



**NATURAL RESOURCE MANAGEMENT  
NATURAL WEALTH ACCOUNTING**



**Local Research. Global Knowledge. Informed Policies. Better Lives.**

## BACKGROUND

**“Natural Resource Management-Natural Wealth Accounting”** is a capacity building program launched by the Global Development Network (GDN) in 2014 to help three ecologically fragile countries—Madagascar, Mauritius and Morocco—to understand the interactions between natural resources and socio-economic activities.

The program aims to bridge the gap between local knowledge and high quality data in the field of natural capital accounting in order to bring policy-relevant evidence to the forefront of debate and practice.

Findings helped to raise awareness on local environmental issues through dissemination workshops and a policy dialogue in Paris. The studies showed that gathering evidence was a critical first step to incentivize key stakeholders toward action.



## PROGRAM OBJECTIVES

- Complement current initiatives for new methods for the valuation of ecosystem services.
- Provide local evidence on the use of natural capital accounting through case studies.
- Improve the capacity of researchers to provide policymakers with useful and implementable findings to better manage natural resources.

## PROGRAM ACTIVITIES

December 2014 - August 2016

**Competitive selection** Launching an open call for proposals and two-step selection by GDN and external experts.

**Data collection and research** Improving research capacity through technical advice from external experts.

**Research methodology workshop** Refining research proposals, training on natural capital accounting, networking with experts.

**Peer review workshop** Reviewing mid-term research outputs to ensure the research is on track.

**Research communication and policy dialogue** Ensuring policy uptake by presenting key findings and recommendations to inform economic and environmental policies.

**Supporting a Summer School in Montreal** on Ecosystem and Natural Capital Accounting.



**"...GDN addresses a gap in the 'natural wealth accounting' market: although there are individual research fellowships on offer in environmental accounting, there are very few (if any at all) other initiatives on research capacity building in natural wealth accounting in developing countries."**

Program Evaluation, October 2016

*Governance and economic accounting issues in the Mauritian water sector: towards sustainable management of a natural resource.*

Mauritius is facing significant water shortages, threatening the ready supply of the resource for both public and private use. Water scarcity across the island is largely driven by important seasonal differences between the wet and dry seasons, which generate penuries at the end of the latter, as well as defecting pipeline networks, through which 50% of water is lost.

The study builds and analyzes water accounts in Mauritius to inform decision-making on the distribution and uses of water in a relevant, standardized and coherent manner. It also builds an understanding of how different policies can impact water demand, considering various climate change scenarios. It highlights that current pricing is inadequate and leads to infrastructural deficiencies.

A thorough analysis of the governance structure of the water sector in Mauritius complements the analysis to illustrate how inadequate governance can lead to ineffective policies and hamper the sustainability of the water sector.

**Principal Investigators** Aleksandra Peeroo, Infragovernance Consulting and Riad Sultan, University of Mauritius.

**Team's Scientific Advisor** Bernard Barraqué (AgroParisTech)

### LESSONS FROM THE METHODOLOGY WORKSHOP

"The first workshop was held in Mauritius (January 2015) with the aim to provide more detailed and better research proposals. A survey held with the 8 participants indicates that they reported an increase in self-assessment skills and that they were confronted with a reality check with respect to research question formulation, literature review skills, data collection and key techniques (for case studies). They also mention an increase in knowledge on theoretical frameworks, a better selection of approach and risk assessment, and an increase in NRM-related and research management capabilities. The workshop was considered effective and efficient and the direct interaction with the mentors was appreciated."

**Program Evaluation, October 2016**



# HOW TO APPROACH NATURAL RESOURCE MANAGEMENT

## MAURITIUS WATER

while **77%** of rain in Mauritius falls in the summer and the rest in winter...

a shortage of water in the residential & non-residential sector persists **100%** of the year

Only about **8%** of water available is abstracted by the water supply industry.

governance issues in the water sector present further challenges

**Water scarcity** in Mauritius is a **major issue**

### ASSESSING THE SUSTAINABILITY OF THE WATER SECTOR

#### WATER ACCOUNTS

##### ASSESSED SITUATION BY

- Organizing hydrological or economic information in a coherent and consistent manner, based on UN standards.

#### CLIMATE CHANGE

##### CONSIDERED CLIMATE CHANGE IMPACTS IN ANALYSES OF

- Water trends
- Economic value
- Future water shortages

#### GOVERNANCE

##### ANALYZED

- Lack of coordination of different actors
- Politicized decision-making and lack of independence
- Transparency
- Attention to sustainability issues

### KEY FINDINGS

by **2030** Water shortages are expected to range between

**19Mm<sup>3</sup>**  
to  
**52Mm<sup>3</sup>**

**50%**  
of water is lost due to:

- Leaking pipeline network
- Faulty meters
- Theft

poor governance

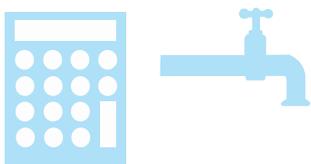
and current pricing is insufficient to finance long-term investments in the water sector

Making Mauritius vulnerable to a **water crisis**

### INFORMING POLICY

Water accounts create evidence to

restructure tariffs in different sectors



pass a **Water Act**

develop **performance indicators, sustainable policies and practices** for better governance (SDG 6)



*Supporting the sustainable management of coastal tourism in Morocco by quantifying the economic value of beach ecosystems.*

In order to meet the infrastructural demands of the tourism sector, 70% of the beaches of Tetouan in Morocco have been eroded through sand mining. In a paradoxical scenario, the same beaches which attract tourists during the summer are being mined for infrastructure development. This has led to a trade-off between short-term benefits and the long-term socio-economic advantages of preserving beaches as a natural resource.

The study first models the evolution of the coast using oceanography and, based on this scenario, proposes an economic valuation of the benefits provided by the beach ecosystem. It shows that the loss of revenue for hotels due to the degradation of the beaches exceeds the revenue generated from sand mining. Furthermore, the study found that this does not account for the additional losses that could result from climate change and other ecosystem services that the sand dunes provide.

**Principal Investigator** Maria Snoussi, Mohammed V-Agdal University.

**Team's Scientific Advisor** Harold Levrel (Centre international de recherche sur l'environnement et le développement)

### IMPACT

Tourism is the bedrock of Morocco's economy, but its beaches, in Tetouan, are fast disappearing. GDN supported a study that quantified the economic value of beach ecosystems.

Findings revealed that losses in the tourism sector due to degradation and loss of beaches will far exceed the revenue from sand mining between 2015-2048. The research shows that valuing beach ecosystem services documents degradation and highlights its costs, which creates incentives for better planning, management and implementation of economic and coastal development policies. Results informed the work of the Ministry of Urbanism and Planning to systematically monitor Moroccan shores.



# HOW TO APPROACH NATURAL RESOURCE MANAGEMENT

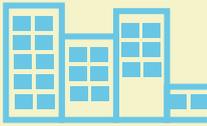
## MOROCCO COASTAL ECOSYSTEMS

\$\$\$   
**Coastal tourism**  
is a critical part of the  
Moroccan economy

and a **top priority** for

\$ economic growth  
 development  
 poverty reduction

This has led to a surge in

INVESTMENTS + CONSTRUCTION  
 +   
in the sector

as a result...

**70%**  
of beaches face **severe**  
**coastal erosion**

posing huge  
economic risks to the  
tourism industry

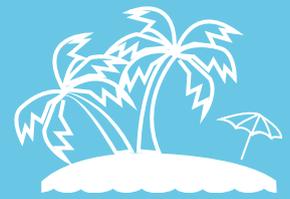
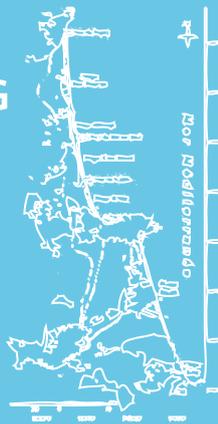
  
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### EVALUATING SERVICES PROVIDED BY BEACHES ON THE COAST OF TETOUAN

#### OCEANOGRAPHY



#### COASTAL MODELING



#### ECONOMIC EVALUATION OF SERVICES PROVIDED BY BEACHES

Based on available data

**2** ecosystem services  
were assessed:

#### SUPPLY SERVICE



sand extraction revenue

#### CULTURAL (TOURISM) SERVICE



losses in overnight stays

### KEY FINDINGS

within

**40-60** years



**THREE** beaches may  
disappear if **no action is taken**

Between

**2015 - 2048**



this may lead  
to a decline in



tourism

+



tourism-related  
jobs

there is a  
high risk of



### INFORMING POLICY

#### Valuing beach ecosystem services

documents degradation and highlights its costs



creates incentives for better planning,  
management and implementation of  
economic and coastal development  
policies (SDG 14)

*Proposition of methodologies to implement a natural wealth national inventory.*

Protecting Madagascar's unique biodiversity is a national priority, given it provides a significant amount of goods and services to a large part of the population, and also because the country is a globally significant biodiversity hotspot.

The study proposes to build ecosystem natural capital accounts for an administrative region using satellite images and *in situ* observations. The accounts provide evidence of the evolution of the land cover, water, carbon and ecosystem infrastructure in this region between 2004 and 2014. The construction of the accounts was a multi-stakeholder process, therefore creating better incentives for action to protect and promote sustainable land management in national and local planning, development processes and accounts.

**Principal Investigator** Solofo Andriamanantsoa Rakotondraompiana, University of Antananarivo.

**Team's Scientific Advisor** Denis Babin (Centre de coopération internationale en recherche

agronomique pour le développement - Université Du Québec à Montréal)

### IMPACT

Madagascar represents around 5% of all global biodiversity. Antrema in Madagascar is a biodiversity hotspot.

Solofo Rakotondraompiana applied a specific methodology, known as natural capital accounting, for measuring natural capital and ecosystem services through land-cover mapping, to a protected area in Antrema.

His research mapped the change in ecosystemic infrastructure between 2004-2014 and its socio-economic interactions. It also identified areas that needed extra managerial focus to rectify the degradation in the area.

As Rakotondraompiana points out, the most important impact of the study has been to show that implementation of natural capital accounting is feasible with few resources.



# HOW TO APPROACH NATURAL RESOURCE MANAGEMENT

## MADAGASCAR

### LAND

ANTREMA,  
MADAGASCAR

A small size protected area in the northwest region of Madagascar.

relies on  
**natural capital**  
**50%** **\$\$\$\$**  
of its wealth

Madagascar is home to

**5%**



of **global biodiversity**  
(World Bank, 2011)

with more than  
**11,000**



endemic plant species

**95%**  
of its reptiles



**92%**  
of its mammals



**exist nowhere else on earth**

(WWF, 2016)

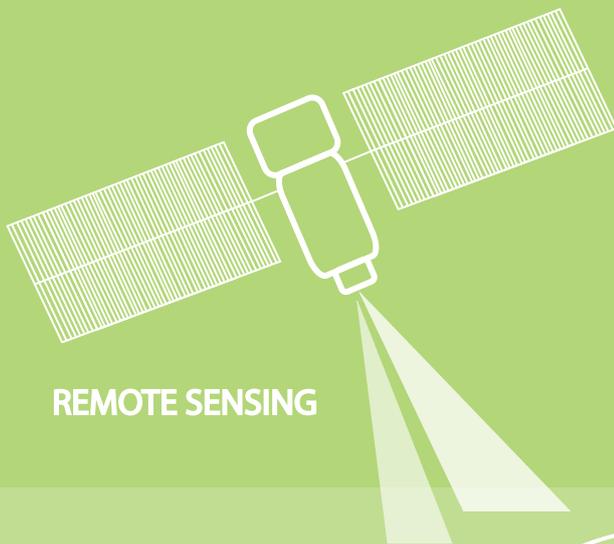


Recent **migration** from the city Mahajanga to Antrema has led to a need for local managers to better understand the **impact of socioeconomic activities on the environment** in order to preserve the area.

## TOWARDS NATURAL CAPITAL ACCOUNTS



INTERNATIONAL DATABASES  
AND NATIONAL REPOSITORIES



REMOTE SENSING

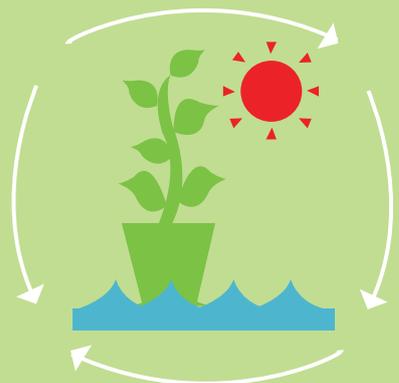


IN SITU OBSERVATION

The approach produced two land cover maps



the **changes of land cover** that occurred over ten years were recorded



bio-physical accounts for **changes in land cover, ecosystemic infrastructure and carbon** were built

## KEY FINDINGS

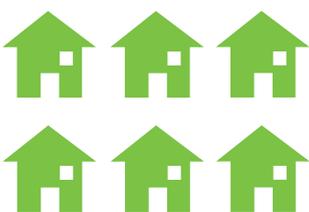
**2004**



villages accounted for

**10ha**

**2014**



villages accounted for

**34ha**

Migration has led to deforestation due to wood cutting to build houses and make coal



**27%**

of raphia palm areas

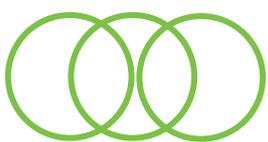


were transformed into meadows for houses and rice fields.

## INFORMING POLICY

### Natural Capital Accounts

provide a **synthesis of evidence**



enable a **dialogue between stakeholders**



Managers of the area



Government



Local populations

provide **incentives for action**



to protect and promote **sustainable land management** in national and local planning, development processes and accounts (SDG 15, Target 9)

## SCIENTIFIC COMMITTEE

Ricardo Martinez-Lagunes (Inter-American Development Bank/World Bank)  
Claire Plateau (Institut National de la Statistique et des Etudes Economiques)  
Jean-Louis Weber (International Consultant)

## GDN PROJECT MANAGEMENT TEAM

Pierre Bertrand: Senior Program Associate  
Yashika Kanojia: Program Assistant

## SUPPORTED BY



## KNOW MORE ABOUT THE PROGRAM

[www.gdn.int/nrm](http://www.gdn.int/nrm)