Potential Rehabilitation of Rugezi Highland Wetlands:

John D. Liu, Environmental Education Media Project (EEMP)

Dec. 2008

The Rugezi highland wetlands are a unique and important ecosystem where functionality or dysfunction has large local, regional and global consequences.

The waters from the area feed the White Nile and the Congo Rivers. Hydroelectricity generated from this area is an important source of energy for Rwanda. When fully functional this area is an important carbon sink as well as a vital hydrological reservoir.

However, there is significant degradation to this vital system. Forested slopes have been converted to farmlands. The reduction in natural forest cover in the highlands has caused a general reduction in ecosystem function. Reduction in biodiversity, biomass and accumulated organic matter have caused, the water table to drop, soil moisture, evaporation and transpiration rates to be altered, and nutrient cycling to be reduced.

This type of ecological disturbance has immediate and long-term implications for the local people, downstream in the river catchments, and globally. The consequences are accumulative, with erosion continuously reducing fertility and high sediment levels muddying the streams and clogging hydroelectric infrastructure.

Economically the impact is also great. The productivity of agriculture continuously erodes with the soil, causing poverty and food insecurity to increase each year. Econometric evaluation suggests that the ecosystem function of the intact ecosystems is worth vastly more than the meager agricultural productivity on the deforested slopes.

Scientific Description of the Problem:

The biophysical disruption to the Rugezi highland wetlands consists of a reduction of biodiversity through de-vegetation of the natural forest cover and replacement by unproductive marginal agriculture, often on hillsides. The reduction in vegetation has led to a decrease in accumulated organic matter in the soil. Continuous disruption has reduced carbon uptake, nutrient cycling and the infiltration and retention of rainwater. Heavy sedimentation carries away the fertility of the region and lowers natural hydrological regulation downstream.

Without intervention the situation will continue to deteriorate with outcomes becoming worse the longer the trends continue. Logical outcomes if the area is not restored include – decreasing fertility and productivity, increasing poverty, lowered hydroelectric potential, flooding, mudslides, long-term downstream dysfunction, changing weather patterns and large-scale climate impacts.

Identifying the Value of the Ecosystem Function

- Biodiversity
- Carbon Sequestration
- Nutrient Cycling
- Infiltration and retention of rainfall
- Sustainability

Taking on the task of rehabilitating the Rugezi Highlands provides an opportunity to base economic theory on fact. When monetary value has been placed on products that can only be produced when there is water, fertility and genetic strength then it is ridiculous to not value water, fertility and biodiversity. By showing the local people, Rwanda, East Africa, Africa in General and the World that value is contained in ecosystem function the rehabilitation of the Rugezi Highlands has the opportunity to lead the world toward a more sustainable definition of economics and to test a model for ending subsistence agriculture by making the people the solution.

Building Consensus:

It is easy to see why the Rugezi highland wetlands are important. Scientists, government officials, conservationists, multilateral agencies, bi-lateral donors, downstream neighbors and local communities ***can all unite*** around the rehabilitation of this important ecosystem.

Potential of Rehabilitation:

The problems in the Rugezi can be seen to be largely caused by unsustainable agricultural methods with meager returns altering an priceless ecosystem by removing the natural vegetations cover thus decreasing the ecosystem function. This suggests that if alternative and sustainable livelihoods could be found for the people and they actively participated in conservation efforts there could be a much better outcome.

Several very favorable conditions exist that suggest that the potential for rehabilitation of the Rugezi Highlands is good. First of all there is sufficient water and solar radiation to generate a great deal of biomass. Scientifically and technically it is possible to restore most if not all of the hydrological functionality by restoring the vegetation cover.

Methodology for Rehabilitation:

Long-term and ongoing research into rehabilitation projects such as China's Loess Plateau Watershed Rehabilitation Project suggest that an integrated approach that combines providing alternative and sustainable livelihoods for the people with the rehabilitation of ecological function to the area is required to restore the area.

The wellbeing of the people, sociologically, economically and psychologically must be considered and restored along with infiltration and retention of rainfall, carbon sequestration, natural nutrient cycling and biodiversity.

When the unique nature and the functionality of the Rugezi Highlands is understood then it will be widely recognized that this area is very valuable. Employing the local people as the conservators of this valuable nature will give them meaningful work that is worth more to the society, economy and the world than the agricultural work they will have to give up.

By acknowledging the value of the region and its ecological function in relationship to continental hydrological functioning of the White Nile and the Congo Rivers as well as the contribution of Carbon Sequestration to reducing human impact on climate change provides a justification for the transfer of significant investment from all over the world to assist in the rehabilitation effort.

By successfully collaborating in rehabilitation of this area a new model of international cooperation in restoration can be shown. This could help many other areas to design ways out of poverty for millions of people and restore ecosystem function over broad areas.

What is needed for the Rugezi Restoration to succeed:

- Valuing the Natural Ecosystem Function
- Adequate Scientific Understanding and Technical Design
- Rwandan Government Approval
- Local Government and Community Voluntary Participation

- Sufficient Investment – External Capital committed over a sufficiently long timeframe to achieve a transformation of both the ecosystem function and the economic situation for the local people.
- Long-term commitment to restoration of the region.

Design Considerations:

Participatory Assessment to achieve voluntary participation: - This is a well know social science technique that engages external experts together with the local people to inquire into the problems and their solutions. It is my experience that it is possible to achieve consensus about change if sufficient effort is expended.

I would only recommend voluntary restoration with the agreement of the local people. I would strongly oppose relocation of people far from where they are or the mandatory acceptance of external directives. The main reason to avoid strict top down solutions is that they are unlikely to work.

The smallest political grouping in Rwanda is the Umudugudu and offers a tremendous opportunity to effect fundamental change. The Umudugudu is generally 600 to 1000 individuals in 100 to 150 households. If through participatory assessment the community decided to voluntarily change it would be able to experiment with new education, employment models that would be of benefit far beyond this local areas.

The Akagari is the second level of political grouping in Rwanda and represents 5 or 6 Umudugudu. The Rwandan government and the ecological logic suggests that potentially 2 Akagari would be involved in a comprehensive project in the Rugezi highlands. This would suggest a population of between 6000 and 12,000 people. I would assume because of the remote nature that the numbers would be around 8000 individuals but this would have to be exactly calculated.

Although exact design cannot be determined because it will have to be determined with the local people some broad goals could be defined. Clearly for this to work subsistence agriculture would have to end, so everyone involved would be committed to the creation of sustainable livelihoods for the entire community.

By committing to end subsistence agriculture it would be possible to simultaneously re-design the economic activity of the villages while restoring ecosystem function to area, specifically through designation of all non-productive agricultural lands as ecologic land and re-vegetating these areas. Re-vegetation would increase infiltration and retention of rainfall, carbon uptake, nutrient cycling and restore and protect soil stability and biodiversity.

Here are some likely ***logical conclusions*** of collaborate design that could emerge from participatory assessment.

- ***Design and Build entirely new Village Infrastructure***

- Methane from Biomass
- Sanitation - Vacuum Collection
- Sidewalk systems - Utility canals below
- Water Delivery - Water recycling
- Housing re-design based on local materials
- Full Healthcare coverage – clinic / regional hospital

- ***Sustainable Agriculture***

- Reduce the percentage of people in agriculture (from majority to minority)
- Use only sustainable agriculture
- Composting
- Worm Farming
- Mushrooms

- ***Conservation Livelihoods***

- Erosion Control
- Biodiversity protection
- Identification and propagation of indigenous and endemic species
- Tree Nurseries
- Tree Planting (pioneer species)

- ***Educational Change***

- Research Center
- Broadband Internet
- Education – Inquiry

- ***Everything becomes employment***

- Eco-Tourism
- Hotels
- Restaurants
- Theaters
- TV and Radio
- Libraries
- Food Processing
- Essential Oils

Initial Partners:

The Rwandan Government has understood the importance of ecosystem function to building a sustainable future for the country and the people but needs external technical and financial assistance to realize this aim.

The local communities in the Rugezi Highlands have the opportunity to voluntarily choose the path of reform and in recognition they would receive external technical and financial support.

The Environmental Education Media Project's "Earth's Hope" initiative is seeking to stimulate and document Integrated Poverty Eradication and Large-Scale Ecosystem Rehabilitation projects to both accomplish local rehabilitation goals and to provide needed models for global ecosystem restoration.

GDR Carbon - The largest Chinese CDM Consultancy Company – is preparing to encourage Chinese individuals and organizations to offset their carbon by contributing to a new carbon offset fund. This fund would have to design and implement conservation projects. The Rugezi Highland Wetland restoration would be a highly visible project that would benefit the local people, the downstream lands and peoples affected by the White Nile and Congo Rivers, global ecologically and the climate.