

Is climate change adaptation all about water?



International conference | 25-26 April 2023 | Brussels

BACKGROUND AND ISSUES



Background

- Rwanda's urban population (2,364,984 inhab.) is expected to grow to 30% in 2035: by 2050 it's expected to reach approximately 70%.
- Largest urban agglomeration is Kigali but **Secondary and satellite cities show** a growing trend in population and urbanization
- Poses huge **ecological impact** and magnate of **environmental hazards.....**due to **Climate change**
- The major environmental threats are **landslides and flooding.**
- Challenging topography
- The wetland was **degraded** and no longer capable of offering its ecosystem
- **Water resources degradation**

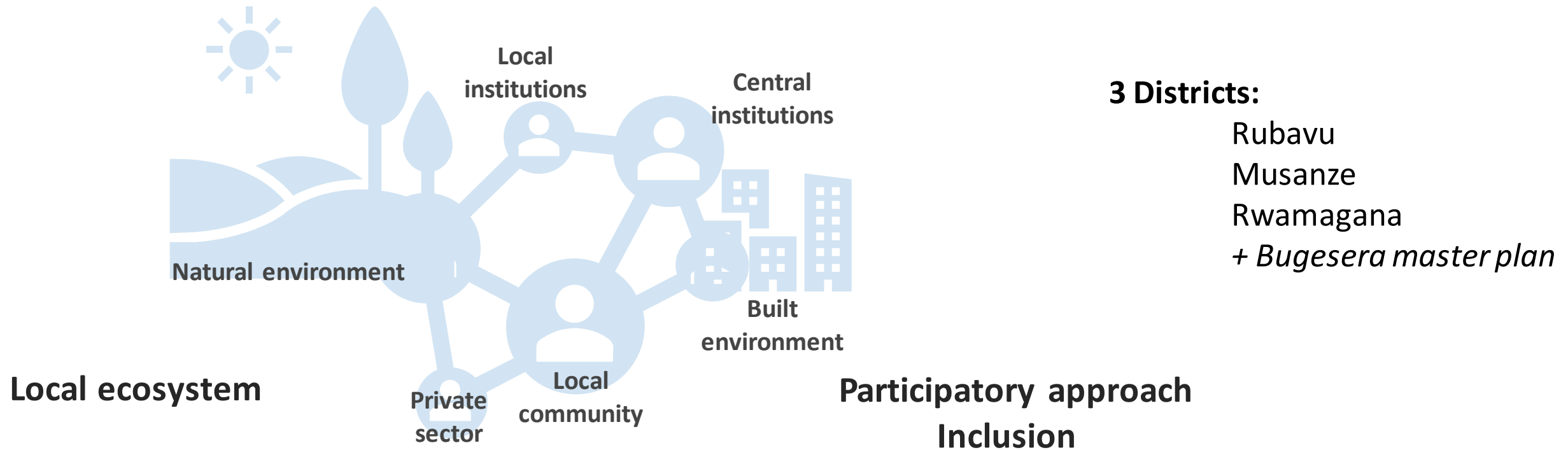
...AND MOST OF THE SOLUTIONS ARE BASED ON OLD NEWS!
EXISTING DATA VS DATA NEEDED (DATA QUALITY)



UEDi (Urban economic Development initiative): A holistic approach



to generate inclusive and sustainable economic development through urban infrastructure

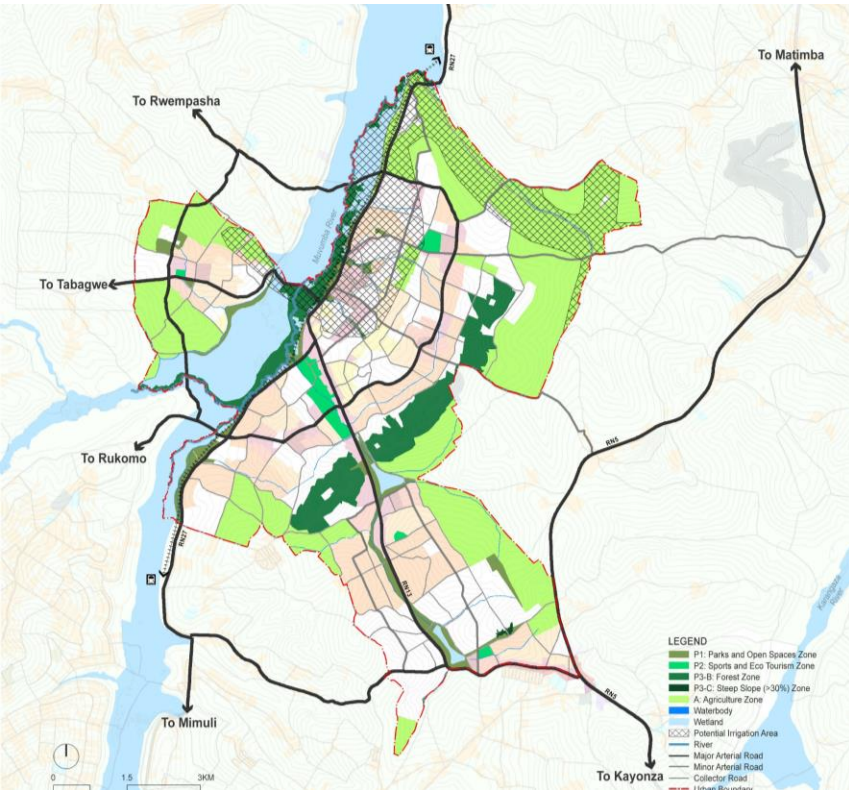


a holistic approach that considers **the city as a living being, a complex ecosystem**

UEDi Project in Rwamagana District

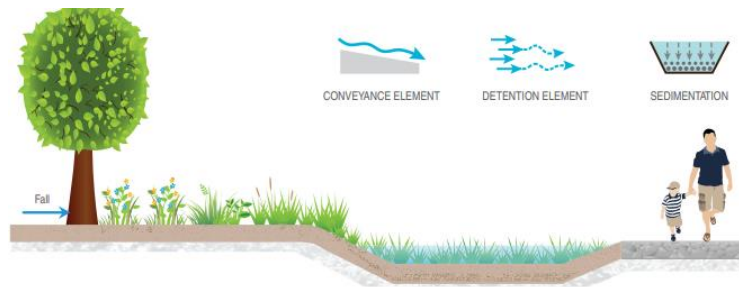


1. LOCAL LAND DEVELOPMENT MASTER PLAN- Green Network

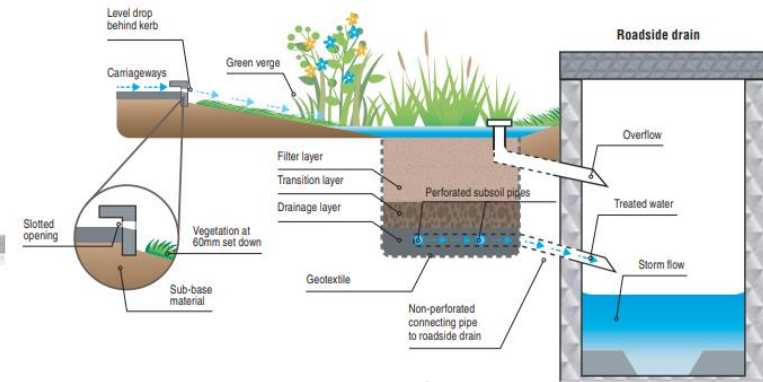


Large-scale integration of blue-green infrastructure has been looked into for satellite cities

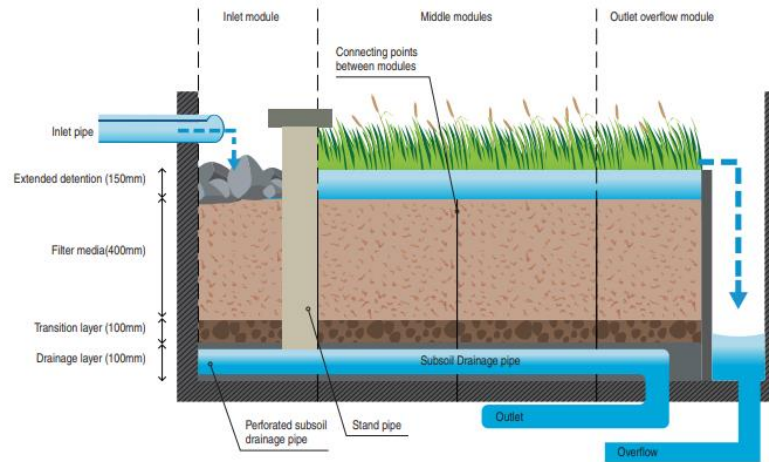
2. Resilient and climate responsive road infrastructure/Integrated road profile



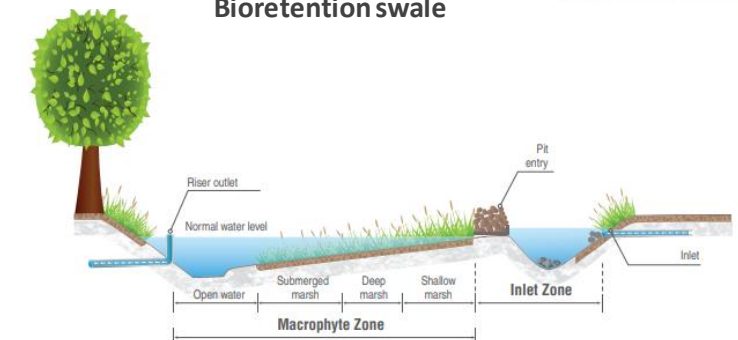
Vegetated swale:



Bioretention swale



Bioretention basin



Constructed Wetland

NBS techniques are integrated into infrastructure detailed design

Source: ABC Water guideline

UEDi Project in Musanze district

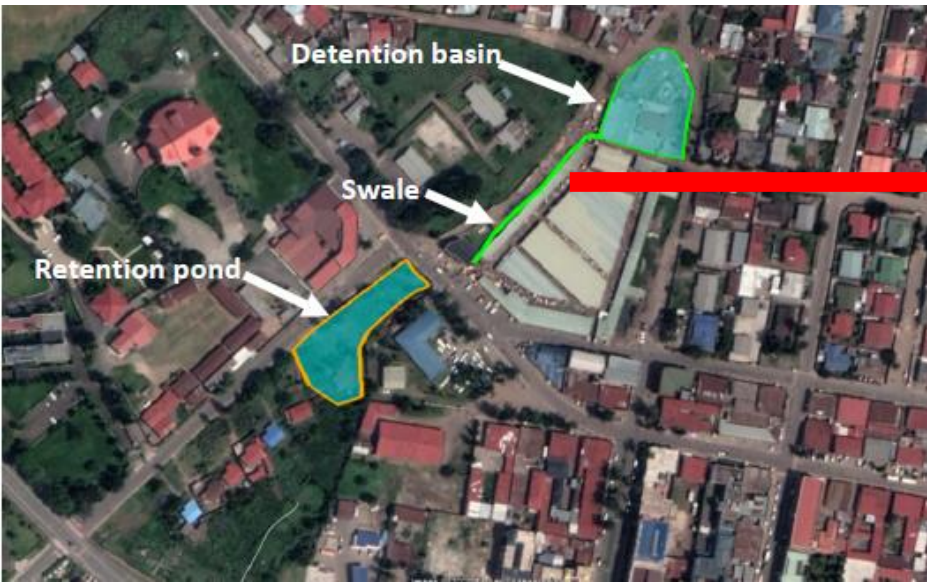


Musanze Storm water management plan Project

- *Vision at the horizon 2050;*
- *Frequent flooding due to lack of proper SWMP*
- *Detailed hydrological model of city;*
- *Flood line analysis to inform developments;*
- *Flood-prone area identification*

Categories of solutions

- Provide storage for peak flows using NBS
- Upgrade channel sections of river
- Replace/upgrade existing wooden bridge crossings which overflow with stone arch bridge
- Provide NBS solutions for the Agri-market and the food court



Typical Swale (Agri-market)



Existing detention basins to be rehabilitated

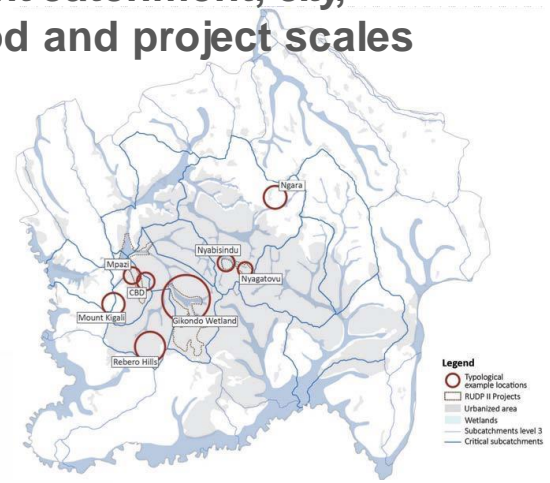


SECOND RWANDA URBAN DEVELOPMENT PROJECT (RUDP-II)

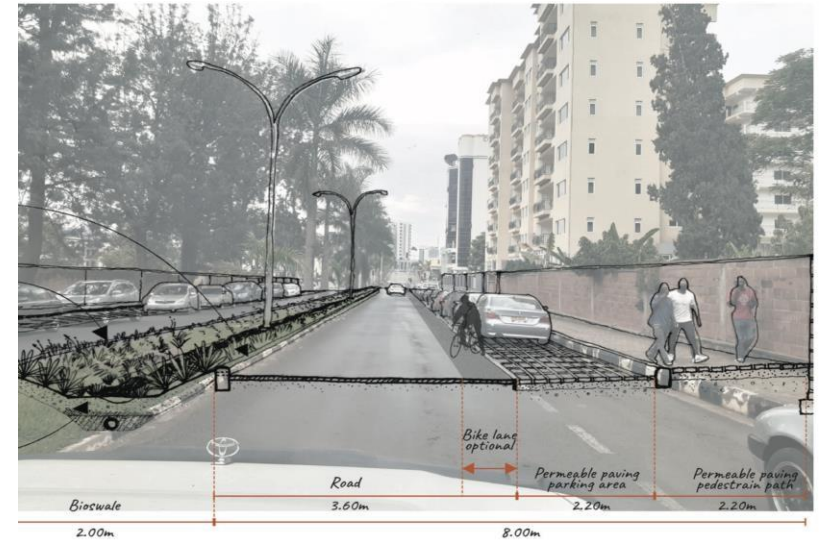
A Landscape Analysis and Pre-Feasibility Study of Urban NBS to Reduce Flood Risk and Strengthen Resilience in Kigali



I. Assessment catchment, city, neighborhood and project scales



II. Twenty-seven NBS in Toolbox, design & implementation guidance



IV. City-wide strategy for Kigali

Big difference: The wetland system is the city's most important NBS and should (together with the forest) be protected and cherished as such.

1000 x 1 measures: By including NBS in ongoing developments, the flood risk reduction system can grow over time, in a cost-effective way.



Defacto urbanism

III. Neighborhood and project recommendations



Lessons Learnt/Recommendation



- Overwhelming dominance of **grey-infrastructure solutions** for water management
- Co-Design ensure active **engagement of local communities** and active participation
- Lack of **Sectoral coordination**
- Lack of technical tools and **knowledge among professionals** to offer alternatives to ‘conventional’ grey solutions.
- **Traditional and local knowledge**, including indigenous peoples.
- NBS: **conflict with alternative land uses**



Figure 4.11: Green Fingers Concept Option - Impression of the Central Plaza in the New CBD Core.
Source: SCS&P

URGENCY of transition from old ” to New Urban Agenda.

- Urbanism: From ‘housing’ to **cities**
- From national to city level for **delivery and innovation**
- From the ‘standard’ to **local context**.
- From statutory planning to **flexible planning**
- From hierarchical decision making to **multi stakeholder engagement and citizen involvement**

Is climate change adaptation all about water?



International conference | 25-26 April 2023 | Brussels

Societal (stakeholders involvement) perspective

Luc Janssens de Bisthoven (Royal Belgian Institute for Natural Sciences, CEBioS)

Prominent elements of the context

Science → International Union for Conservation of Nature →

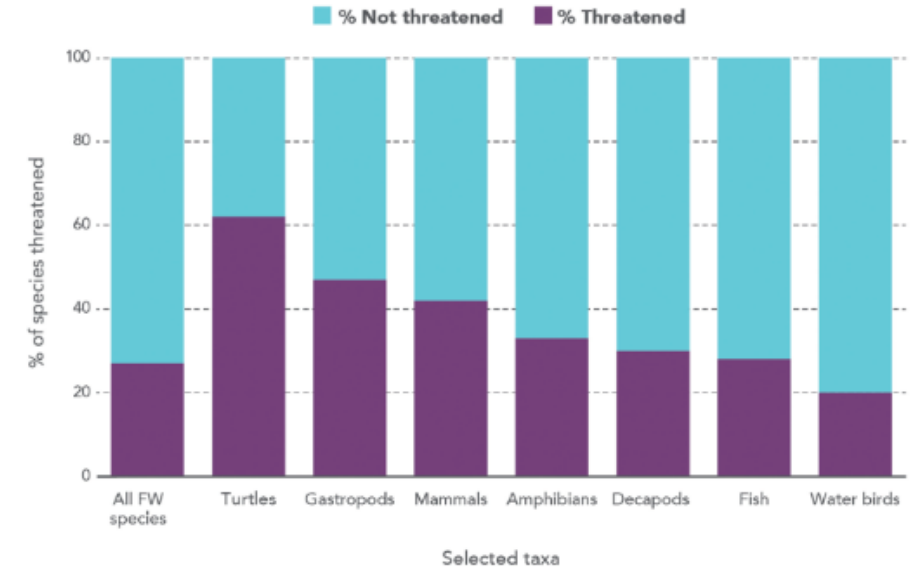
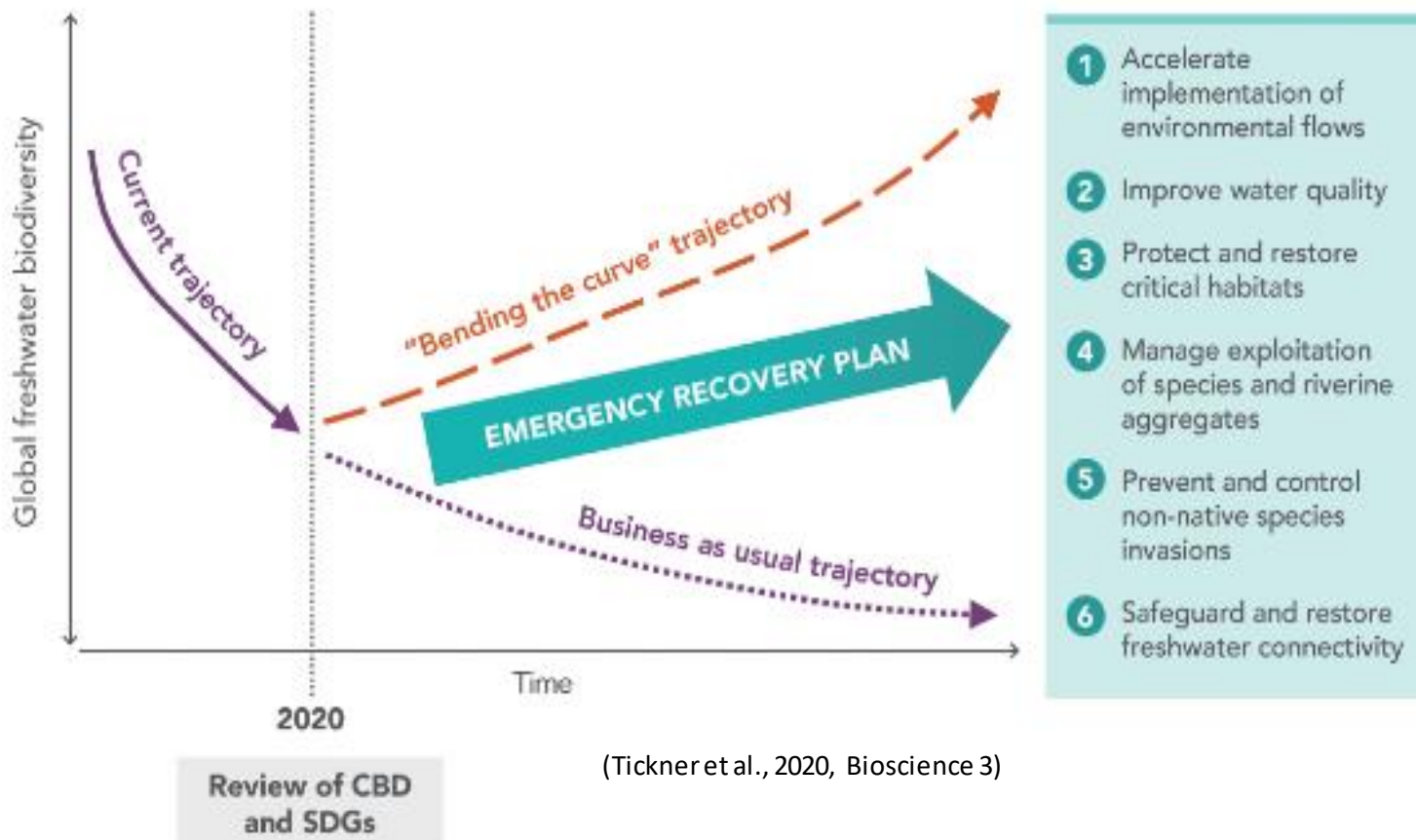
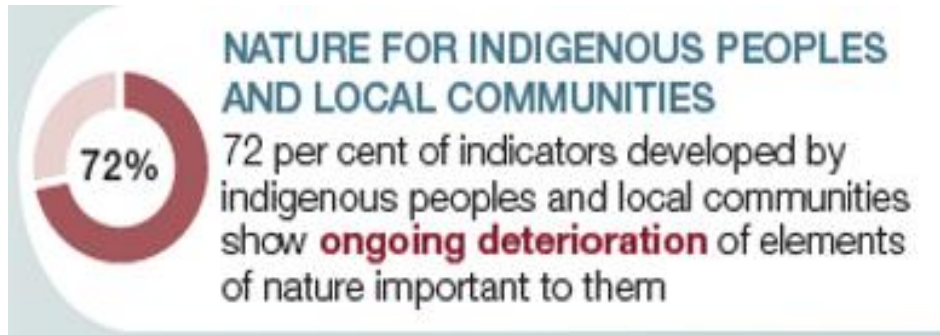


Figure 1. Proportions of freshwater taxa threatened with extinction. Source: IUCN (2019).

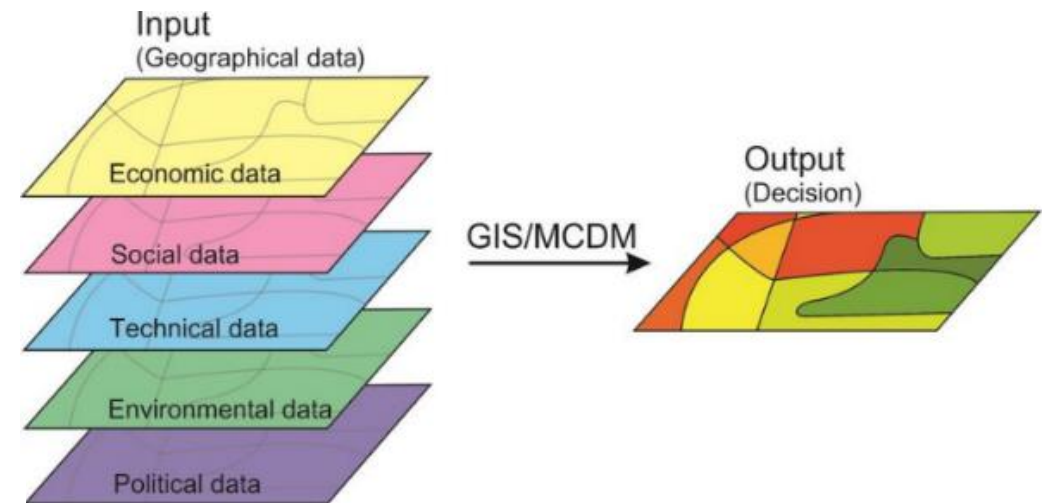
“ Freshwater biodiversity is disproportionately threatened and underprioritized relative to the marine and terrestrial biota, despite supporting a richness of species and ecosystems with their own intrinsic value and providing multiple essential ecosystem services.” (Van Rees et al., 2020. Conservation Letters)

Figure 2. The Emergency Recovery Plan for freshwater biodiversity: Six priority actions for global action to bend the curve of freshwater biodiversity loss that should be reflected in the post-2020 biodiversity framework. Threats to freshwater biodiversity are often synergistic so coherent planning of interacting priority actions to address such threats is necessary.

→ Intergovernmental Platform for Biodiversity and Ecosystem Services → Convention on Biological Diversity / Global Biodiversity Framework → Solutions?



IPBES

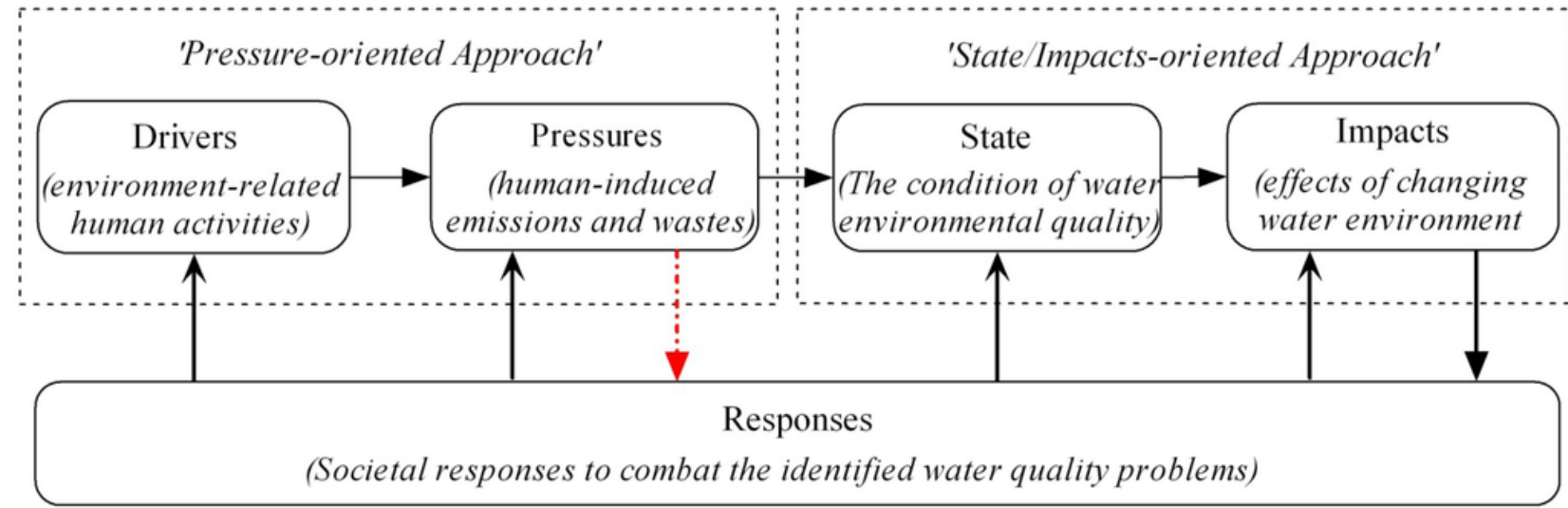
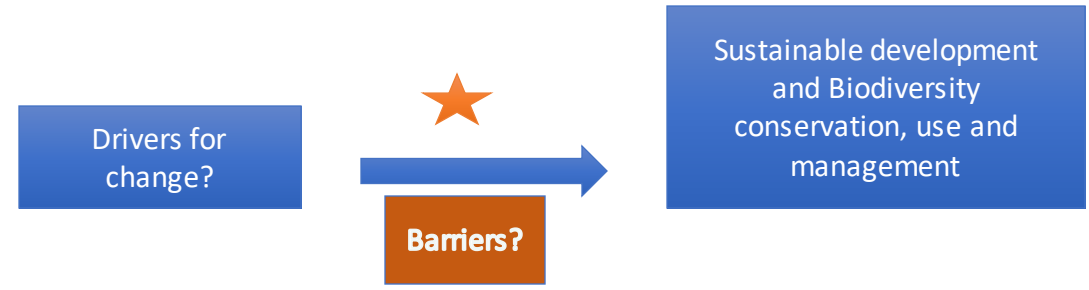
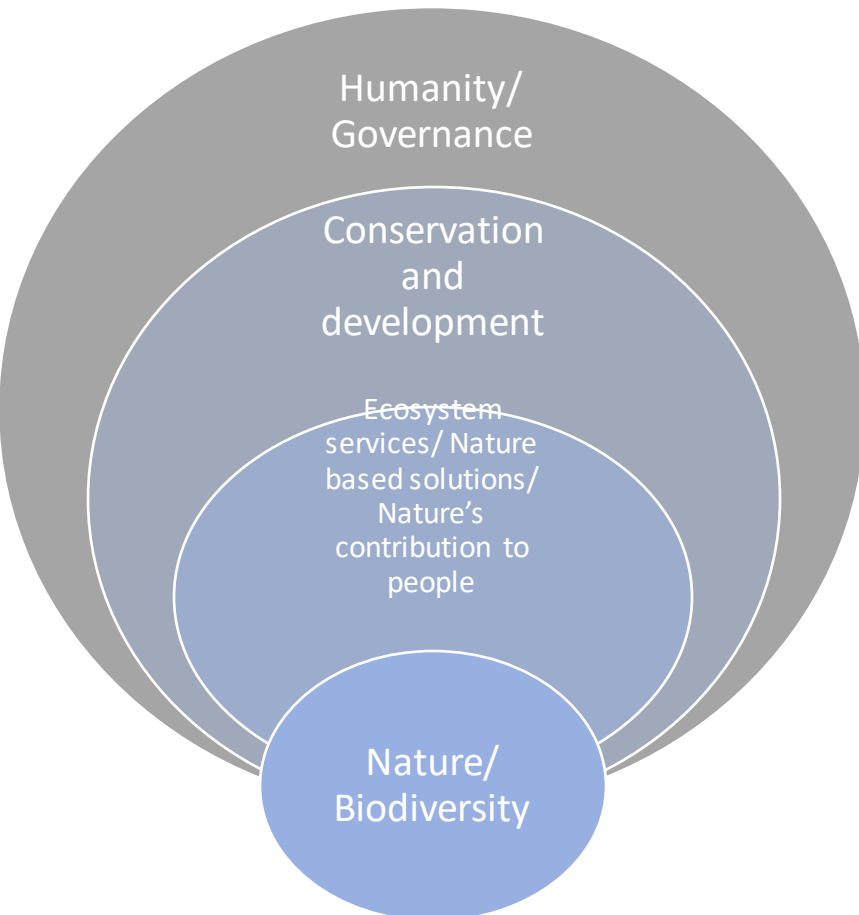


Kunming-Montreal Global Biodiversity Framework: 23 targets

TARGET 1

Ensure that all areas are under participatory integrated biodiversity inclusive spatial planning and/or effective management processes addressing land and sea use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities,

Resilient socio-ecological systems



“Innovative” features

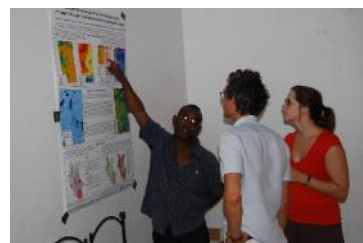
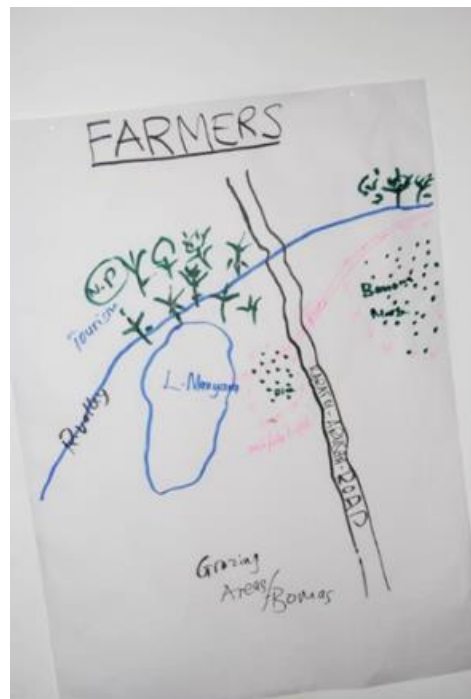
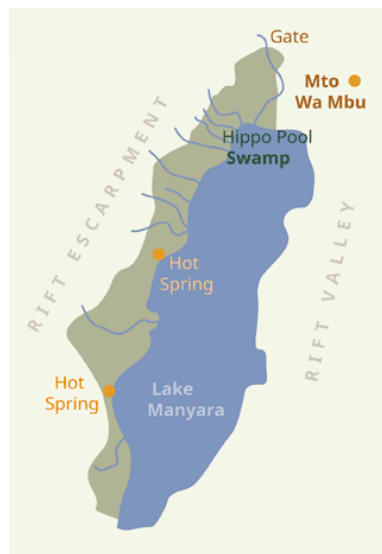
Listen to stakeholders to find solutions for the management of freshwater



Lake Manyara, Tanzania



Community mapping



Research article

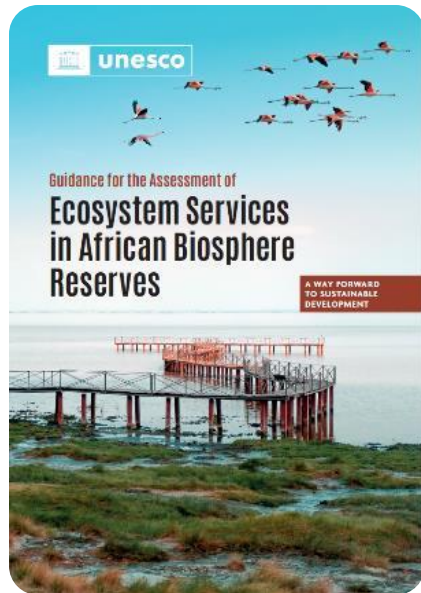
Social-ecological assessment of Lake Manyara basin, Tanzania: A mixed method approach

L. Janssens de Bisthoven^{a,*}, M.P.M. Vanhove^{a,b,c,d,m}, A.-J. Rochette^a, J. Hugé^{i,k,n,o}, S. Verbesselt^b, R. Machunda^d, L. Munishi^d, M. Wynants^e, A. Steensels^b, M. Malan-Meerkotter^f, S. Henok^f, T. Nhiwatiwa^g, B. Casier^h, Y.A. Kiwango^l, R. Kaitila^h, H. Komakech^h, L. Brendonck^h



Valuation of ecosystem services

<https://unesdoc.unesco.org/ark:/48223/pf0000382278>



d Social-Ecological system

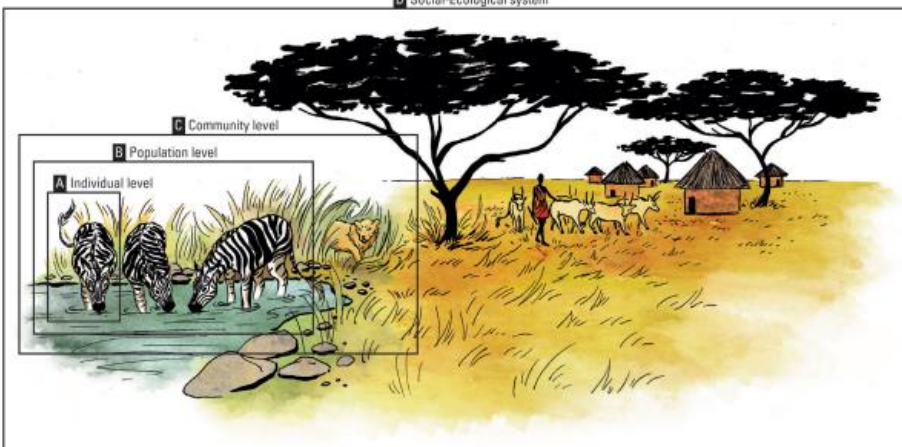


Illustration : Mado Berthet, RBINS

FIGURE 1. STRUCTURE OF THE MANUAL

I would like to...

I am a community representative, community leader, NGO representative

I am a policy maker, decision maker, politician, authority

I am a Biosphere Reserve manager

Better understand the concept of ecosystem services

Refresh my understanding of MAB

Have some idea about existing rapid assessment tools for assessing ecosystem services

Understand how to value ES and have some examples
Understand Payments for Ecosystem Services

Translate this knowledge into concrete actions towards better conservation, sustainable development and a greener economy



CHAPTER 1
Ecosystem services



CHAPTER 2
Biosphere Reserves



CHAPTER 3
Ecosystem Services Assessment Tools



CHAPTER 4
How to value ecosystem services?



CHAPTER 5
From ecosystem services assessment to real changes

And throughout the manual



Examples and case studies from African Biosphere Reserves

References to additional useful resources at the end of each chapter

Good practices



To **elicit perceptions and judgements, ideas, traditional knowledge**

With structured, moderated conversation, dialogue, debate with stakeholders, tiered and multi-actor process



OUTCOMES:

- increased **information** and **knowledge** for all parties
- increased **understanding** of each other, of the situation, environmental conflict, **trade-offs (arbitrages)**
- Provide **transparent** governance, **fair, equitable** and effective **decisions**, strategies, plans and implementation of management
- **DECISION SUPPORT SYSTEM** based on different knowledge systems (science, traditional)
- Increased **ownership** of conservation & other processes!
- Increased chance of **success** (and **impact!**) of decisions, measures, management of freshwaters & other ecosystems

Lessons learned



UN Water Conference and main conclusions → related to stakeholders



1. Professionalisation of (multi-actor & South-South) stakeholder engagement (and budget accordingly)
2. Holistic & integrative approach, focus on RESILIENCE
3. Innovation within existing institutions
4. → capacity building
5. Multi-disciplinarity teams
6. Embrace complexity !
7. **Development Cooperation** is about change management with people
8. **Nature-based solutions** work if they are human-based → human in the sense of humanity, respectful steward of people & nature → **Nature's contributions to people**

Thank you!



Is climate change adaptation all about water?



International conference | 25-26 April 2023 | Brussels

The economics of NBS in climate change adaptation



What we should do

... and why we *do not always* do it.

Expected economic impact of climate change



EVALUATION OF THE SOCIO-ECONOMIC IMPACT OF CLIMATE CHANGE IN BELGIUM

STUDY COMMISSIONED BY THE NATIONAL CLIMATE COMMISSION

Final Report

Koen De Ridder¹, Koen Coudere², Mathieu Depoorter², Inge Liekens², Xavier Pourria², David Steinmetz², Eline Vansuytrecht¹, Katelijne Verhaegen², Hendrik Wouters²

¹ VITO
² KENTER
³ ECORES

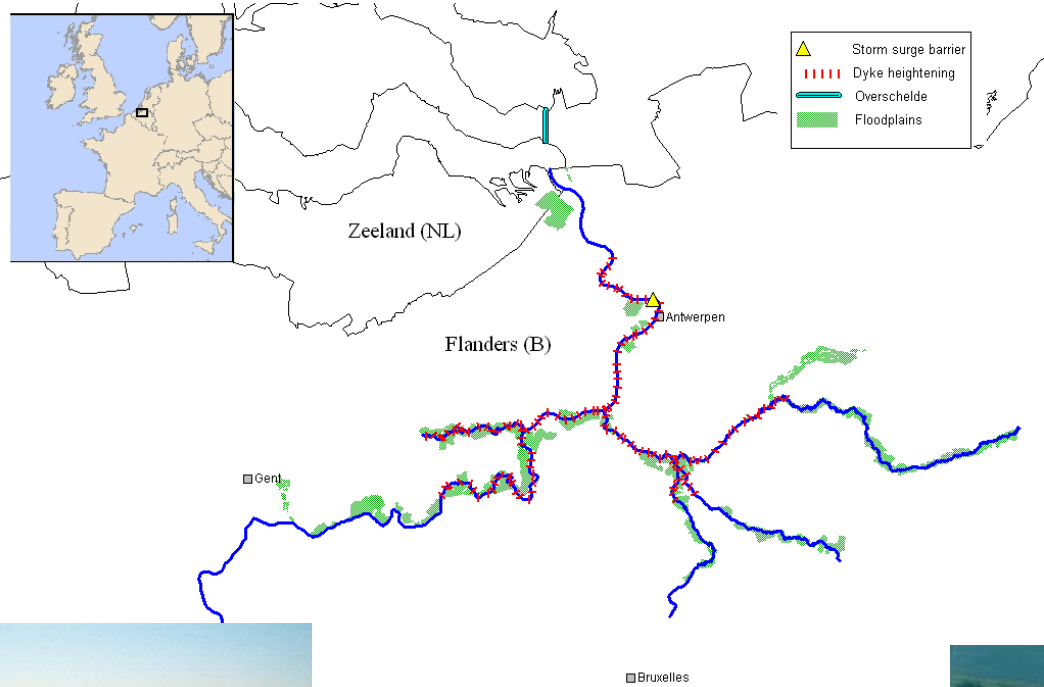
July 2020 (2020/RMA/R/2271)



- Costs of climate change: 9,5 billion € per year in 2050, 2% of GDP
- Main costs:
 - Health impact and reduced labour productivity due to heat stress
 - Material damages due to floods
 - Drought impact agriculture
 - *Transboundary effects, biodiversity*



The Flanders Sigmoplan



The Flanders Sigmoplan



	Costs	Benefits	Other	Pay back
Storm surge barrier	387	727	- 1	41
Higher Dykes	240	691	-	27
Floodplains 1/4000	233	733	+ 6	20
Risk based 'optimal' combination floodplains + dykes	139	730	+33	13

The Flanders Sigmaphan – we are doing it.



Overview of ongoing projects – www.sigmaphan.be

Flemish adaptation policy



Impact category	Expected damages due to climate change	Benefit ratios of measures	cost of	Importance co-benefits in assessments of total benefits	Foreseen investments of Flemish authorities	Main role of Flemish authority
Coastal zone management	++	10		+	+++	Implementor
Fluvial flooding (big rivers)	++	1 – 5		+	+++	Implementor
Droughts and water scarcity	++	unknown		++	++	Facilitator
Pluvial flooding (heavy rainfall in urban areas)	++	0.5 - 2		++	+	Facilitator
Heat stress	+++	unknown		++	+	Facilitator

We are not doing enough in some areas

Why do we not invest more in NBS?



“If you possess so much natural capital,
why do you need additional funding?”

Return on investment rainwater infiltration



My return on investment rainwater storage tank

- Costs: 3.000 €
- Subsidy: 500 €
- Savings on water bill: 30 m^3 (toilet, washing machine) $\times 4,3\text{€}/\text{m}^3 = 129\text{€}$
- Pay back time: 19 years



My return on investment nature-based infiltration measures: 0

Societal benefits

- Protection water resources (**avoid scarcity cost**)
- Reduced pollution from combined sewage overflows
- Flood risk prevention



Possible strategies



Implementation of more NBS is a challenge, but feasible.

Combination of measures:

- We need green and grey infrastructure.
- Better demonstrate and communicate benefits of NBS as a cost-effective solution. Be realistic.
- A longterm financing strategy. Reform of economic instruments to provide a bigger stimulus to invest in NBS:
 - Reform water tariffication systems, infiltration bonus, solidarity mechanism,...
 - Synergies: health, insurance sector, biodiversity policy, spatial planning

More information?



- steven.broekx@vito.be
- <https://www.natuurwaardeverkenner.be/>
- <https://klimaat.vmm.be/>
- <https://klimaat.be/news/2020/socio-economische-impact-in-belgie>
- <https://remotesensing.vito.be/case/natural-capital-accounting>
- <https://papbio.vito.be/>

Is climate change adaptation all about water?



International conference | 25-26 April 2023 | Brussels

Water and Climate



Water access and **resilient water management** are crucial for the Paris Agreement and SDG



Similar means of implementation (finance, technology development, data collection technology transfer and capacity building)



Holistic, **cross-sectoral** approach accelerates **mitigation** and **adaptation** including understanding **loss and damage**



Reforms to meet the scale and urgency of the **development** and **climate crisis**





Mozambique



- Significant water and energy resources
- High vulnerability to climate change
- Access
 - 83.5% of urban population
 - 54% rural access
 - Enabel project in Gaza
- Sanitation: around 40%
- Demand is expected to increase due to population growth, urbanization, industrial development, climate change, etc.

Financing sources



Needs: 3.1 billion (2020-2029)

What do we do next?

- Nexus approach
 - Food Security
 - Energy,
 - Forestry,
 - NbS
 - WEFE
- TA
- Adaptation benefits mechanism
- Loss and damage



Is climate change adaptation all about water?



International conference | 25-26 April 2023 | Brussels