RAPID ECOSYSTEM SERVICE ASSESSMENT FOR DECISION MAKING
Examples from Cambodia & Madagascar

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ACES
December 2014
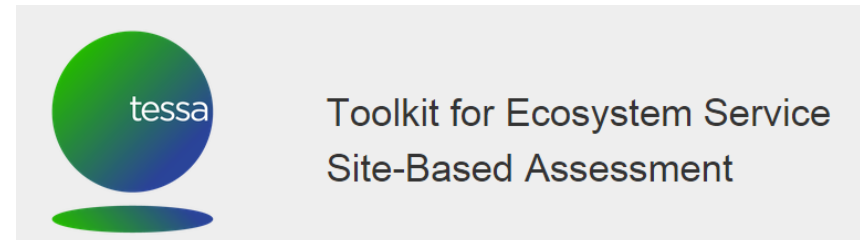
CONSERVATION INTERNATIONAL

INTRODUCTION

- Demand for incorporation of ecosystem services (ES) into decisions
- Decision making processes rapid, funding limited
- Dizzying array of existing tools
- → *Challenge: ES assessment that is spatially explicit, rigorous, & relevant for decision-making, but also quick & cheap*
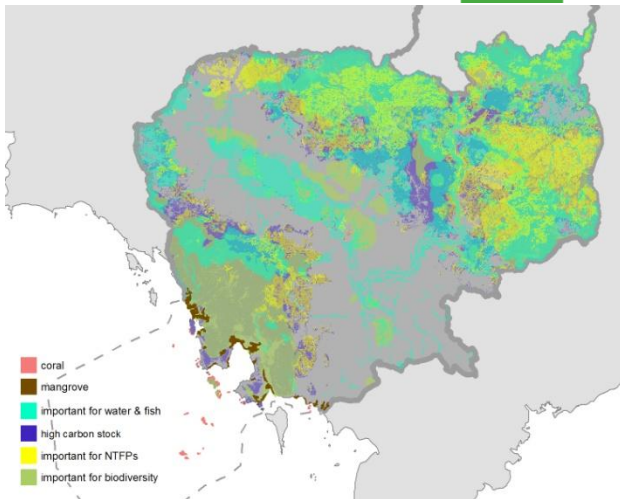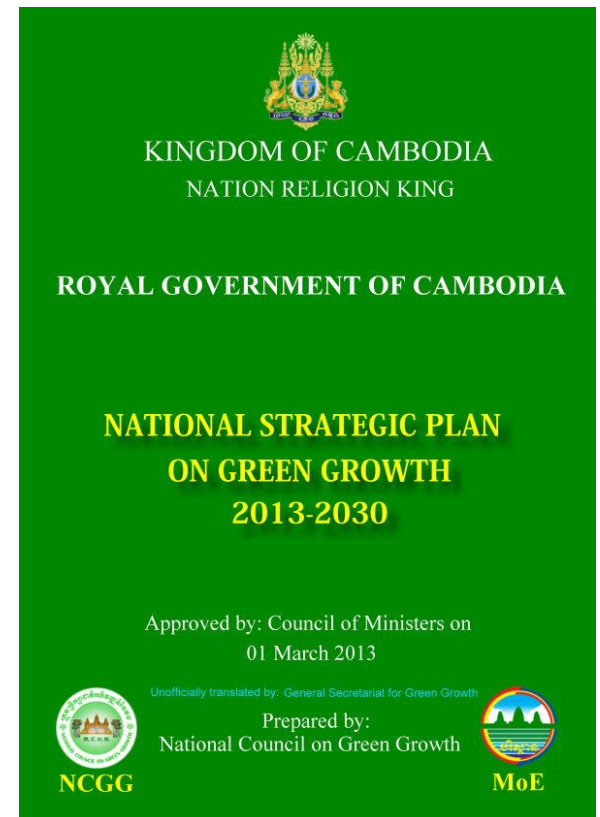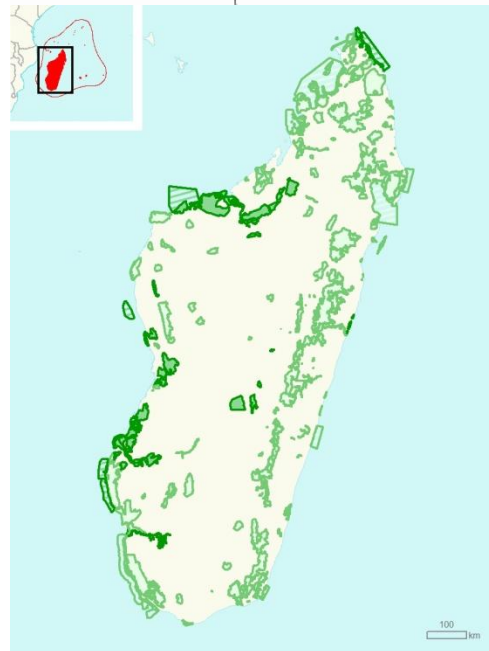
WHY?

- Priority-setting and monitoring conservation impact
- Site prioritization for investment
- Measuring progress towards sustainable development goals
- → *Rapid, national-scale ES assessment with existing spatial data, limited desktop analysis & stakeholder consultation*


CONSERVATION INTERNATIONAL

coral
mangrove
important for water & fish
high carbon stock
important for NTFPs
important for biodiversity

CRITICAL ECOSYSTEM PARTNERSHIP FUND

KINGDOM OF CAMBODIA
NATION RELIGION KING

ROYAL GOVERNMENT OF CAMBODIA

NATIONAL STRATEGIC PLAN
ON GREEN GROWTH
2013-2030

Approved by: Council of Ministers on
01 March 2013

Unofficially translated by: General Secretariat for Green Growth

Prepared by:
National Council on Green Growth

NCGG   MoE

METHODS

1. Define objectives
2. Scope relevant ecosystem services
3. Collect existing data & reports
4. Review available ES modeling tools
5. Conduct desktop analyses for selected ecosystem services
6. Validate results with local experts
7. Refine analyses, summarize results
8. Develop recommendations

Define objectives
↓
Scope ecosystem services
↓
Collect existing data
↓
Review available tools
↓
Conduct desktop analyses
↓
Validate results with experts
↓
Refine analyses
↓
Develop recommendations

STAKEHOLDER ENGAGEMENT
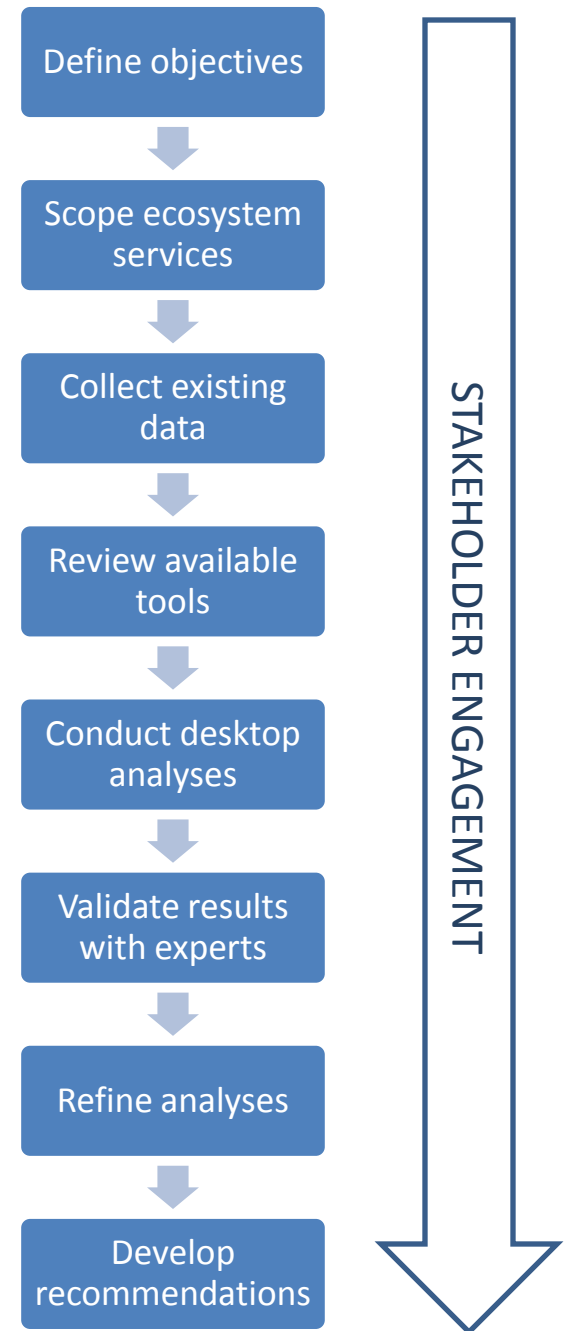
CAMBODIA

- Biodiversity hotspot, intact forest, threat: dams
- Population ~15 million
- 80% live in poor rural settings
- Mainly subsistence farmers and fishers
- ~20% live below the poverty line
- High level of malnutrition
- Main energy sources wood, charcoal

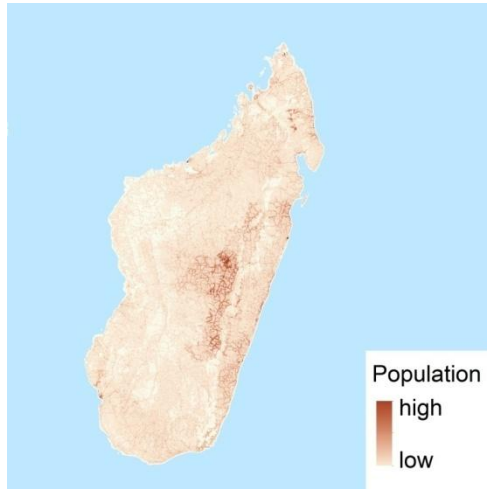

Student cycling home from school, Cambodia

MADAGASCAR

- Biodiversity hotspot, 90% endemism, 90% deforested
- Population ~23 million
- 85% live in rural settings
- Mainly subsistence farmers and fishers
- ~75% live below the poverty line
- High level of malnutrition
- 90% of households use wood, charcoal

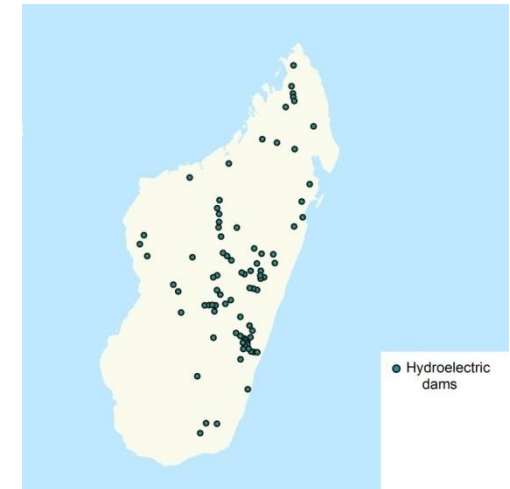Women selling crops at a market, Madagascar
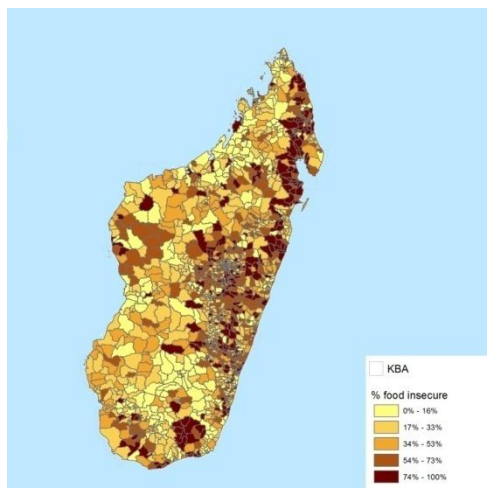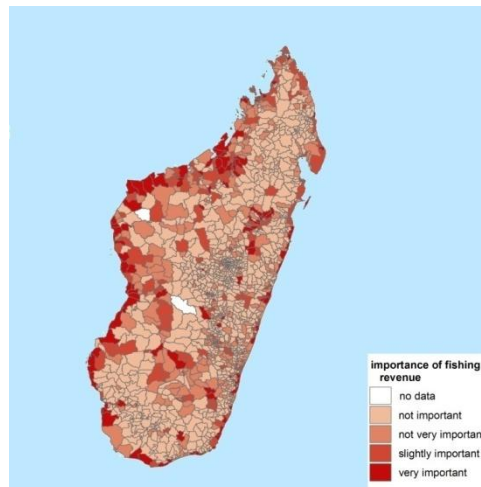
KEY BENEFICIARIES

Population centers

Population
high
low

Irrigated rice

Rice paddies

Hydropower dams

Hydroelectric dams

Food insecurity

KBA
% food insecure
0% - 16%
17% - 33%
34% - 53%
54% - 73%
74% - 100%

People dependent on fisheries

importance of fishing revenue
no data
not important
not very important
slightly important
very important

People vulnerable to cyclones

people vulnerable to cyclone storm surge
High : 9061
Low : 0
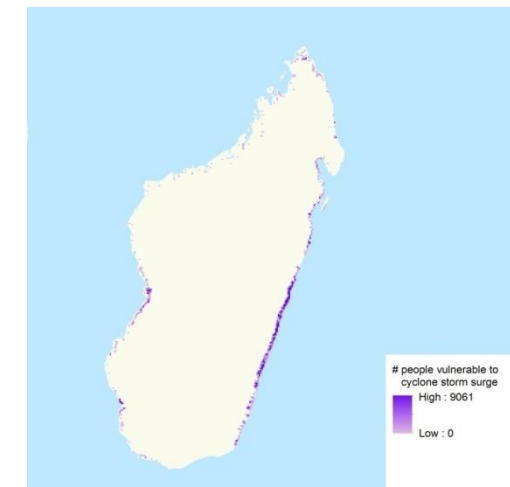
KEY ECOSYSTEM SERVICES

Section	Division	Key Ecosystem Services in Madagascar
Provisioning	Nutrition	**Fish**
		Bushmeat
		Edible plants
		Medicinal plants
		Water flows for domestic use
		Water flows for irrigation
	Materials	Construction materials (wood, thatch)
		Materials for artisanal products (wood, sedges)
		Water flows for mining
	Energy	Fuelwood
		Charcoal
		Water flows for hydropower
Regulation & Maintenance	Mediation of waste, toxics and other nuisances	Water quality for household use
		Water quality for irrigation
		Water quality for hydropower
	Mediation of flows	**Flood regulation**
		Drought regulation
	Maintenance of physical, chemical, biological conditions	**Carbon storage and sequestration**
		Protection from cyclones
		Genetic material
Cultural	Physical and intellectual interactions with ecosystems and land-/seascapes	**Ecotourism**
		Existence value (biodiversity)
	Spiritual, symbolic and other interactions with ecosystems and land-/seascapes	**Cultural and spiritual identity**

Framework: Common International Classification of Ecosystem Services (CICES) http://cices.eu/
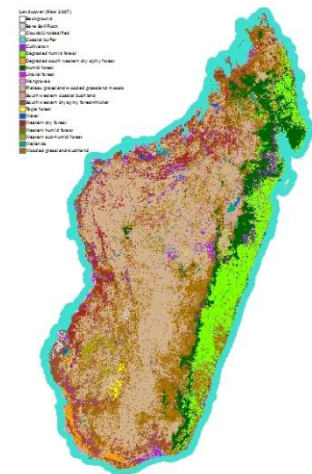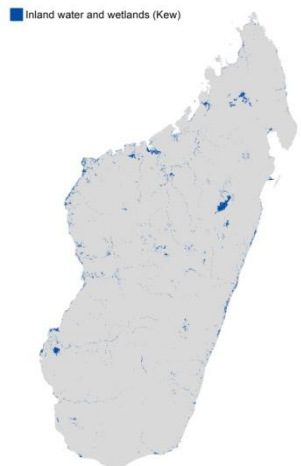
DATA: BIOPHYSICAL & LAND USE

Coral reefs & mangroves

Key Biodiversity Areas

Landcover

Fresh water lakes and wetlands

Forest cover and loss

Biomass carbon

DESKTOP ANALYSES

Provisioning

1. Fresh water quantity
2. Inland & coastal fisheries
3. Non-timber forest products

Regulating

4. Fresh water quality
5. Fresh water flow regulation
6. Biomass carbon stock
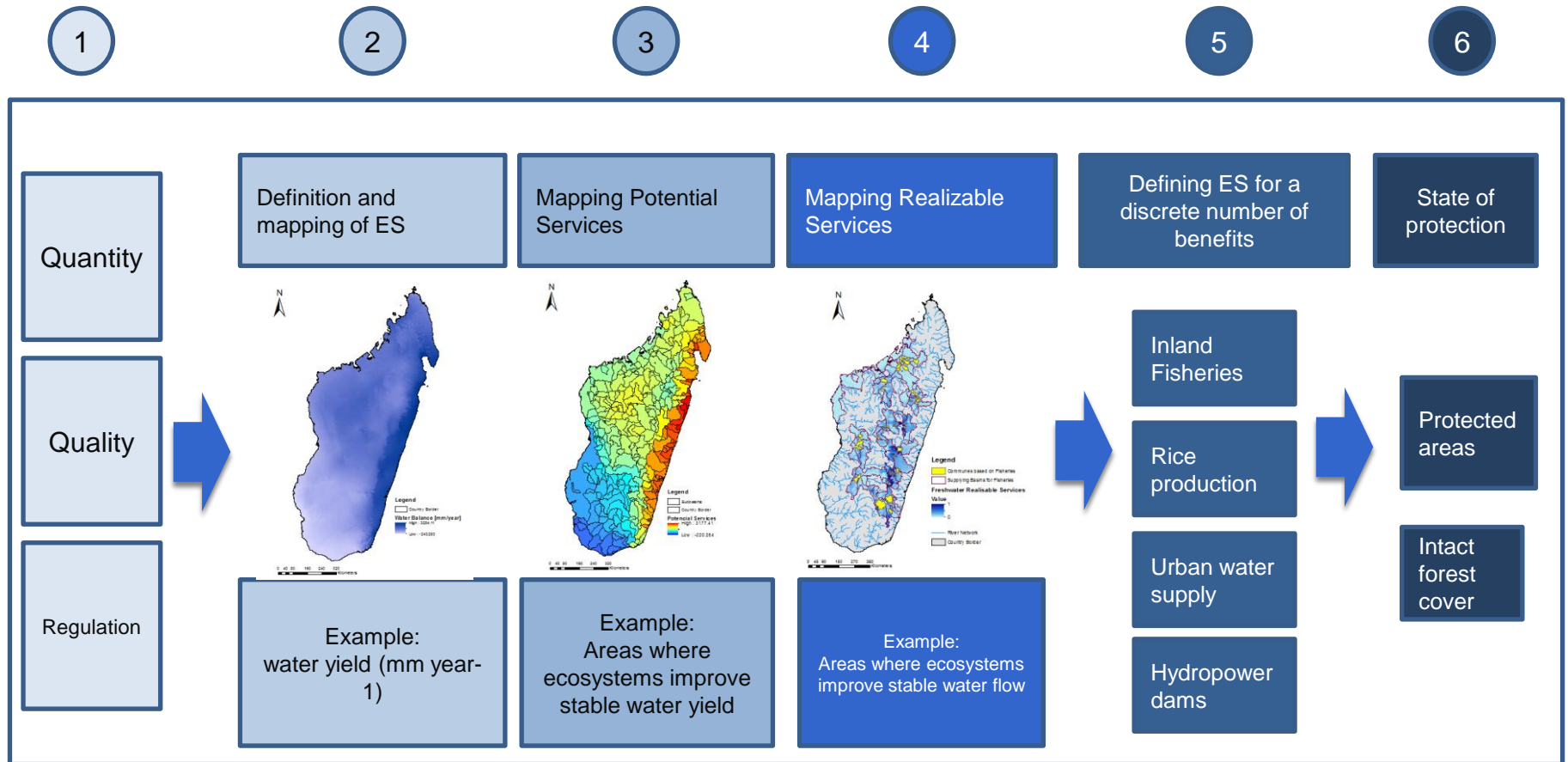7. Avoided CO_2 emissions
8. Coastal protection

Cultural

9. Ecotourism

ArcGIS
ESRI

WaterWorld

InVEST
integrated valuation of
ecosystem services
and tradeoffs

CONCEPTUAL MODEL: FRESH WATER

| 1 | 2 | 3 | 4 | 5 | 6 |

| | Definition and mapping of ES | Mapping Potential Services | Mapping Realizable Services | Defining ES for a discrete number of benefits | State of protection |

Quantity

Quality

Regulation

Example: water yield (mm year-1)

Example: Areas where ecosystems improve stable water yield

Example: Areas where ecosystems improve stable water flow

Inland Fisheries

Rice production

Urban water supply

Hydropower dams

Protected areas

Intact forest cover

THRESHOLD: FRESH WATER

Freshwater Index

Freshwater Index
value above the national mean

THRESHOLD: FOREST CARBON STOCK

Biomass carbon stock
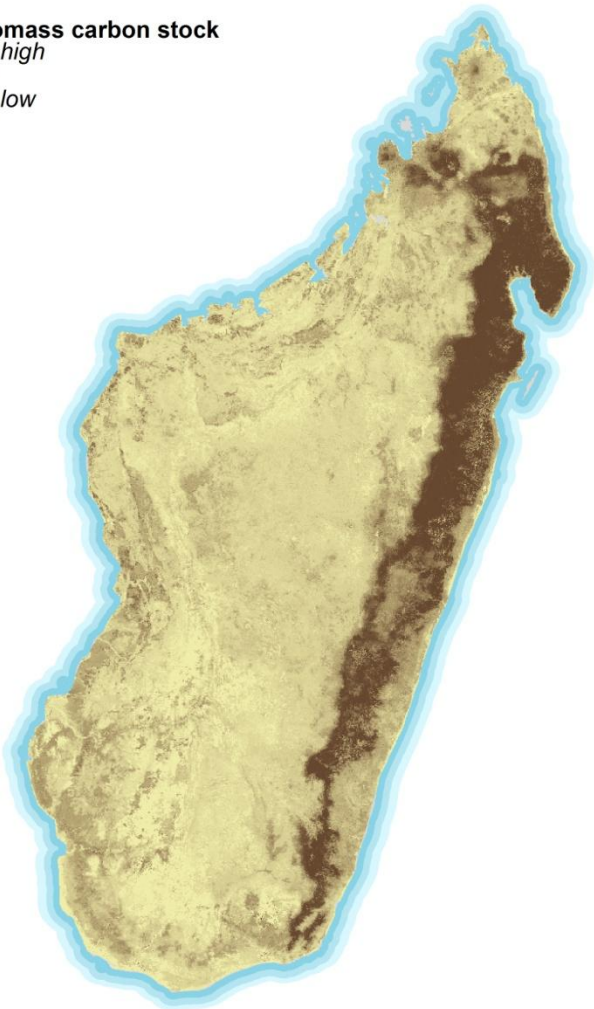
High carbon stock areas
(>35 tC/ha)
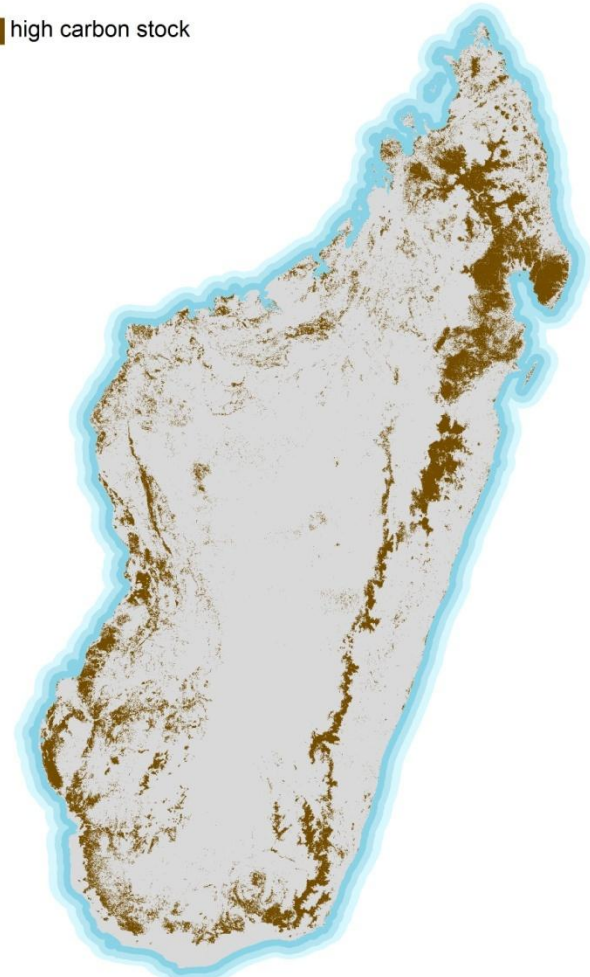
RESULTS (examples)

Coastal fisheries

Tourism
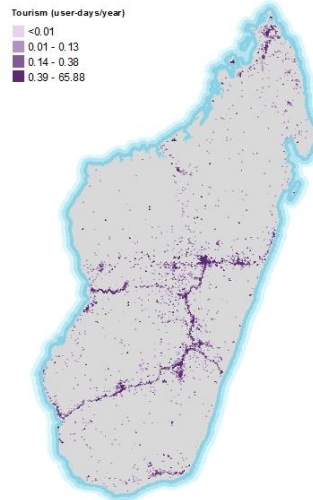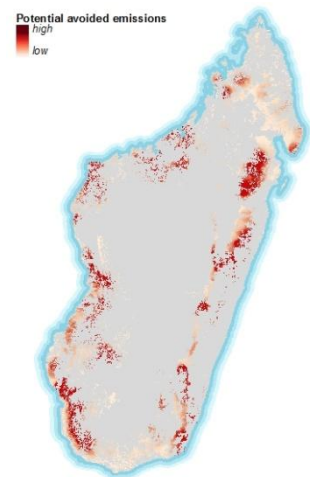

Non-timber forest products
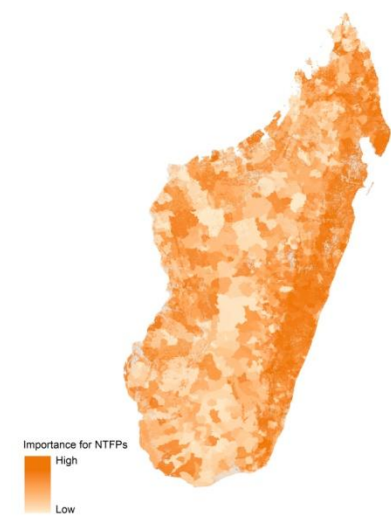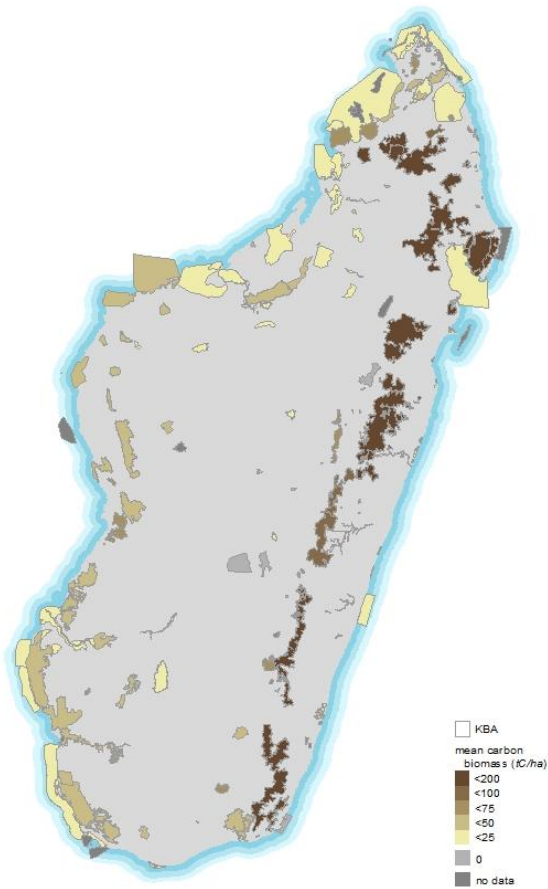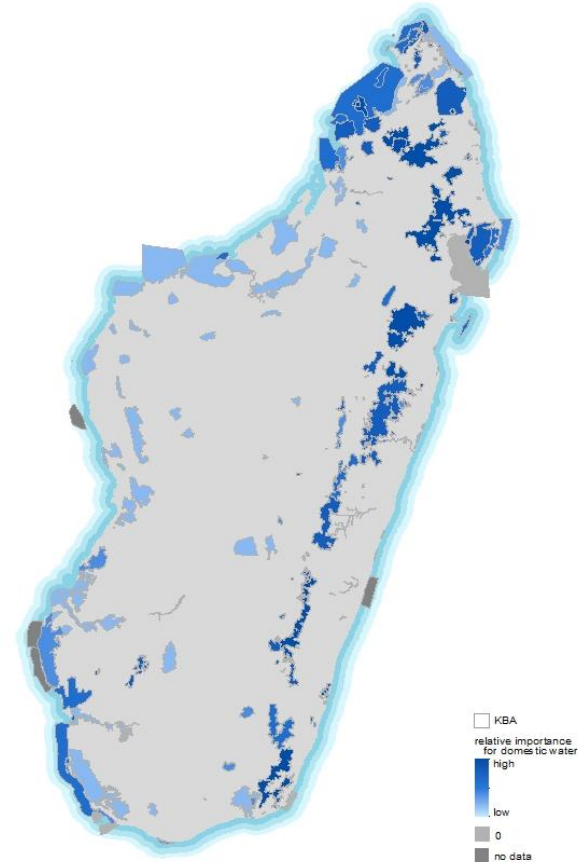

Inland fisheries

Coastal protection

High potential emissions

SITE PRIORITIZATION & MONITORING
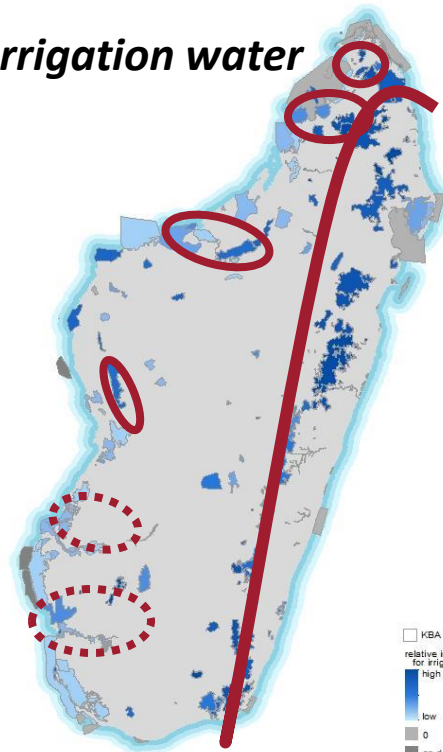
Average carbon stock within
Key Biodiversity Areas

Average importance for fresh
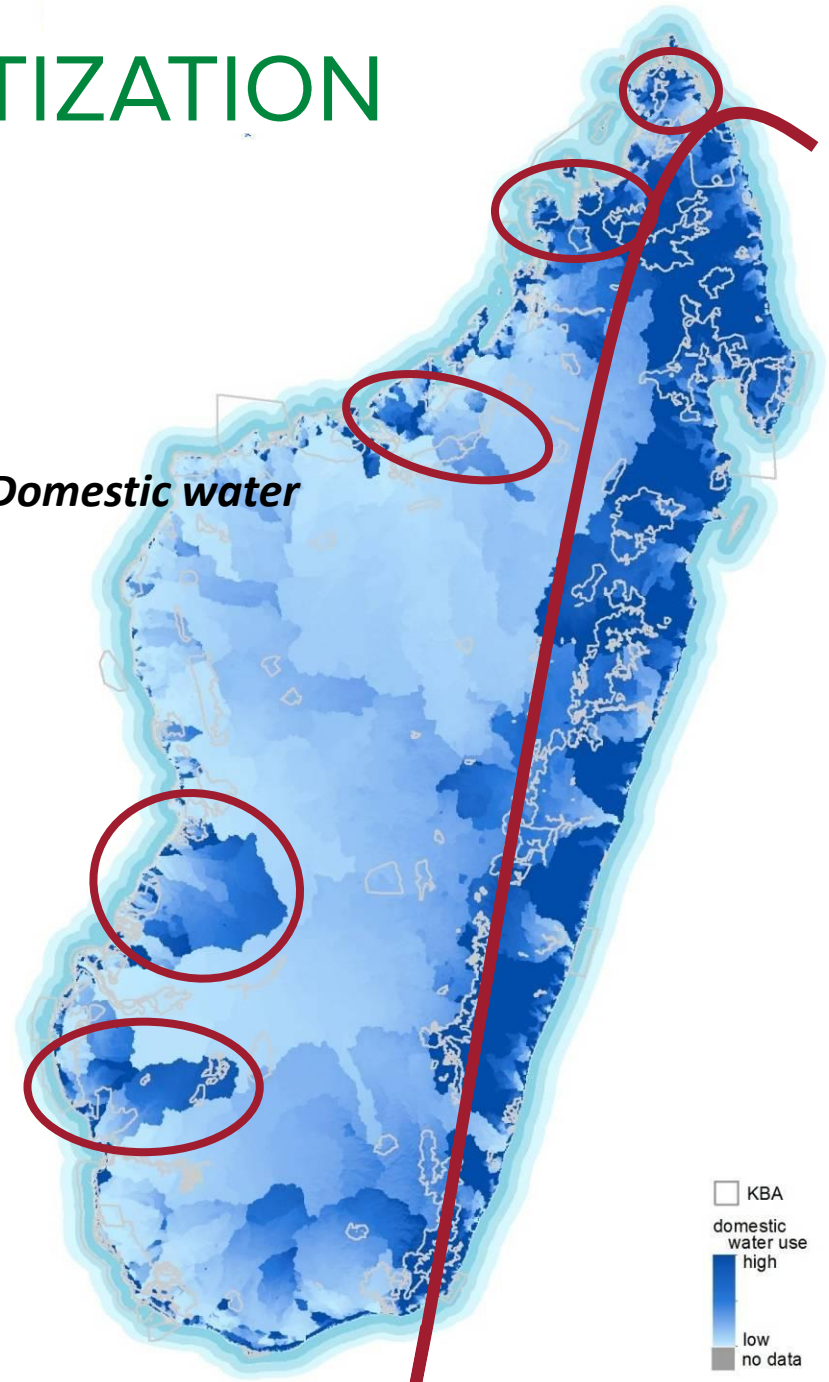water for domestic use

SITE PRIORITIZATION

Domestic water

Irrigation water

MAPPING IMPORTANT NATURAL CAPITAL

Important natural capital

Legend:
- KBAs
- high carbon stock
- important for freshwater
- mangroves & corals near vulnerable coast
- important inland fisheries
- important coastal fisheries
- important for NTFPs
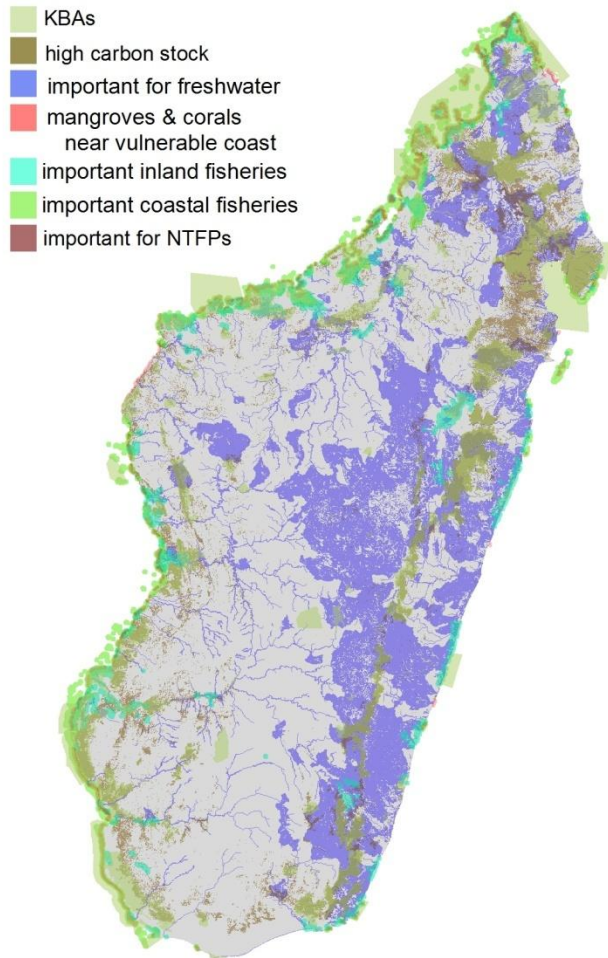
Important natural capital that is protected

Legend:
- important natural capital
- protected areas
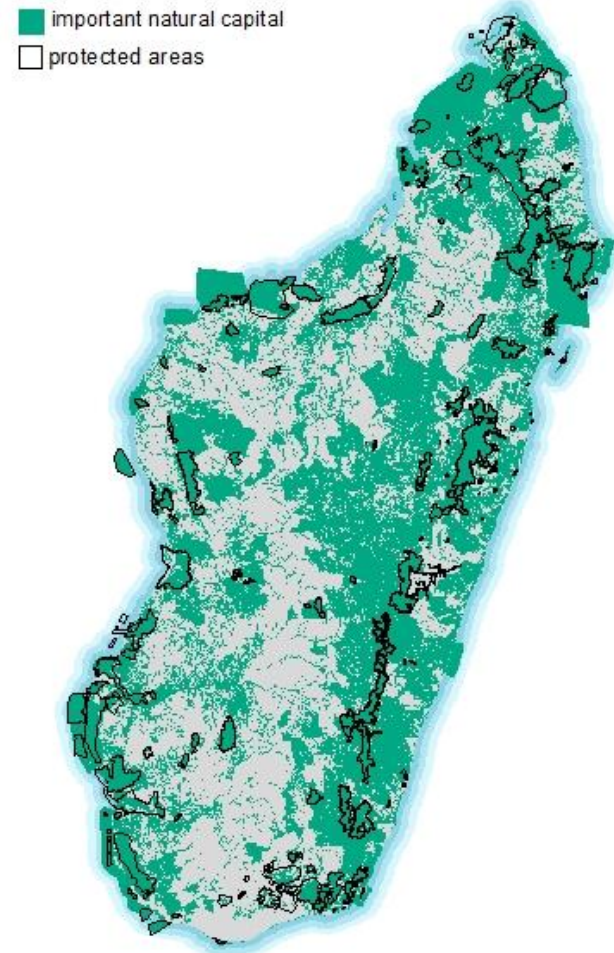
MONITORING IMPORTANT NATURAL CAPITAL

Percentage of Important Natural Capital in Protected Areas

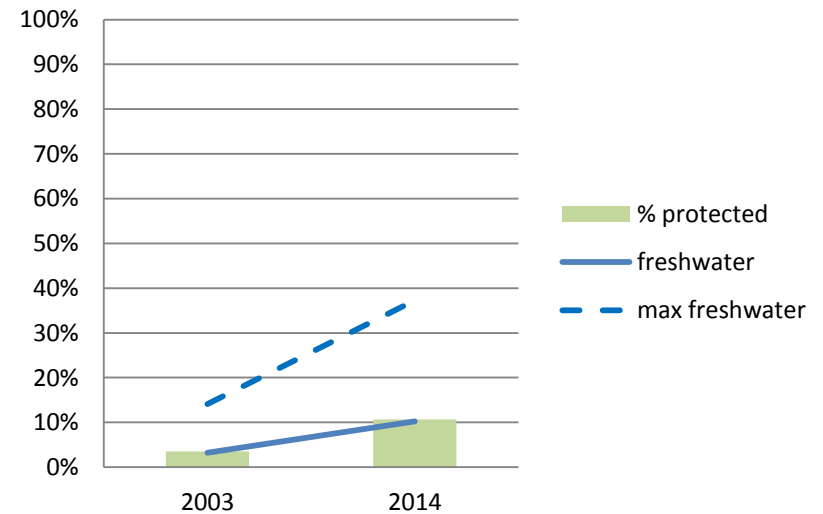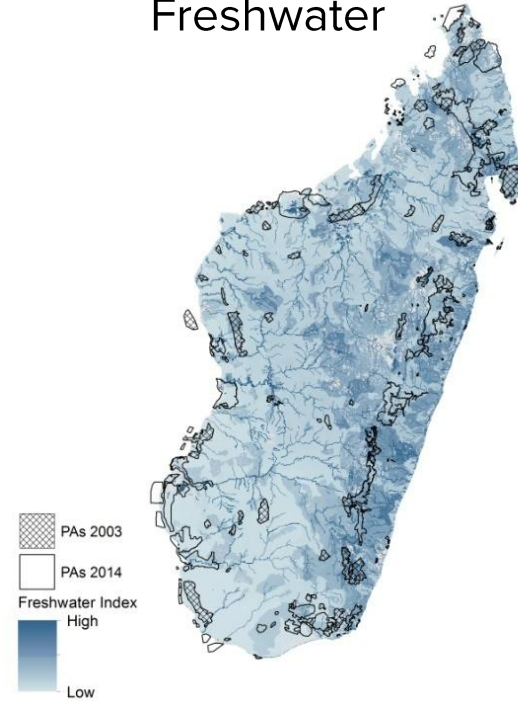| Category	Percentage
Biodiversity (KBAs)	50.0%
Freshwater	11.4%
Non-timber forest products	18.5%
Coastal protection	34.0%
Mitigation - high carbon stock	42.4%
Mitigation - high potential emissions	34.6%
All Important Natural Capital	17.8%
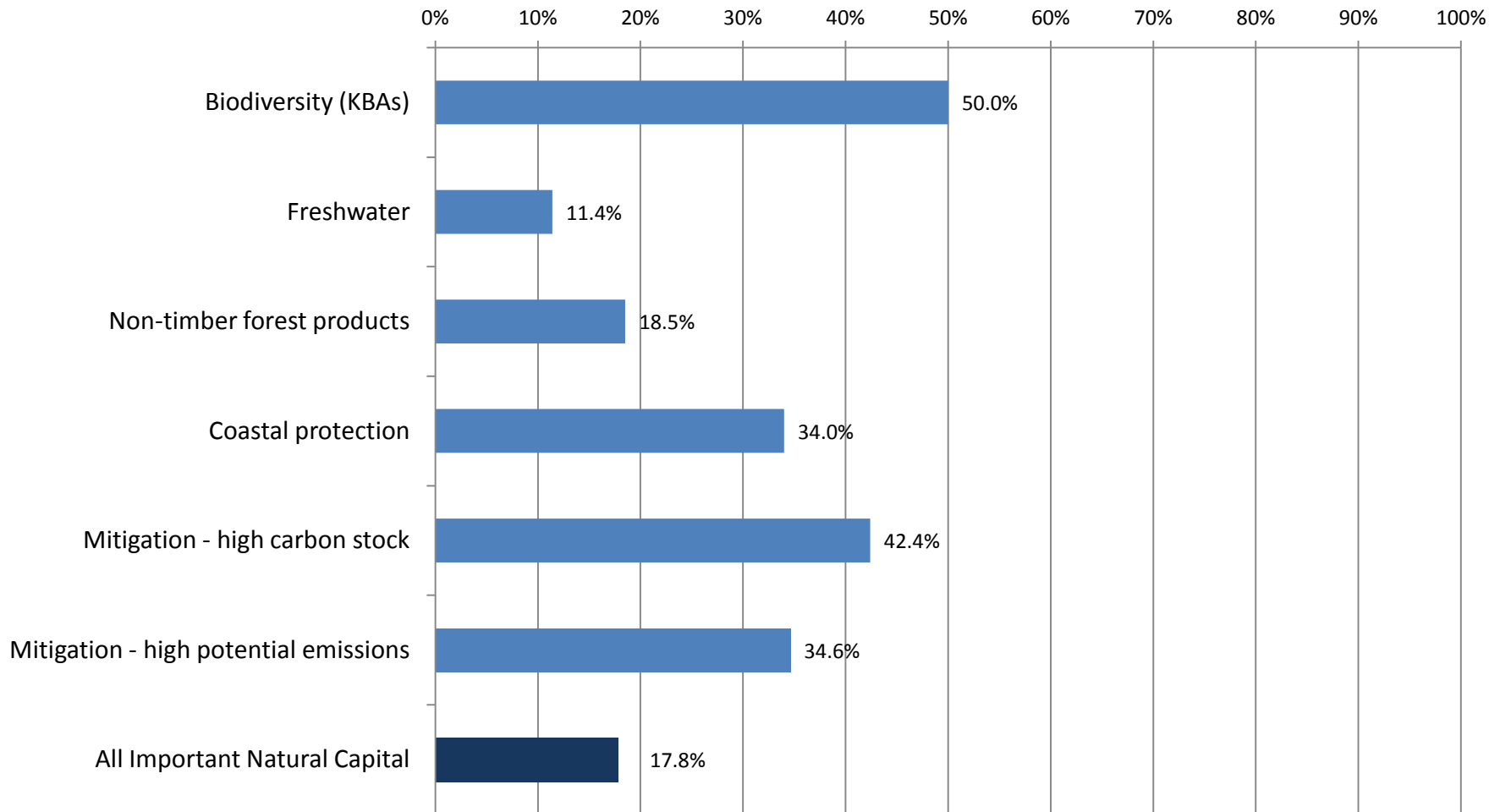
PROTECTED AREA REPRESENTATION

Carbon stock
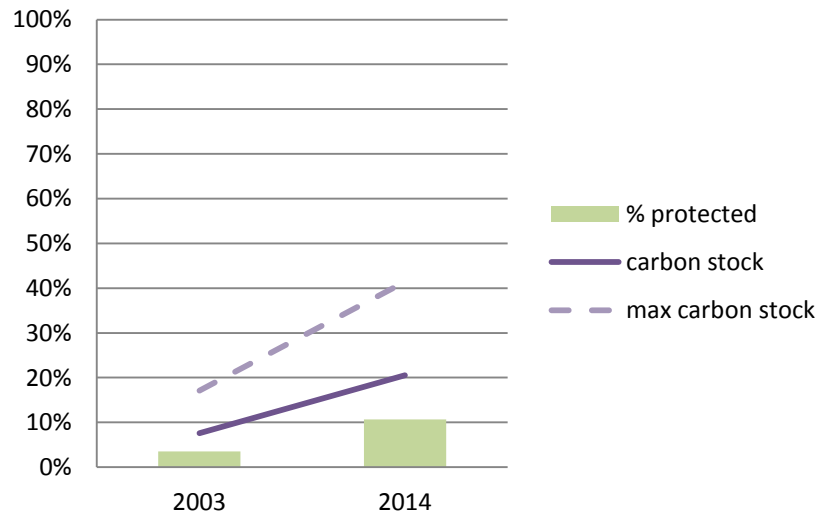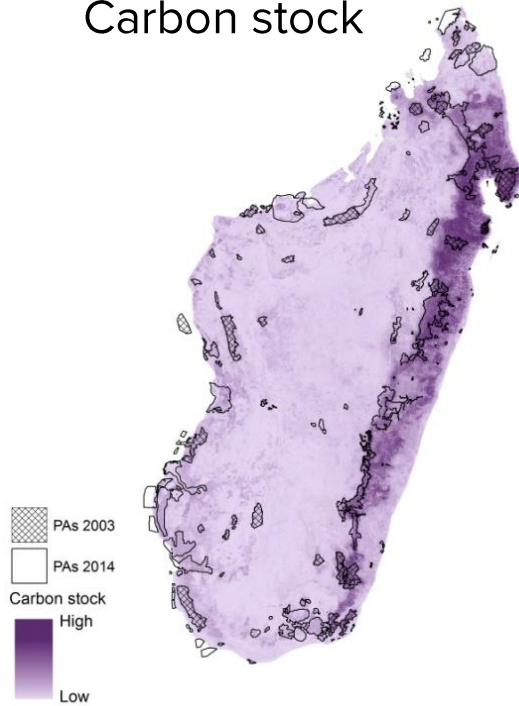
Freshwater

CONCLUSIONS

- Many demands for information about ecosystem services
- Many questions can be answered using existing data and "rapid" analyses (6 months, GIS modeling, in-country workshops)
- Stakeholder & expert consultation essential

Fishing for shrimp on the Tonle Sap Lake, Cambodia

Washing clothes near a rice paddy in Madagascar

LIMITATIONS & CAVEATS

- Not sufficient for all decision contexts, e.g. economic valuation, REDD+

- Can support prioritization but not sufficient for "Priority Setting"*

- Some ecosystem services lend themselves to large-scale analyses, others don't

- Lots of gaps in local/national datasets

- Global datasets and modeling can help, but

- Validation using local data & expert consultation essential

Forest cleared for rice and agriculture, Madagascar

*requires analysis of tradeoffs, feasibility, opportunity, cost, threats, etc.

Thank you

EXTRA SLIDES

DATA WISH LIST

| Biophysical characterization	Socioeconomic characterization	Threats	Existing land use & priorities
- Species distribution - Land / vegetation cover (terrestrial, freshwater, coastal/marine) - Land use - Hydrology - Current climate (precipitation, temperature, storms, floods, droughts) - Soils - Topography	- Settlement locations - Population data - Poverty rate - Food insecurity (malnutrition, undernourishment) - Dependence on forest products - Dependence on fisheries - Water source/supply data - Important economic sectors / contribution to GDP - Roads, bridges - Hydropower dams - Relevant studies – dependence on natural resources, ecosystem service assessments, climate vulnerability assessments	- Deforestation - Climate projections - Sea level rise - Disaster risk - Development plans / projections	- Agricultural areas - Fishing areas, catch data - Hunting areas, gathering areas, species collected - Concessions (mining, forestry) - Sacred natural areas - Ecotourism - Existing protected areas - Biodiversity priority areas

DATA SOURCES

Dataset	Cambodia	Madagascar
Landcover	JICA 2001	Kew Royal Botanical Gardens 2007
Forest cover	Hansen et al. 2013	ONE, DGF, FTM, MNP & CI 2013
Population	Landscan	Landscan
Hydropower	Mekong River Commission	JIRAMA
Irrigated rice	JICA 2001, MRC	BD500
Coral reefs & mangroves	Giri et al. 2011, Burke et al. 2011	Giri et al. 2011, Burke et al. 2011
Food security	Commune database	FID Commune Census 2007
Freshwater flows	WaterWorld v2 2014, MRC	WaterWorld v2 2014
Carbon stock	Saatchi et al. 2011	Saatchi et al. 2011
Protected areas	Open Development Cambodia	Conservation International
Biodiversity priority areas	KBAs (CI) + BPAMP (WWF)	KBAs (CI)

PROTECTED AREA REPRESENTATION
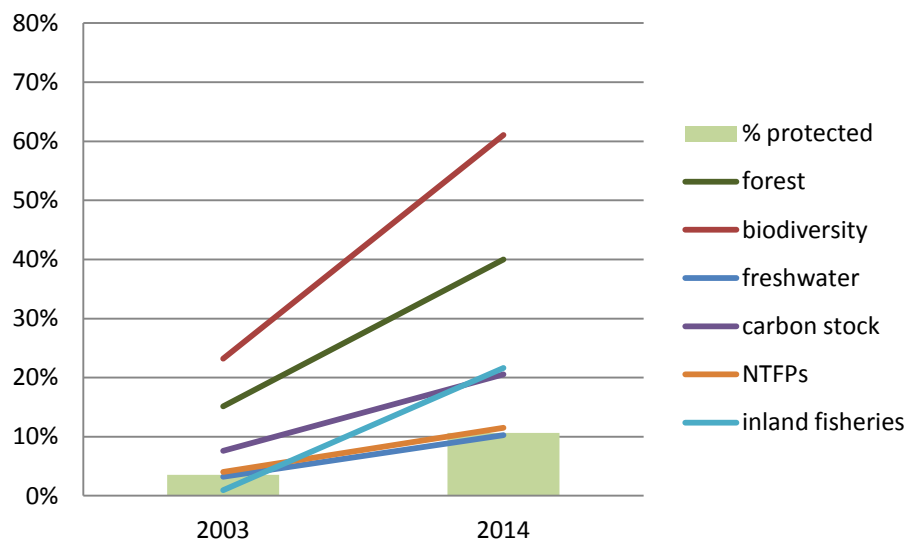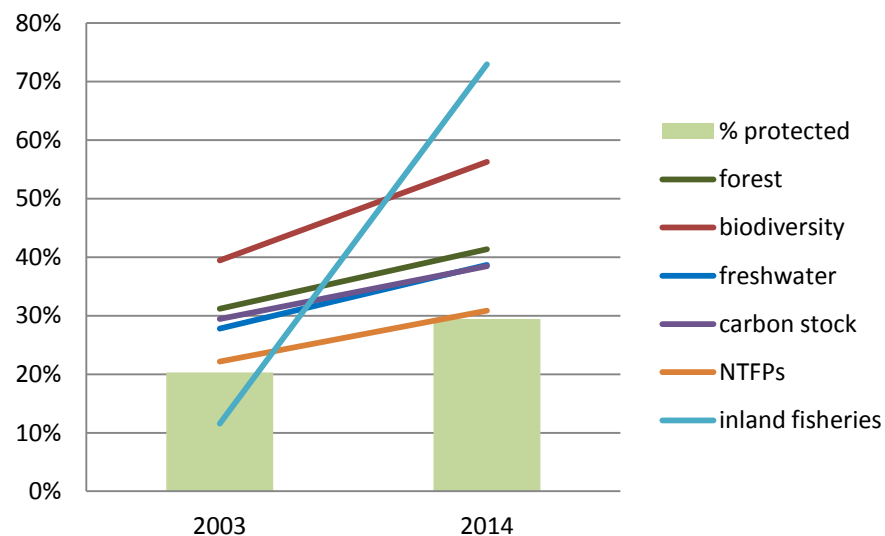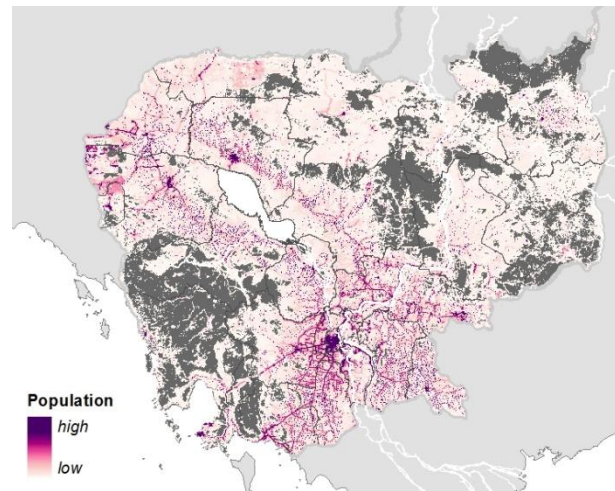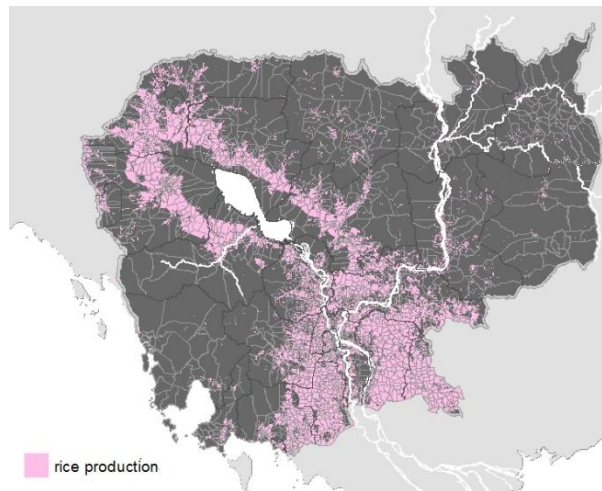
KEY BENEFICIARIES (CAMBODIA)

1. Population centers

2. Vulnerable groups: people vulnerable to storm surge or floods, food insecure populations, people dependent on forest products or fisheries

3. Important economic sectors: hydropower, rice agriculture, fisheries

Population centers

Irrigated rice

People dependent on fisheries

Population
high
low

rice production

Fishery
Dependence
high
low