Developing Markets for Ecosystem Services in Rwanda

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Outline

- Introduction
- WCS strategic approach to PES development
- WCS Rwanda pilot projects to date
- Challenges

INTRODUCTION

- Rwanda's economy is largely dominated by the agriculture sector, which employs more than 90 percent of the economically active population and accounts for more than 43.2% of GDP

- This key sector is experiencing two major constraints: a decline in productivity, land shortage and fragmentation due to soil erosion and intensive land use

- Growing levels of rural poverty and deforestation through encroachment on remaining natural forests which are major watersheds of the country and home of rare and endangered species

INTRODUCTION

Targets for the EDPRS in 2012 and Vision 2020

Priority area	Indicator	Baseline 2006	Target 2012	Vision 2020 targets
Raise agricultural productivity and ensure food security	% of agricultural land protected against soil erosion	40	100	100
	Area under irrigation (hectares)	15,000	24,000	
Improve environmental management	Forestry coverage (%)	20	23.5	30
	Reduction in annual wood consumption (million cubic meters)	8.9	6.2	4.45
	Critically degraded ecosystems mapped, assessed and rehabilitated (%)	50	80	
	Access to safe/clear water (%)	64	80	100

INTRODUCTION

- The Water Resources Law (2008) provides for sustainable use, conservation, protection and management of water resources

- Improved protection and management of protected areas and wetlands is one of the objectives of the national strategy and action plan for the conservation of biodiversity in Rwanda

- Major challenges :
  - **The current investment level from the Government doesn't meet the expected environmental (forest /protected areas/wetlands) management needs**
  - **Opportunity costs of conversion of forests and wetlands to agricultural lands are too high**
  - **Conflicts policies and priorities**

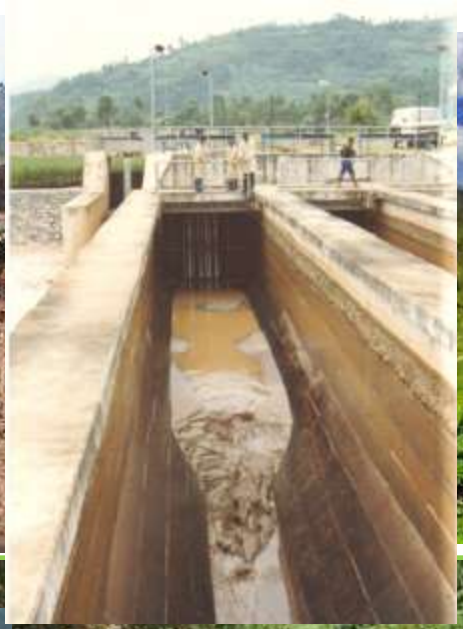
INTRODUCTION

- Past and current approaches to deal with the problem of environmental degradation has mainly focused on law enforcement and expanding the physical infrastructure through engineering projects (irrigation and hydropower dams)

- Farmers have been expanding agricultural land into the fragile valley – bottom lands and fragile marginal lands on steep slopes previously used for pasture and/or woodlots

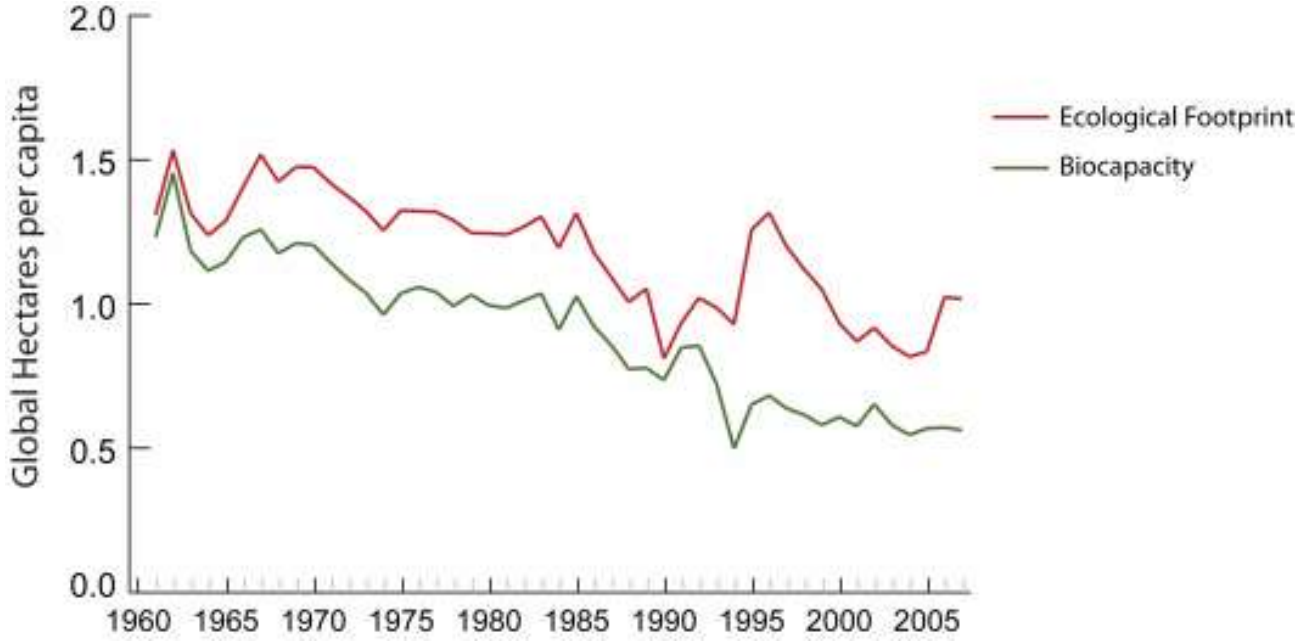
- In wetland areas, intensive “marsh” cultivation are causing stream flow changes, increased water evaporation and reduced water tables and groundwater recharge

Evidence of degradation in Rwanda



Evidence of degradation in Rwanda:

Rwanda's Ecological Footprint



This figure tracks the per-person resource demand (Ecological Footprint) and resource supply (Biocapacity) in Rwanda since 1961

Evidence of degradation

- Almost 50% of the agricultural land shows signs of soil erosion indicating a reduction in the capacity of the land to produce food and fiber
- Rwanda has one of the most severe nutrient depletion rates in Africa, with on average -54 kg N, -20 kg P_2O_5, and -56 kg K_2O per ha per year (Stoorvogel and Smaling 1990)
- Due to reduced water flows the generation of electricity from two hydropower stations, Ntaruka and Mukungwa, has declined from 11.25 MW to 2.5 MW and from 12.45 to 5 MW respectively in the last two decades (Safari, 2010)
- Rising treatment costs of drinking water and higher maintenance costs of water and hydropower plants in the Gishwati watershed
- **The cost of energy per kWh has increased from 7.5 cents USD in 1997 to 20 cents USD in 2005 (NELSAP, 2006).**

Evidence of degradation

- The estimated direct economic costs of household damage, agricultural losses and fatalities at $4 to $22 million as a result of 2007 flood (Stockholm Environment Institute , 2009)

- These costs do not include the wider economic costs from infrastructure damage (including loss of transport infrastructure), water system damage and contamination, soil erosion and direct and indirect effects to individuals

- Much of current debates around a new conservation paradigm has centered on the need to link ecosystem services, biodiversity conservation and human wellbeing

Ecosystem Services Approach

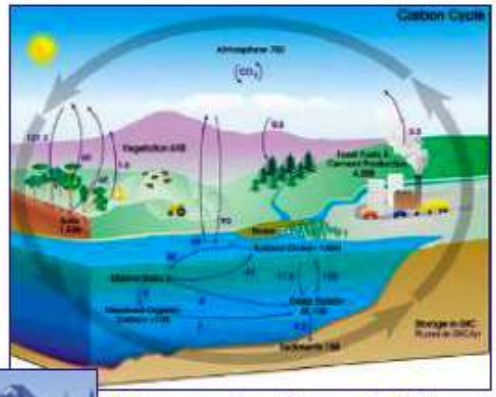
- Integral to improving NRM -seeks to integrate the ecological, social and economic dimensions of natural resource management by:

- explicitly **identifying and classifying the benefits that people derive from ecosystems;**

- describing and communicating these benefits in concepts and **language that a wide range of people can understand;**

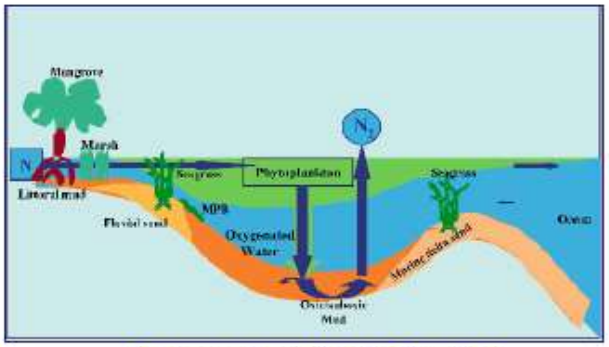
- posing and trying to **answer a set of critical questions about sustainable management of ecosystems and human welfare;**

- the answers could involve **positive approaches by rewarding people who, by their actions, contribute to the maintenance of ecosystems that provide services.**



Atmospheric and Climate Regulation

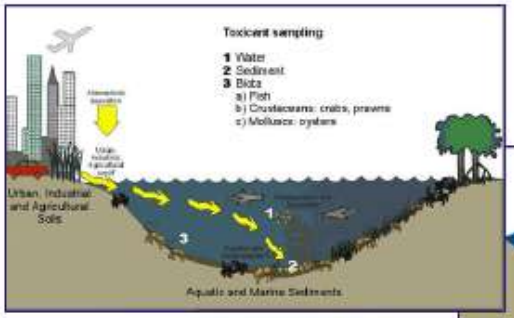
Flood Attenuation/ Storm Surge Protection



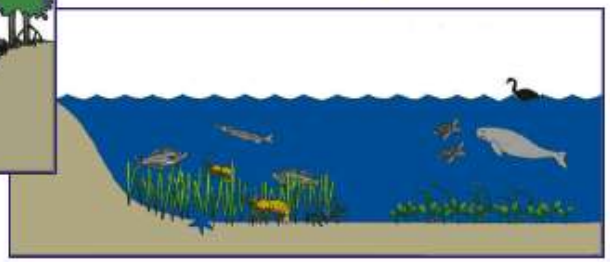
Biogeochemical Cycling

Recreation / Aesthetic

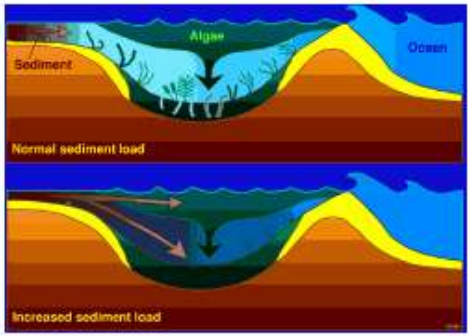
Food and Fiber



Waste Regulation



Habitat/Fisheries



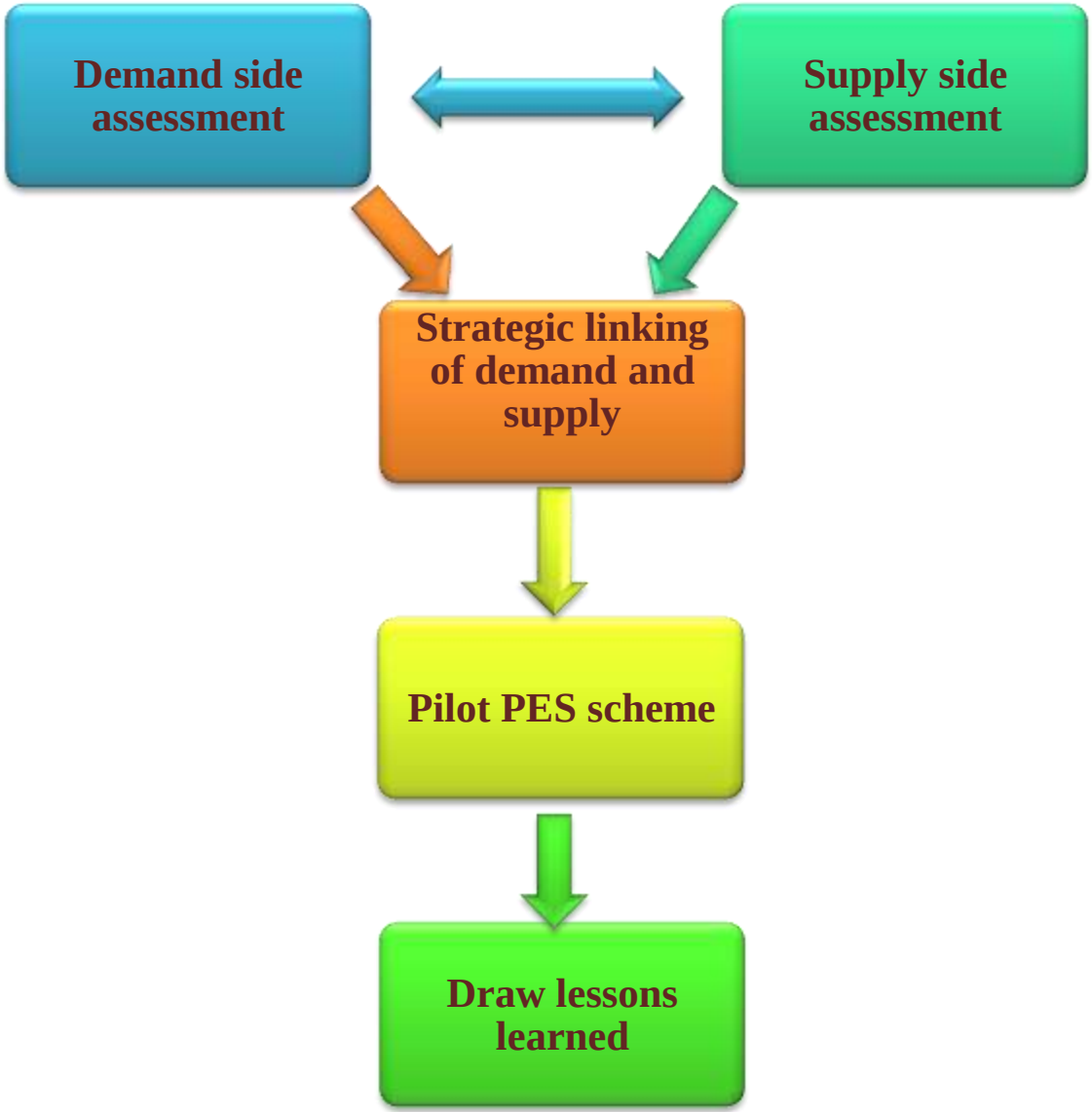
Soil and Sediment Regulation

Water Quality and Supply

Pest and Disease Regulation

Ecosystem Services

WCS's strategic approach to PES development in Rwanda



WCS'S STRATEGIC APPROACH TO PES DEVELOPMENT IN RWANDA

1. Demand assessment

- Who benefits from the environmental services, directly and indirectly?
- How is ES demand is expected to develop?
- How is the ES demand reflected in national policies?

2. Supply assessment

- What is the current status of forests (protected and unprotected), wetlands and who are the drivers of change?
- What are the strengths and weaknesses of current management strategies?
- Who are the managers of these resources and the challenges they face?

WCS'S STRATEGIC APPROACH TO PES DEVELOPMENT IN RWANDA

3. Strategic linking of supply and demand

- How can PES concepts can contribute to relevant national development objectives (e.g. water and hydro-electrical provision, tourism development, climate change mitigation, forest management and conservation and rural development) and therefore become strategic objectives for PES development?

- How can the GoR ensure that the design of PES schemes reflect its national context and strategic objectives in:
  - securing sustainable finances for environmental services?
  - promoting effective supply of environmental services through sustainable land use planning and management?

4. Pilot PES schemes

- Nyungwe Assisted Natural Regeneration project
- Payments for watershed services
- Carbon development in villages around Nyungwe

Pilot PES schemes

- Initial studies (Baseline assessments)
  - providing baseline estimates of the value of ecosystems services in the watershed
  - cost-benefit analysis for major land use types providing rationale and basis for piloting sustainable conservation finance mechanism
- Public awareness, Capacity Building/training
  - Awareness raising campaigns on importance of biodiversity conservation and other environmental services values undertaken local, national level and with private sector
  - Training and capacity building on various disciplines including forest carbon stock assessment, field surveying, and watershed modeling.
- Implementation

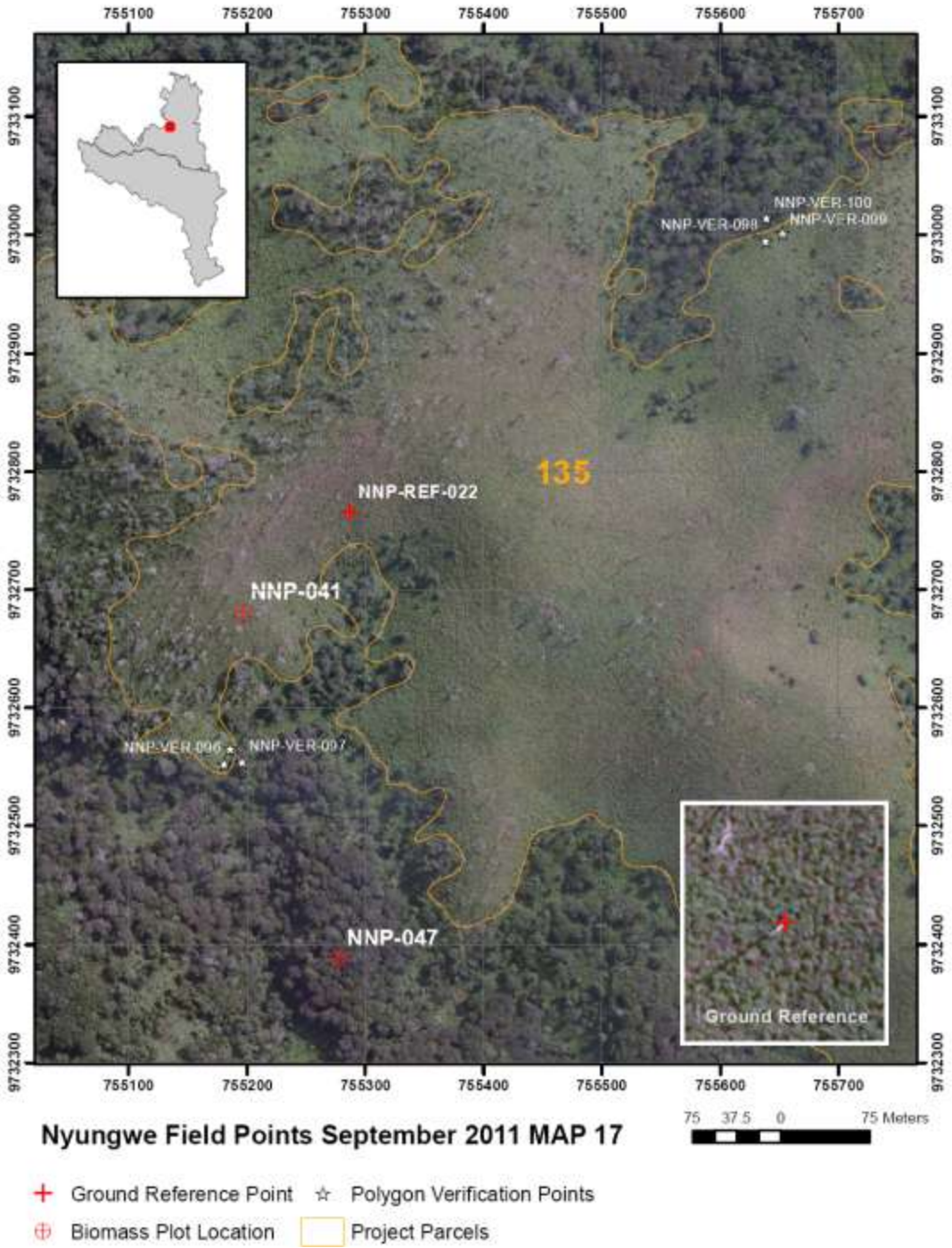
Nyungwe Assisted Natural Regeneration project in partnership with Terra Global Capital

- Burnt areas NNP in 1997-1998
- Initial colonizers of burned areas include the fern species Pteridium aquilinum (L.) Kuhn, which subsequently become the most dominant herbaceous species in burned areas

Manual Fern removal helps regeneration of trees

4 cutting/year during 3 years

Treated plots



Project boundary demarcation : 6000 ha (initially estimated at 13,000 ha

biomass inventory : 52 plots 2/3 burnt area, 1/3 in intact forest

Verification of project boundary

Baseline methodology

- CDM Approved afforestation and reforestation baseline methodology AR-AM0002,

  - "Restoration of degraded lands through afforestation/reforestation", AR-AM0002 / Vers 03

Preliminary results

- ***Total Emissions Volume (tCO2E, estimate)***: 1,856,855
- ***Annual Emissions Volume (tCO2E, estimate):*** 906,075
- After 18 years no more additional credits to sell
- Carbon revenues at 5$/ ton: 6.44 $(millions)

  7$/ ton: 9.02 $ (millions)

Carbon Management Scheme for Rural communities Around Nyungwe National Park

(Kivu, Muganza, Nyabimata & Ruheru sectors)

In partnership with ECOTRUST UGANDA

- The feasibility assessment is intended to identify areas around Nyungwe National Park where a small holder carbon-offset scheme can be piloted

- The feasibility assessment has been based on the Plan Vivo System, which is a set of guidelines, procedures and standards representing a tried and tested system for generating carbon offsets whilst promoting sustainable land-use and improving livelihoods

- This is a 3-year project and the initial year (2011) is mainly focusing on socio-economic as well as biomass baseline assessments, which will generate information that will be used to assess the feasibility of such a project

Cultivation on the slopes of Nyungwe hills

Preliminary Results

- Socio-economic assessment examined land tenure and its implications to a carbon project and desired farming systems,

- Biomass assessment focused on the current carbon stocks and estimating the net accumulation potential of desired species in the preferred farming systems

- Preliminary results suggest that there is opportunity to tap into the permanency of farmers' residence, restrictions on stray livestock, and presence of agriculturally unproductive lands, to front a strong case for tree growing as a mid to long term investment strategy.

- On-going land registration exercise that enhances household land tenure security and is likely to boost farmer confidence to invest in tree enterprises

- Apparently, the institutional prerequisites for setting off the carbon scheme are also in place with only few additional capacities to reinforce.

Preliminary Results

- The results indicate that the carbon baseline is estimated to be 2.6 t of carbon per hectare in the absence of project activities

- Based on current landholdings there is possibility of applying two farming systems i. Boundary planting whose long term carbon storage has been estimated as 33.4tC per ha and strip planting along the slopes/hill of Nyungwe area

- These systems have both environmental and livelihood benefits. The estimated carbon emission reduction, the scheme will contribute to controlling soil erosion

PES scheme for watershed services of Nyungwe NP

Ecosystem services	Direct beneficiaries/Users	Indirect beneficiaries/users
Hydrological services	Water utilities Hydropower producers Tea factories Cement producers Rice farmers	Water users – All economic sectors Hydropower users: All economic sectors Construction industry: All economic sectors

Crops	Water needed to produce 1 kg
Roasted coffee	20.4 m^3
Black tea	10.4 m^3
Rice	2,500 liters

Emission from cement production is 222 kg of C/t of cement

Watershed modeling with the support from USFS

- What are the hydrological responses resulting from different land use practices on total streamflows, either within a specific sub-catchment, or accumulated downstream from the headwaters to the exit of the entire catchment?

- What effect do different land use practices have on sediment yield (i.e.erosion of soil reaching the stream and being transported downstreams)?

- How do these responses vary between wet and dry seasons? What are likely to be the impacts of climate change on Nyungwe hydrology?

- Are there certain areas within Nyungwe where the impacts are more severe than elsewhere, either because of physiographic characteristics (e.g. slope and/or soil properties)?

Preliminary Results

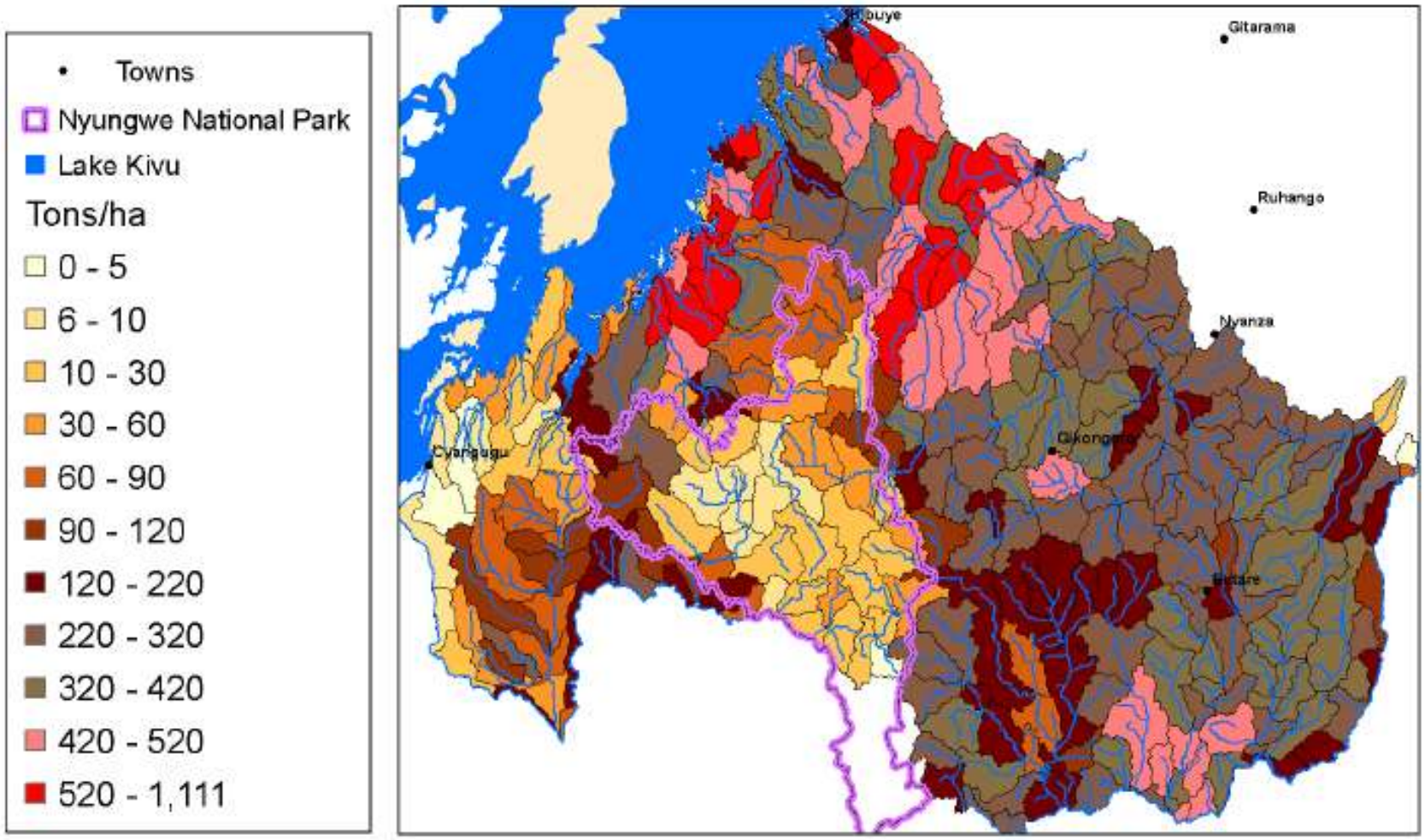
- The modeling suggests that, due to global climate warming (temperature increase), streamflow (or water yield) appears to have decreased across Rwanda which means the amount of available water could be decreasing

- The Nyungwe National Forest Park has relatively high water yield (30-40% of annual precipitation);

- The Nyungwe National Forest Park has low sediment yield, but deforestation can cause serious sedimentation problems due to high rainfall and steep slopes (as seen in other watersheds dominated by croplands)

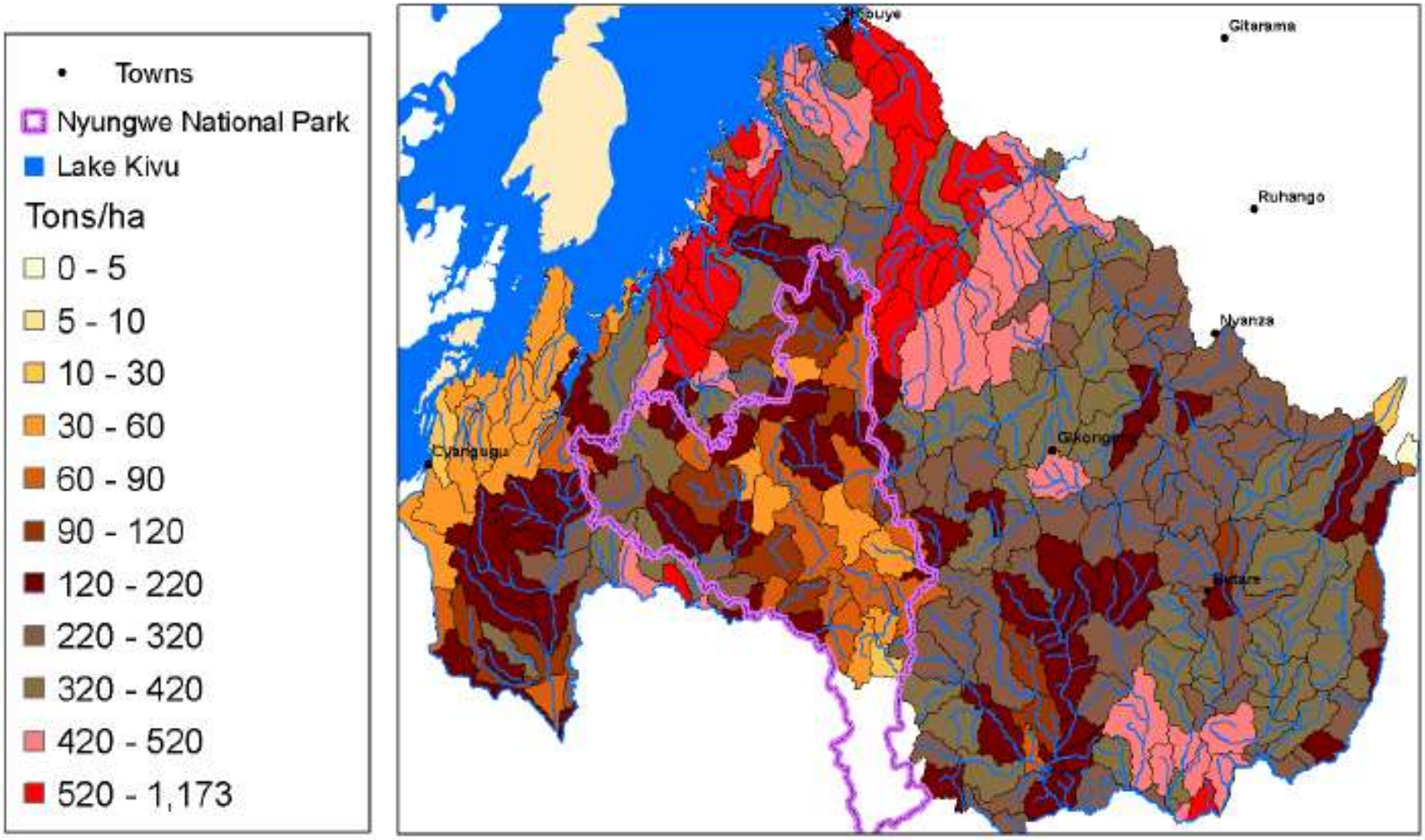
WILDLIFE CONSERVATION SOCIETY

Universal Soil Loss Equation Mean Potential Soil Loss by Watershed: Baseline



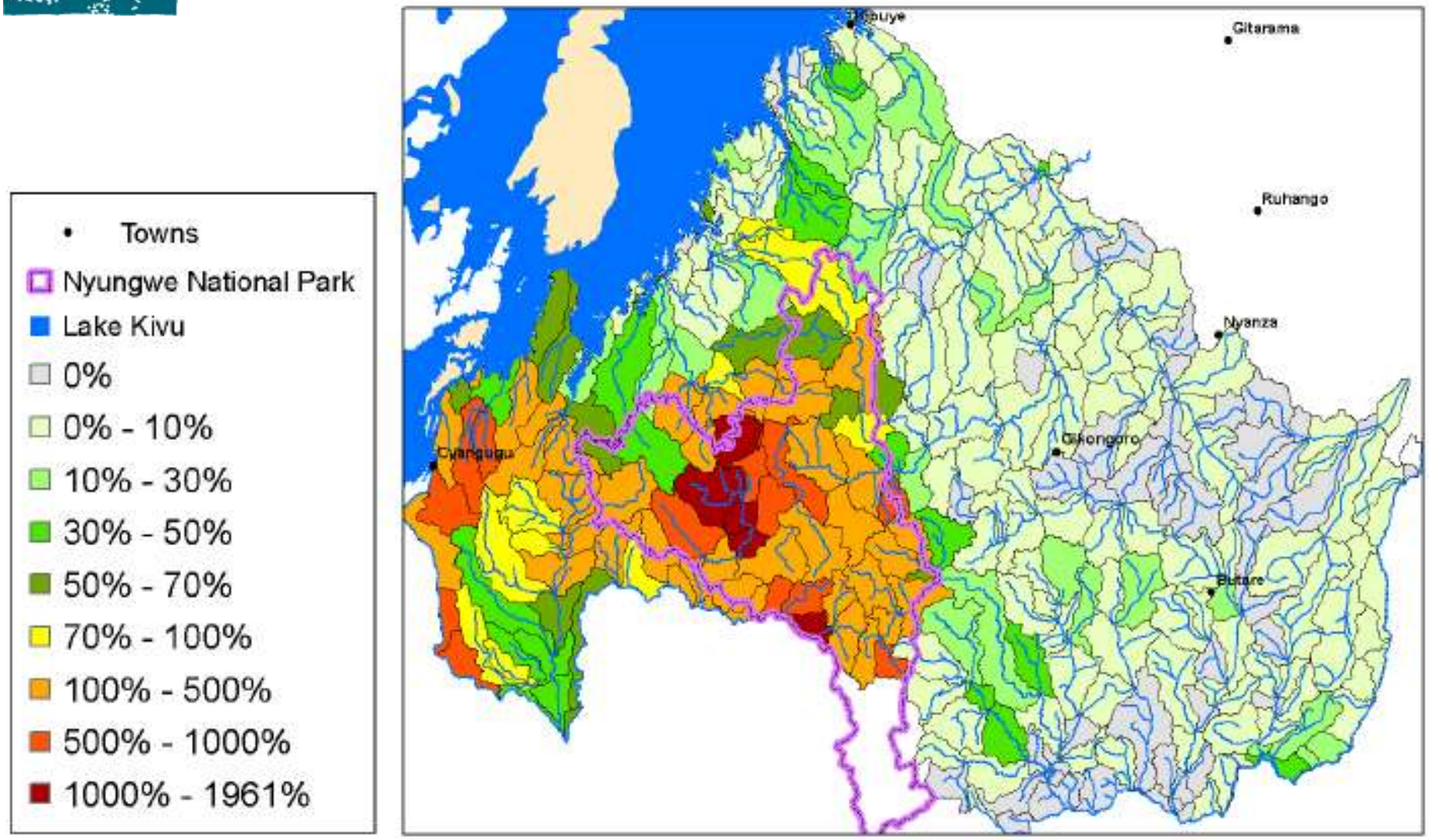
WILDLIFE CONSERVATION SOCIETY

Universal Soil Loss Equation Mean
Potential Soil Loss by Watershed: Deforestation



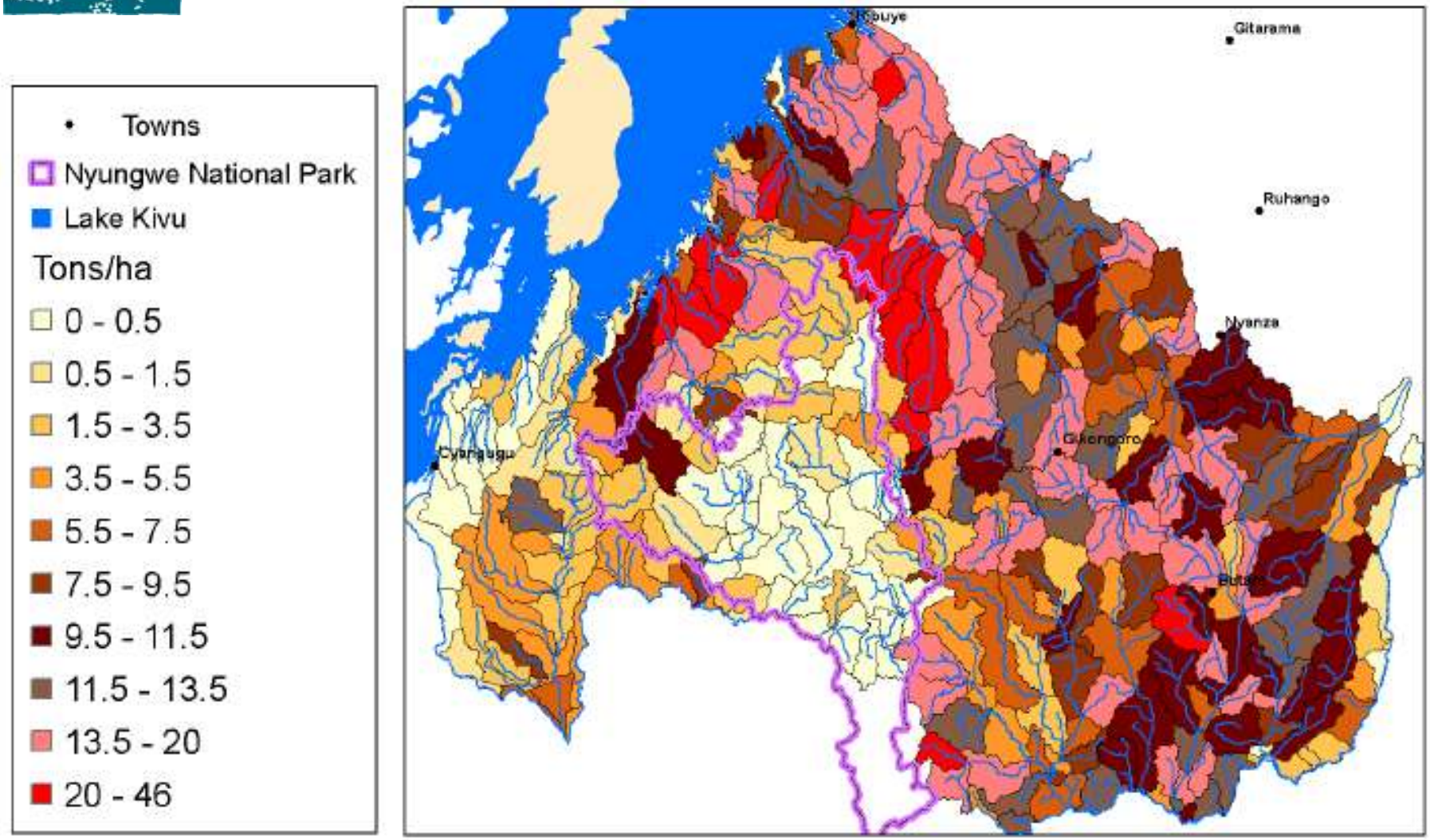
WILDLIFE CONSERVATION SOCIETY

Universal Soil Loss Equation Potential Soil Loss by Watershed: Percent Difference



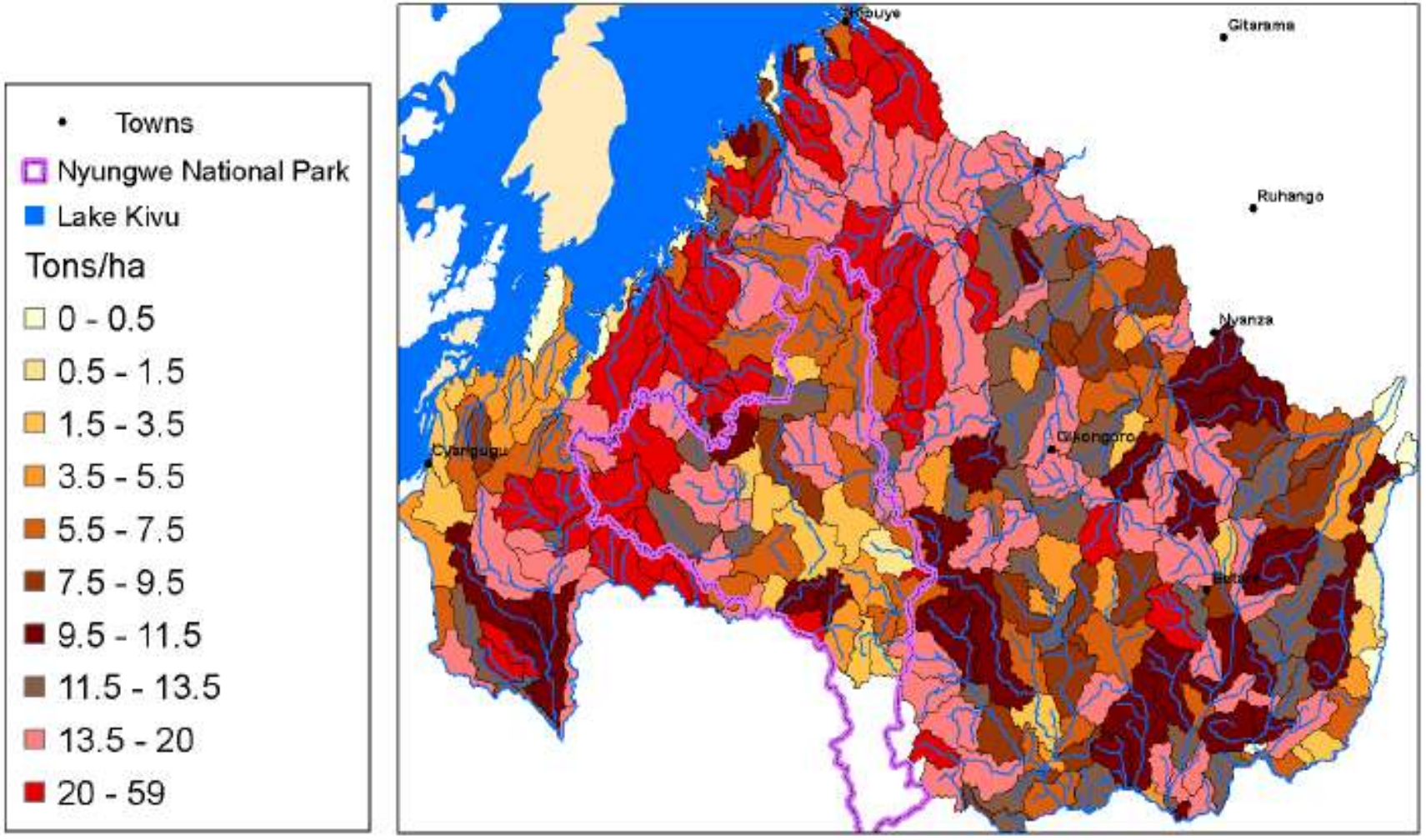
WILDLIFE CONSERVATION SOCIETY

Mean Sediment Exported by Watershed: Baseline



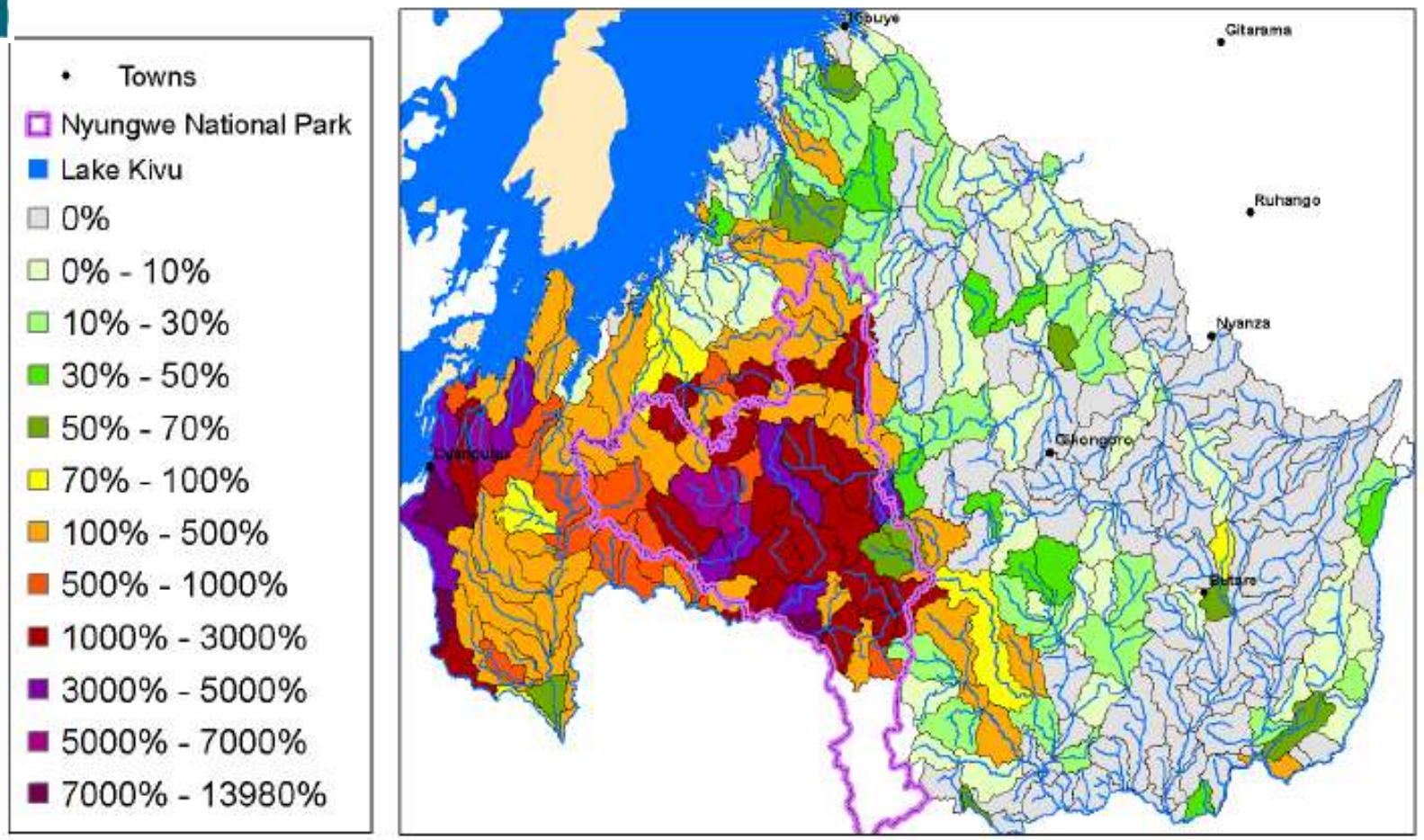
WILDLIFE CONSERVATION SOCIETY

Mean Sediment Exported by Watershed: Deforestation



WILDLIFE CONSERVATION SOCIETY

Sediment Exported by Watershed: Percent Difference



- Ground-data and monitoring are needed to estimate water balance and sediment loading and to improve the models predictions and reduce uncertainty in the model predictions

PES CHALLENGES

- There is no guiding policy on how to design PES schemes and still there is very little practical guidance from the field

- The main obstacles to the development of PES schemes include limited institutional experience, inadequate legal framework and lack of coordination among government agencies

- Natural resources are often managed by multiple agencies. Land use planning may be the responsibility of one agency, while water resources management and supply the responsibility of another

- Each agency has its own regulatory mission, and none include the design of novel, market-like solutions to environmental problems

- Investment in information and capacity building, e.g., mapping supply and demand of ES and engaging stakeholders

PES policy review

- Purpose is to:
  - Establish the basis for the development of the legal framework for a national policy on payment for ecosystem services,
  - Clearly define the responsibilities and benefits of the providers and users of ecosystem services
  - Mainstream the natural resources sector in support of the national economy
  - Mobilize additional resources from society to sustain protection and management of natural resources

The strengths from legislation, policies, plans

- Principles e.g PPP, User-pays, precautionary, prevention, IWRM, etc
- Statements of rights, obligations and penalties
- Defining land rights, including leases
- Defining institutional mandates and roles
- Emphasis on cost-recovery, to ensure financial sustainability
- Co-operation for management of shared waters and source of related incentives e.g Nile Basin Initiative
- Planning and decision making tools e.g EIA

Limitations

- Failure to define allowable activities in water-stressed sub-basins
- Specifying **few** not all relevant land use standards by sub-basin
- No reference on valuation of externalities and need to compensate those providing those providing positive ones
- Watersheds are occupied by government and land owners with varying scale, and capacity to enter and withdraw from contractual obligations e.g PES
- Few incentives
- Delay to set **charges** to operationalise polluter-pays-principle, only fines are set

Existing financial and fiscal incentives

- VAT exemption
- Reduction on taxable profits
- Financial support
- Reduced customs duty
- Bonus
- Penalties
- FONERWA
- Donor funding
  - NB: Many water users and providers do not know the existence of these incentives

Potential additional sources of incentives

- Levy on fuel
- Income or corporate tax deduction or exemption for investments in watershed protection of **pre-determined scale**
- Non-monetary institutional recognition (e.g Awards)
- Watershed Endowment Fund or as a window in FONERWA
- Environmental performance bonds
- Green funds or other related external funds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Thank you