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# Ecosystem Services and Impact Assessment

*IAIA Washington Branch Meeting  
World Bank - 1818 H Street NW  
MC C1-200*

**Charles Hernick ■ 7 October 2015**



- Why ecosystem services in Impact Assessment?
  - Understanding how communities depend on ecosystem services can strengthen an environmental impact assessment and inform decision-makers on trade-offs
  - IFC Performance Standards
- How / how often is it being done? (Rosa & Sanchez 2015)
  - Ecosystem Services Review (WRI)
  - Example: Agricultural development in Tanzania
- Is there a future for ecosystem service review in ESIA?

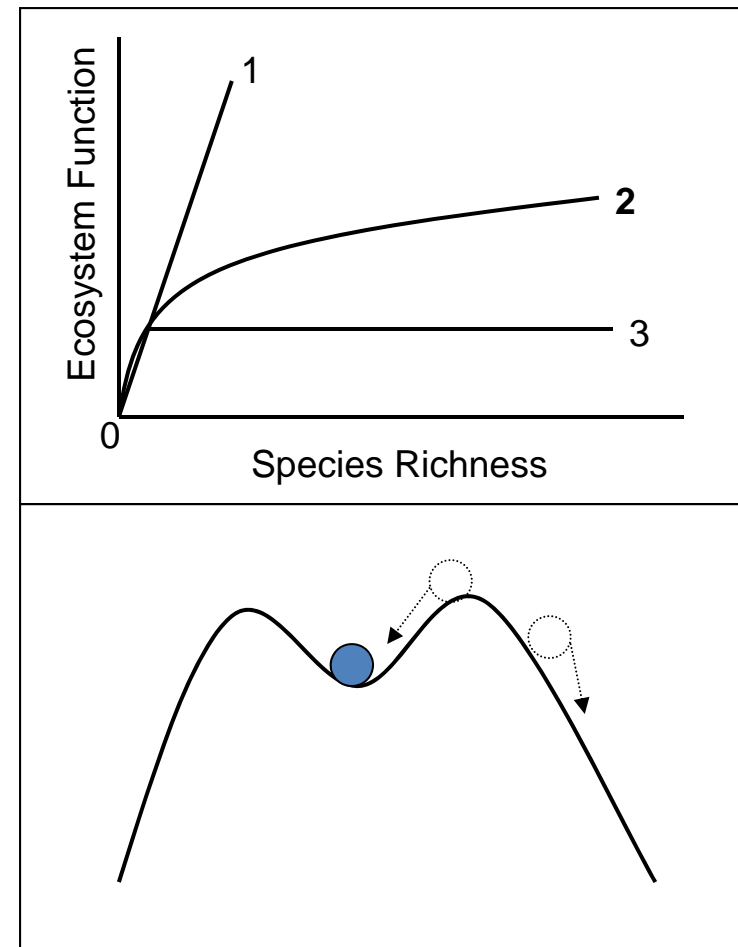


## The benefits people derive from ecosystems

- Ecosystem: The biotic community and its abiotic environment
  - Species
  - Physical and chemical characteristics
- Ecosystem Function: Processes resulting from species interactions (e.g., primary production)
- These processes result in goods and services that benefit humans (or any other species)



- Effects of biodiversity (stock)
- Equilibrium
  - Resistance
  - Resilience
- Result: Continued provisioning of goods and services (flow)



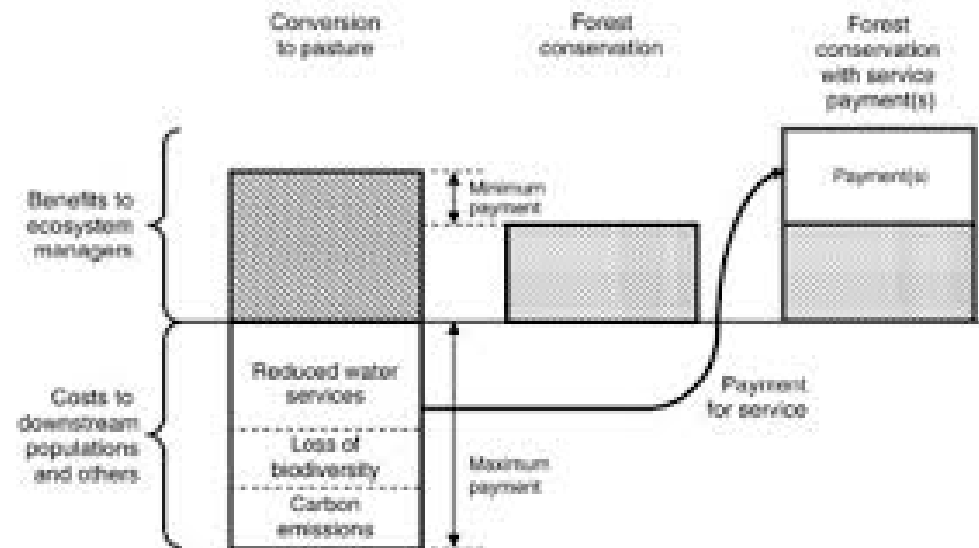




Provisioning Services	Regulating Services	Cultural Services
<p>Food</p> <ul style="list-style-type: none"> <li>• Crops</li> <li>• Livestock</li> <li>• Capture fisheries</li> </ul> <p>Raw materials</p> <ul style="list-style-type: none"> <li>• Timber and other wood fibers</li> <li>• Biomass Fuels</li> <li>• Fresh Water</li> </ul> <p>Pharmaceuticals and natural medicines</p>	<ul style="list-style-type: none"> <li>• Regulation of water timing and flows</li> <li>• Erosion control</li> <li>• Maintenance of soil quality</li> <li>• Water purification and waste treatment</li> <li>• Climate regulation (global, local and regional)</li> </ul>	<ul style="list-style-type: none"> <li>• Spiritual and religious values</li> <li>• Recreation and tourism</li> </ul>



- Payment for Ecosystem Services
  - A voluntary transaction where
  - A well-defined environmental service
  - Is being 'bought' by a service buyer
  - From a service provider
  - If and only if provider secures service provision (conditionality)
  - Payment exceeds opportunity cost
- Examples
  - Carbon
  - Water
  - Wetlands / Biodiversity



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# What about Impact Assessment?



- How have ecosystem services been treated in recent international practice?
  - 5/xx performed some level of review because of PS6



Is the ecosystem service concept improving impact assessment? Evidence from recent international practice

Josianne Claudia Sales Rosa<sup>1</sup>, Luis E. Sánchez

**Table 5**  
Key tasks of an ecosystem services assessment.

Key tasks	Oyu Tolgoi	Simandou	Adjaristsqali	Merian	Gamsberg
1. Description of affected ecosystems	-	✓	-	-	-
2. Identification of potentially affected ES	✓	✓	-	-	-
3. Description of beneficiaries for each ES	-	-	-	-	-
4. Prioritization of ES	✓	✓	✓	✓	✓
5. Delineation of the study area for ES	✓	✓	-	-	-
6. Baseline for priority ES	✓	✓	-	-	-
7. Impact prediction	-	-	-	-	-
8. Assessment of impacts on priority ES	✓	✓	✓	✓	-
9. Indication of mitigation measures for ES	✓	✓	✓	-	-





ESIA stages	ESR for IA steps
Scoping	1. Prioritize ecosystem services because of project impact <sup>a</sup>
	2. Prioritize ecosystem services because of project dependence
	3. Establish the ESIA Terms of Reference for ecosystem services
Impact analysis	4. Assess negative project impact on priority ecosystem services <sup>a</sup>
	5. Assess project dependence on priority ecosystem services <sup>b</sup>
	6. Produce summary report
Mitigation	7. Identify options to enhance or at least maintain affected beneficiaries' well-being and project performance derived from ecosystem services at acceptable levels <sup>a,b</sup>

# Ecosystem Service Review

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## Ecosystem Services Review for Impact Assessment

by Florence Landsberg, Suzanne Ozment, Mercedes Stickler, Norbert Henninger, Jo Treweek, Orlando Venn and Greg Mock - November 2011

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The *Ecosystem Services Review for Impact Assessment* (ESR for IA) provides practical instructions to environmental and social practitioners on how to incorporate ecosystem services throughout environmental and social impact assessment.

*The latest version of the ESR for IA is now available [here](#).*



### Post-Hoc Evaluation:

- Dependency
- Impacts
- Implications

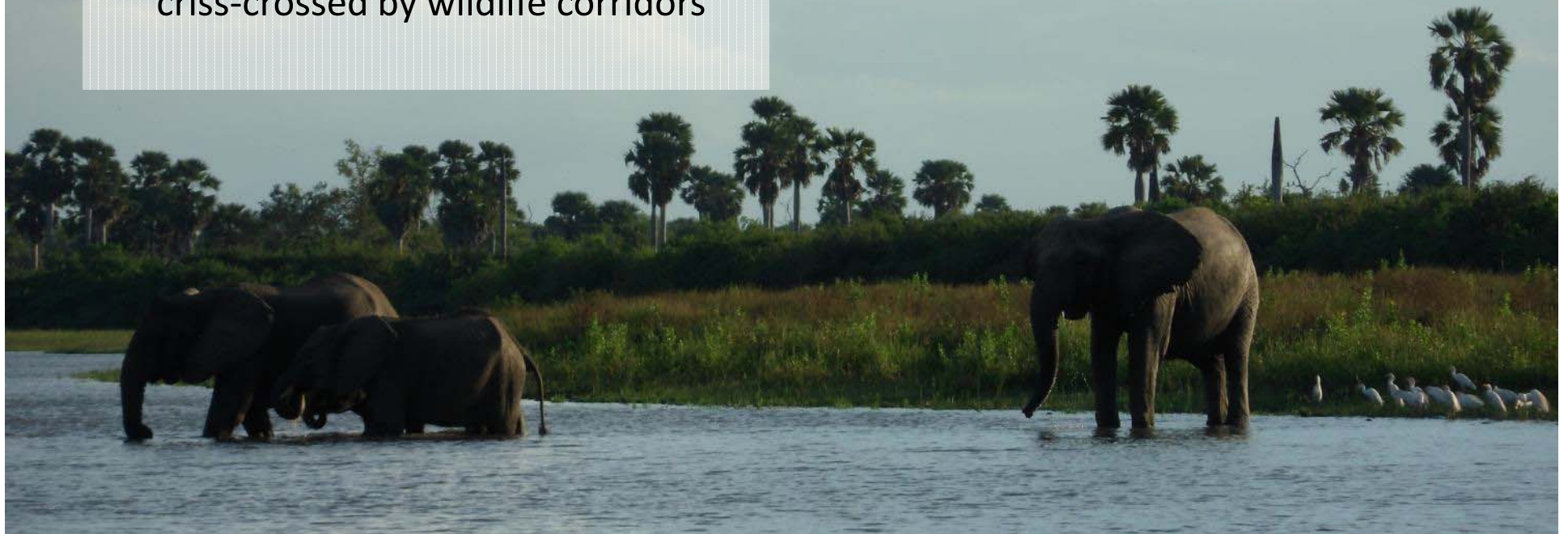
1. Determined scope: Kilombero Valley--users at local and national scales
2. Identified priority ecosystem services
3. Described trends in priority ecosystem services
4. Discussed development risks and opportunities
5. DID NOT develop strategies for addressing risk and opportunities

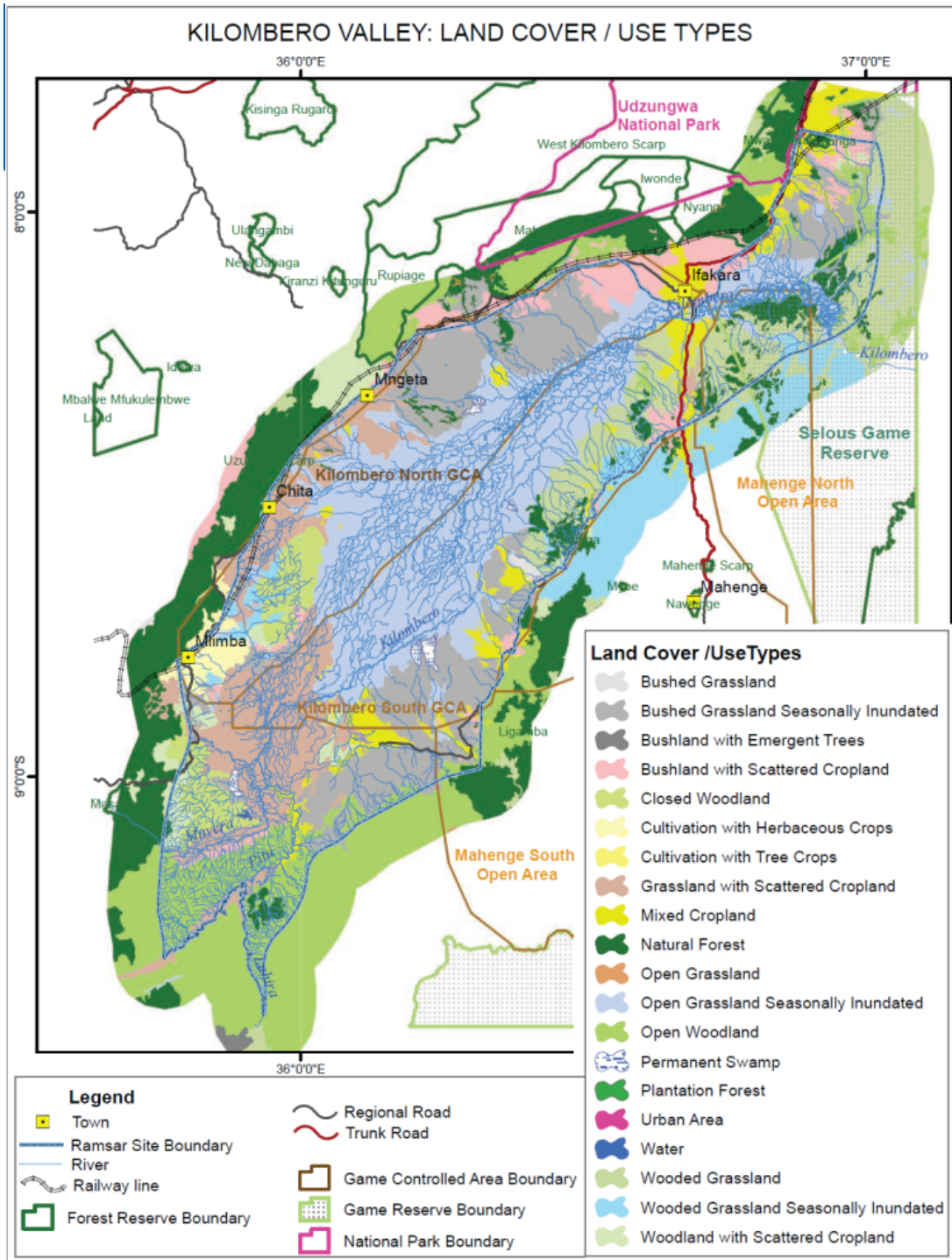




## Kilombero Valley

- Low-productivity agriculture, pastoralism, and foraging for forest products and bushmeat (provisioning services)
- Bordered by two game reserves, is designated as a Ramsar wetland and Important Bird Area, and is criss-crossed by wildlife corridors







Lake Nation

TANZANIA

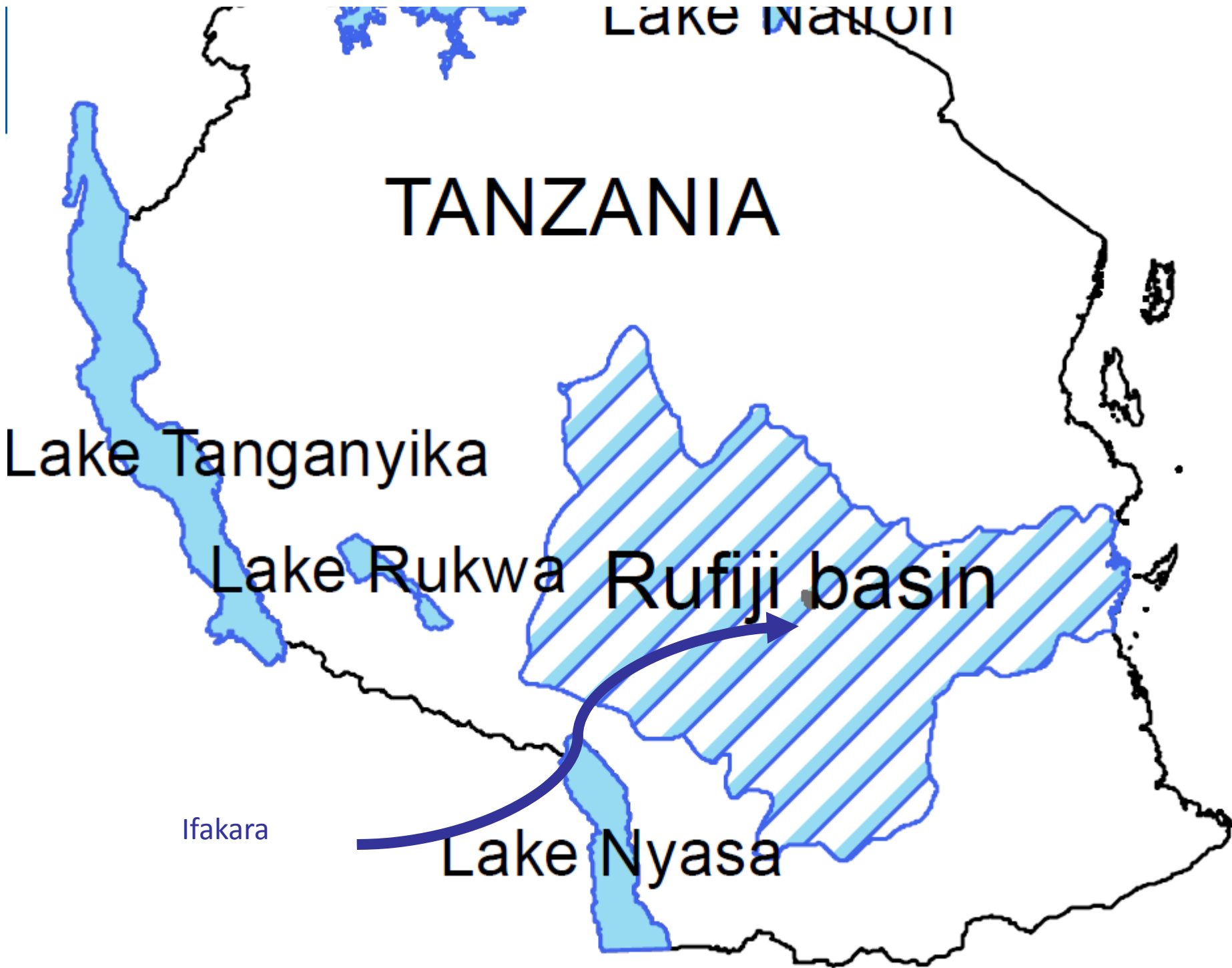
Lake Tanganyika

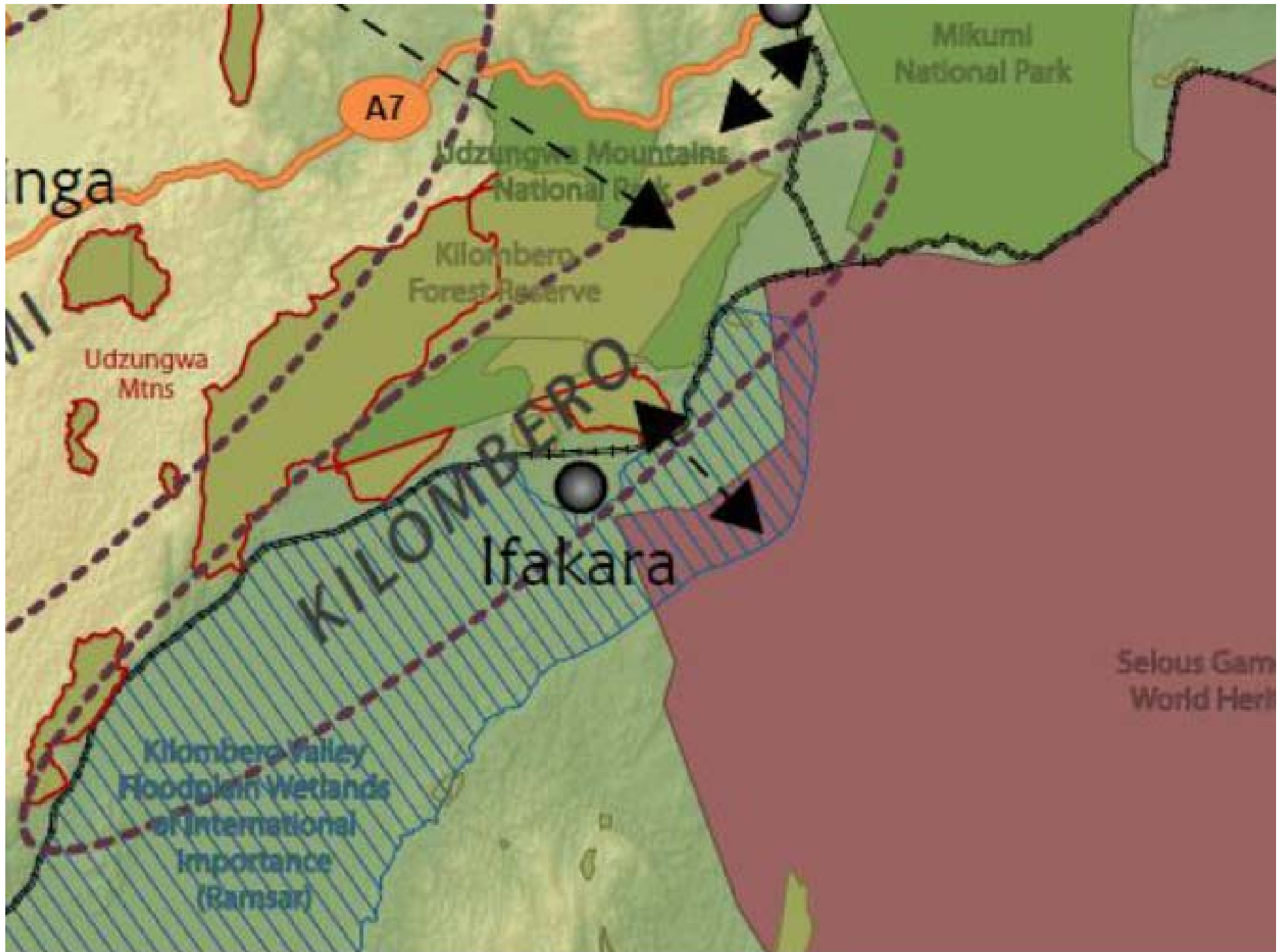
Lake Rukwa

Rufiji basin

Ifakara

Lake Nyasa







# Government's Proposal

- Construction of surface water-based irrigation schemes at five sites in Kilombero District
  - Magombera Kimbiyoko (MaKi), Kisegeese, Udagaji, Mgugwe, and Mpanga-Ngalimila
  - Construction is complex and will require large-scale earthworks. Each new system will involve weir diversions, distribution canals, secondary control structures, drainage, and on-farm access roads.
- Beneficiaries are smallholder farmers
  - Construction will be combined with a farmer training program



		Village/Community		Region/Valley (Kilombero District)		National	
Ecosystem services		Dependence	Impact	Dependence	Impact	Dependence	Impact
<b>Provisioning</b>							
Food	Crops	●	+	●	+	○	+
	Livestock	●	+	●	+	○	+
	Capture fisheries	●	-	●	+/-	○	+
	Wild foods	●	-	●	-	Low	+
Raw materials	Timber and other wood fibers	●	+	●	-	○	+/-
	Biomass fuel	●	?	●	-	○	?
	Freshwater	●	-	●	+/-	●	+
<b>Regulating</b>							
	Regulation of water timing and flows	●	-	●	-	●	+/-
	Erosion control/soil replenishment	●	+/-	●	+/-	●	+/-
	Water purification and waste treatment	●	-	●	-	●	+
	Maintenance of soil quality	●	-	●	-	●	+/-
<b>Cultural</b>							
	Recreation and ecotourism	Low	+/-	Low	+	●	+
<b>Supporting</b>							
	Habitat	●	-	●	+/-	●	+

Key	
● High	+ Positive impact/effect from use
○ Medium	- Negative impact/effect from use
Low	? Don't know





## Result

### At the national level

- Substitutions exist for many provisioning services
- The game reserves and parks—and associated Ecotourism—depend on maintenance of migratory corridors in the valley

### At the village level

- Cost effective substitutes are not available
- Dependency on regulating services is high, and existing practices have a negative impact on these services
- Ecotourism is constrained by limited accessibility and accommodations options

Dependency on the provisioning of fresh water is high at both levels

### Raises questions:

- Beneficiaries (Purpose)
- Stakeholders
- Affected Area (Baseline)





## Summary

- Ecosystem function depends on species and physical/chemical characteristics
  - Biodiversity
  - Pollution
  - Land use
  - Climate
- Environmental impact assessment ensures that planned social and economic benefits are realized and are not undermined by negative environmental impacts
- Understanding dependencies and impacts on ecosystem services is critical
- An ecosystem service review may draw out important **trade-offs** worthy of consideration



## Questions

- Can an ecosystem service framework improve ESIA?
  - ESIA vs. P- or S-ESIA
- Examples of improved or additional mitigation measures?
- Does the need to factor-in climate change resilience open a door for an ecosystem service framework?