users have to get a license. However, the money goes to WRMA instead of the local WRUA. Each WRUA can only get funds from WRMA after submitting a sub-catchment management plan.

Questions and comments:

1. Q. How do they deal with farmers who are not participating yet, as we saw along the way, they are neighbours with farmers implementing PES activities? A. The chairman said that the farmers who

initially refused to participate have seen the benefits from their neighbours and they now want to join.

2. Q. How sustainable is it to rely on donor funding, such as that from CARE/WWF? A. The chairman said that though there may not be money in the long term, they are trying to get farmers to understand that the measures they are taking on their farms will be beneficial in future.

3. Q. How do they ensure quality control of data? A. The chairman said that farmers have been trained to read instruments. They also make use of volunteers who are paid with grass strips and tree seedlings. The chairman added that his WRUA is about to complete a sub-catchment management plan where there will be provision of funds for hydrological monitoring.

1200 Arrive Dam, presentation and discussion of water issues and payments for environmental services – John Mwangi

Using GIS maps as well as landmarks, John Mwangi showed the group the limits of the Sasumua watershed. He also explained how water is fed into the reservoir from distant sources through a series of pipelines and tunnels. There was an additional discussion on the grazing of livestock at the banks of the reservoir.

1400 Wrap up discussion on the implications of material presented and discussed for catchment management in relation to Lake Tanganyika and the ICRAF contract in support of this.

Fergus Sinclair sought advice on how to proceed with the national workshops scheduled for September, October and November 2010. The country workshops should be participatory, to be held at sites where there is some work taking place (action research, hotspot approach).

The **Tanzania** team said that they will be busy in September due to project evaluations but can work with Saskia and Gabriel to help determine a suitable date for the workshop. Who will be invited? Who handles the logistics? UNDP Tanzania should be kept informed. Fergus explained that the role of ICRAF is to support PMUs on appropriate interventions and not to implement them itself. This involves finding out the interaction between policy and governance as well as field studies. Thomas Gumbrecht said that GIS data is available for various hotspots and suggested that, for the national workshops people who know GIS should be invited so that they can afterwards be able to do analysis in-house.

For **DRC**, Fergus said that appropriate people should be invited for various specialties. There are currently no student researchers at DRC. Discussions to begin with WWF to get French speaking people who understand the methodology we are using. Daniel Nzyuko, WWF representative from DRC, said that the national workshop (the next workshop to take place) should be combined with the inception workshop. He will consult with colleagues in Kinshasa. Fergus said that workshops could be different in each country. There is need for spacing between national workshops.

The DRC team suggested that the national workshop be held at Uvira instead of Kinshasa. There is a research centre at Uvira with 20 scientists and a suitable database. ICRAF could assist with pilot sites in order to develop models. Fergus told the DRC team that a visit to Uvira should be arranged soon.

A participant from **Zambia** stated his country's needs.

Fergus revisited the TORs with regards to the workshops. There will be two workshops: the first will be for design, and the second one will be held a year later for purposes of monitoring. However, there is no budget for monitoring (by ICRAF). There should be a mix of participatory and other forms of monitoring. Information is required on what monitoring is actually taking place. The more data is available for monitoring, the richer the analysis.

What should be expected from ICRAF? Fergus and Saskia explained that ICRAF is playing a facilitating role, based on the ToR. ICRAF will provide information on the design of interventions. Hotspot analysis will be made available to national agencies. In some landscapes, there will be an analysis of what interventions need to be put in place.

The **Burundi** team expressed frustration with the project. Not enough attention is paid to Burundi despite the fact that many of the threats to L. Tanganyika originate from Burundi due to high population density putting pressure on the land. The team requested that Burundi be integrated fully so that, in the next meeting, Burundi can participate as a stakeholder rather than as an observer. On this, Fergus said Burundi should be invited to the DRC workshop.

Dialogue should continue and the ICRAF ToR made available to all. The report on this workshop will be submitted in one week.

Participants' Workshop Evaluation forms which had been distributed earlier were collected. The results were collated and participant's responses analysed using the SPSS statistical package. The results of this analysis are attached as Annex 4. To briefly summarise these findings: the mostly highly rated presentation was that on land cover change given by Dr. Thomas Gumbrecht, closely followed by that on Agroforestry interventions given by Dr. Fergus Sinclair. Over 55% of participants felt that presentations given were very important, 50% felt that the workshop had strengthened their existing knowledge, 55% rated the audio-visuals used as excellent, 55% that the field visit was very relevant, and 50% felt that the timing of the visit was appropriate in the context of the overall programme.

3. CONCLUSIONS

The draft land cover change analysis reveals hotspots of degradation in the Lake Tanganyika Basin, and those of greatest concern are those in the north close to Lake Tanganyika in DRC and Burundi. Although Burundi had earlier chosen to focus on pollution aspects, the analysis indicates that Burundi needs to be more closely involved in this project than hitherto foreseen, and it is recommended that the UNDP-GEF project considers how best this can be effected.

As well as the more technological aspects, the workshop covered governance and participatory approaches to land care, tools and approaches for selecting tree species for improved ecosystem and other functions, experience from other regional agroforestry approaches in controlling sediment flow, and lessons from watershed management in the Lake Victoria Basin. The field visit demonstrated practical application of these approaches, and that catchment environmental services

can be delivered by smallholder farmers who can be compensated for the ecosystem services they support.

Despite earlier widespread consultation and dissemination, it was clear that there was some confusion as to ICRAF's role in the overall UNDP-GEF project. ICRAF's ToR was shared with all participants and it was clarified that the current contract limits ICRAF's role to provide training, advice, support, and some backstopping in relation to lake basin catchment management, design of catchment management interventions, and the participatory monitoring of their implementation, to the national units responsible for the project's implementation. It should be noted that ICRAF has provided additional resources at its own considerable expense, including acquisition and analysis of a vast amount of remote sensing data, its prior research results and proven methodologies, and a statistically valid ground truthing exercise of the land cover analysis combined with socio-economic analyses in support of both this workshop and its findings and of the national workshops which will follow.

The next workshop is due to take place in DRC covering spatially explicit methods for identifying degradation hotspots and classifying vulnerability in the lake basin catchment and selection of the DRC demonstration site combining ecological, socio-economic and governance criteria. The participants from DRC recommended that it take place in Uvira. The recently formed PMU with WWF-ESARPO will need to locate suitably qualified French-speaking persons to implement the ground-truthing protocols which have been applied by degree fellows in Tanzania and Zambia.

The national design workshops will follow, and it was apparent that participants were eager to see the application of these technologies and methodologies of lake basin catchment management demonstrated and applied in a practical way in their country. It is envisaged that these will be based on the chosen demonstration sites covering 1) site characterization (based on presentation and analyses of trends in tree cover for the area) that place the demonstration sites within their overall national lake basin context and provide landscape analysis for underpinning design of interventions 2) participatory validation with local communities of the landscape analysis and back-processed images 3) participatory design of agroforestry interventions to mitigate sediment loading and enhance local livelihoods including tree species selection and market diagnostics, 4) capacity strengthening in application of a land care approach and 5) design of participatory monitoring strategies and baseline assessment.

ANNEX 1 – List of Participants and Workshop Programme

ANNEX 2 – Draft Papers and Slide Presentations

ANNEX 3 – ICRAF’s Terms of Reference

ANNEX 4 – Participant’s Workshop Evaluation