Research Group
Ecosystem Management
University of Antwerp

Ecosysteem diensten: Het concept om economie en ecologie te verzoenen?

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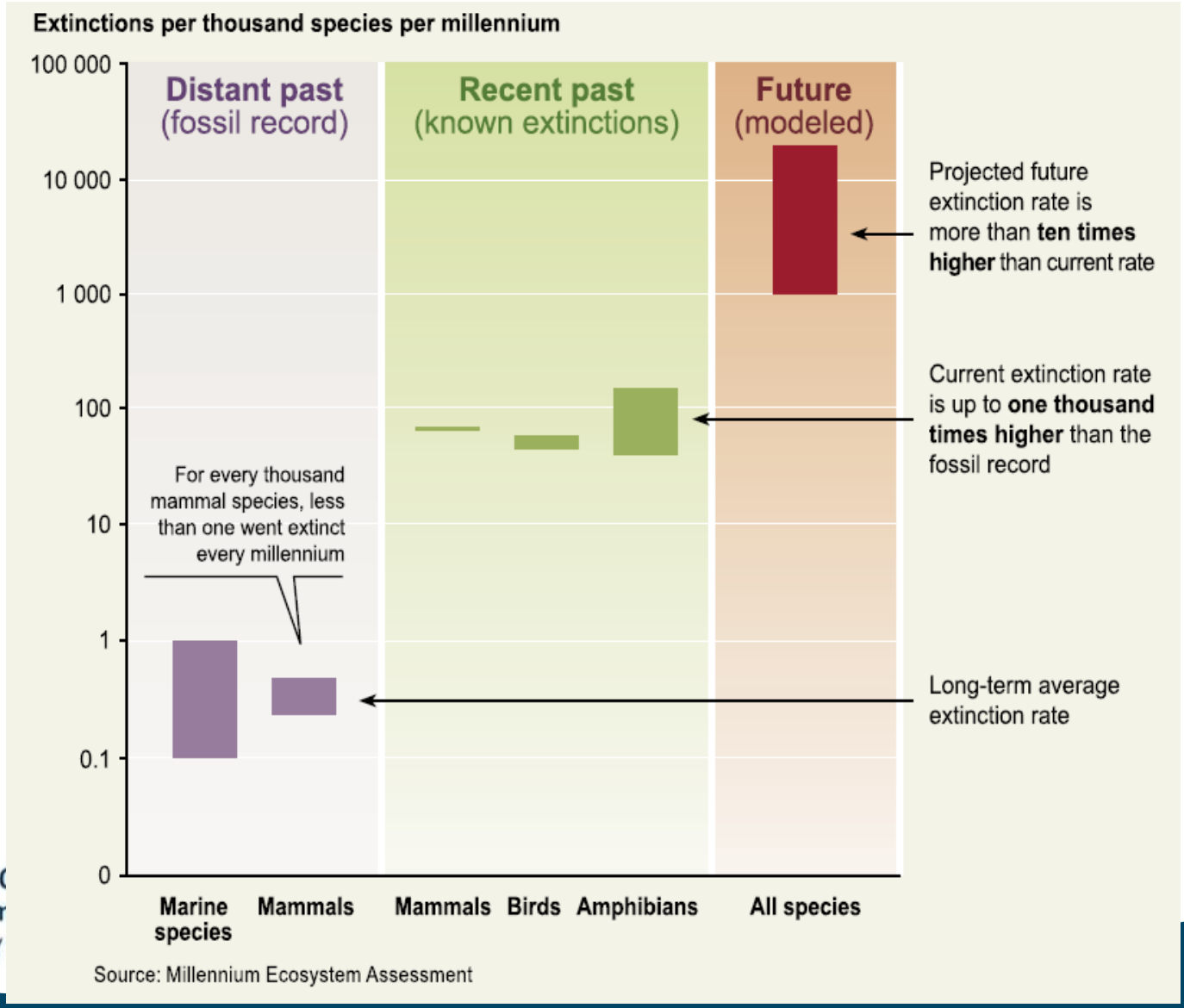
Universiteit Antwerpen
Dr. Eric Masson
Université Lille 1

Date (optional)

University
of Antwerp

Global loss of biodiversity



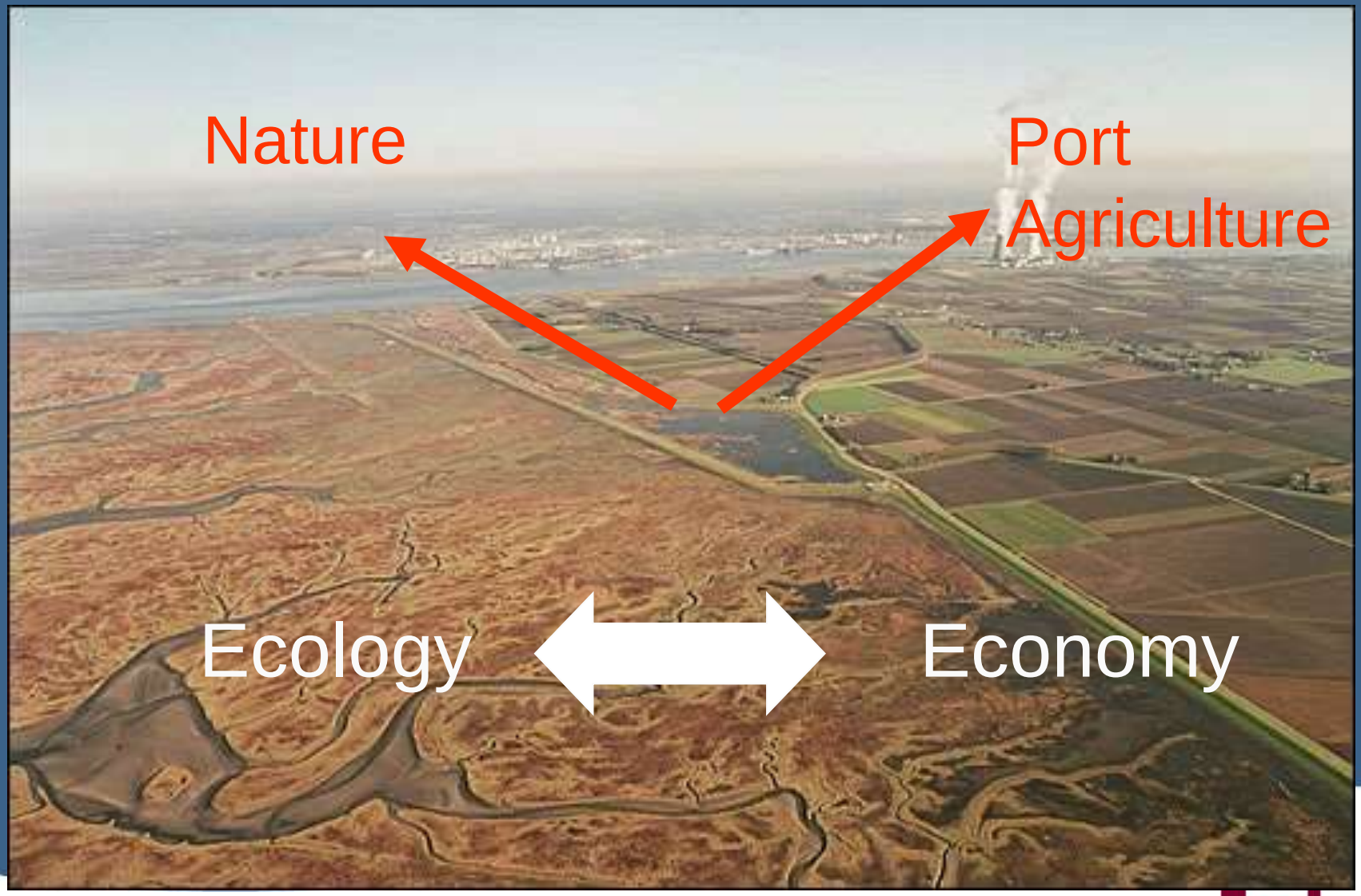
Introduction

The global loss of biodiversity has led to many juridical measures, aiming to stop this loss:

- Global conventions (CBD, Ramsar,…)
- European directives (Habitat and bird directive)
- National legislation
- ➔ a clear trend from protection to restoration and development

Introduction

- Ecological main head structure, Flemish Ecological network, Natura 2000 network
- But gradually there is more and more opposition against these approaches and strategy of restoration is questioned.
- Central idea: Nature protection/development blocks economic development


Nature
Port
Agriculture
Ecology
Economy

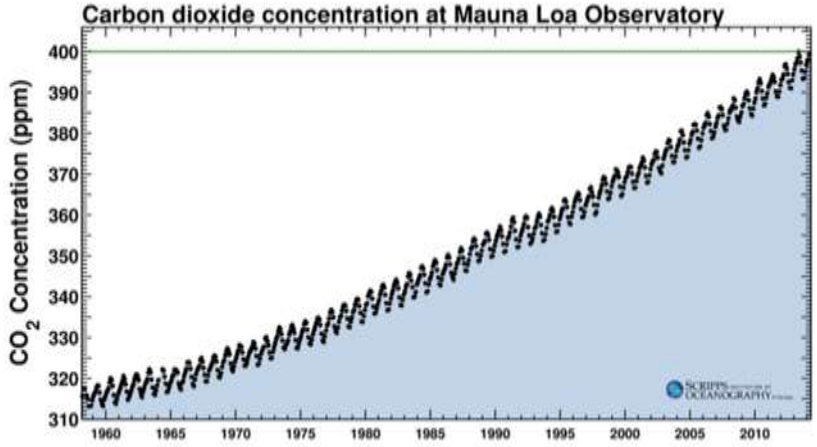
Environmental legislation

Environmental legislation has resulted in some remarkable improvements of the state of the environment

Micky Tackx has shown that waterquality in the Schelde did improve

➔ BUT some problems remain and new ones may appear

- ➔ New pollutants
- ➔ Nutrient ratio's change



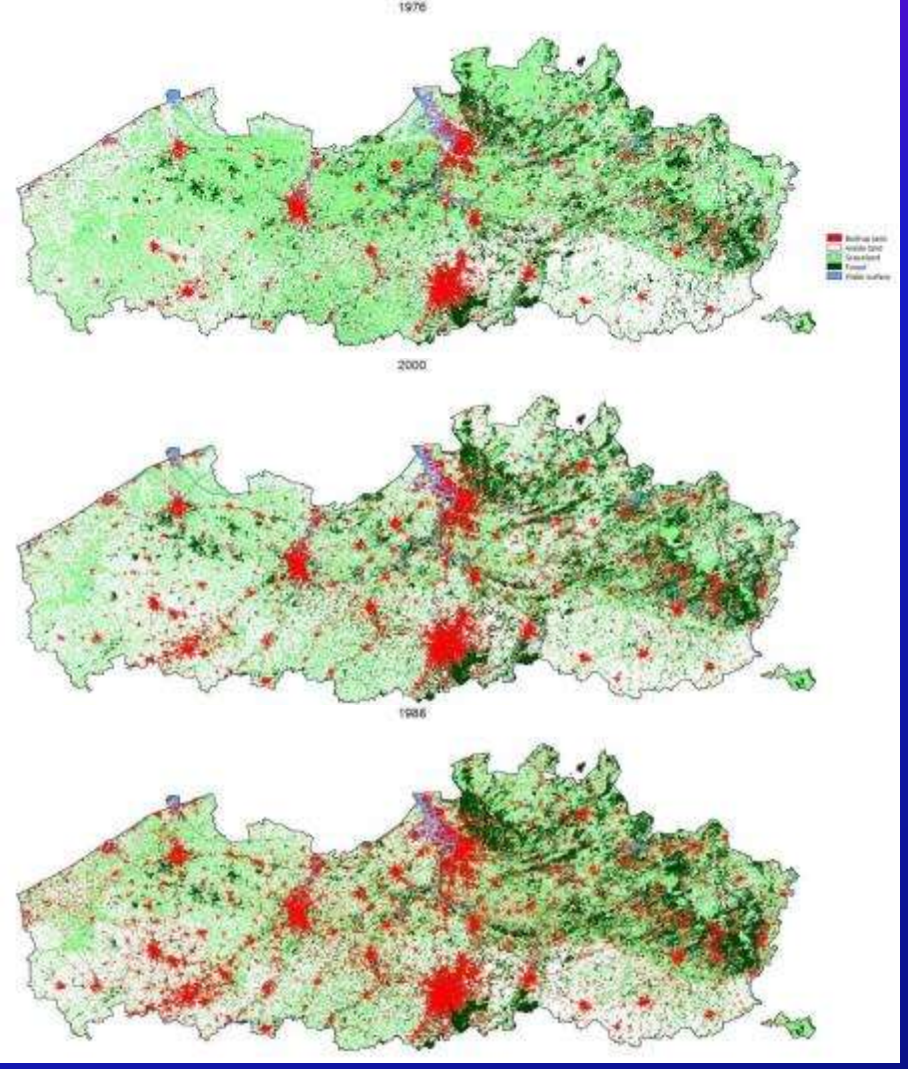
- Emissions of greenhouse gasses ➔ climate change.
- ➔ Mitigation, reducing emissions is crucial
- ➔ low carbon economy

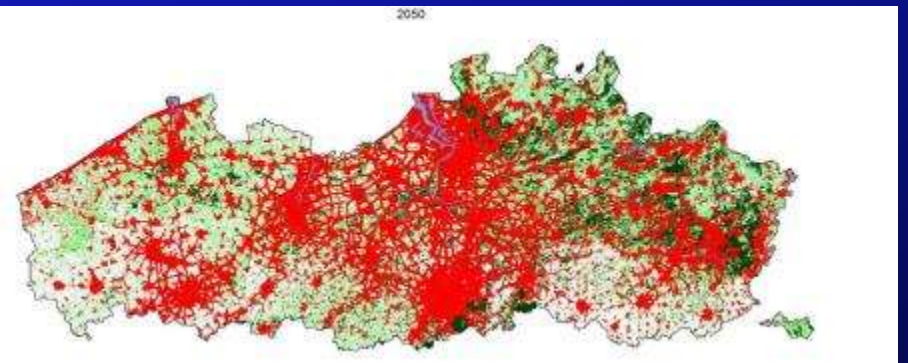
Is climate change the only problem?

- No!
- It comes on top of all the other pressures on the system
- Changes in the watersystem are due to
  - Land use change

But there is more

- Changes in the watersystem
  - Land use change
  - Morphological changes in the watercourse and river valley
  - Interbasin transfer (eg to feed canals, water supply)





"in 1976 was **7,**2 procent van onze oppervlakte bebouwd;

in 1988 was dat al **11,7** procent.

in 2000 was **18,3** procent bebouwd volgens onze cijfers. (+ 56% in 10 jaar!)

Thans is de verharde oppervlakte 20%!!

Voor 2050 voorspelt het model, dat uitgaat van een gemiddelde groei van de bebouwing, **41,5** procent."

(Lien Poelmans, KULeuven 2010):

We start to understand the impact consequences of all these measures:

- Droughts
- Floods
- Changes in tidal characteristics
- Changing sedimentation/erosion patterns
- Impact on productivity,
-

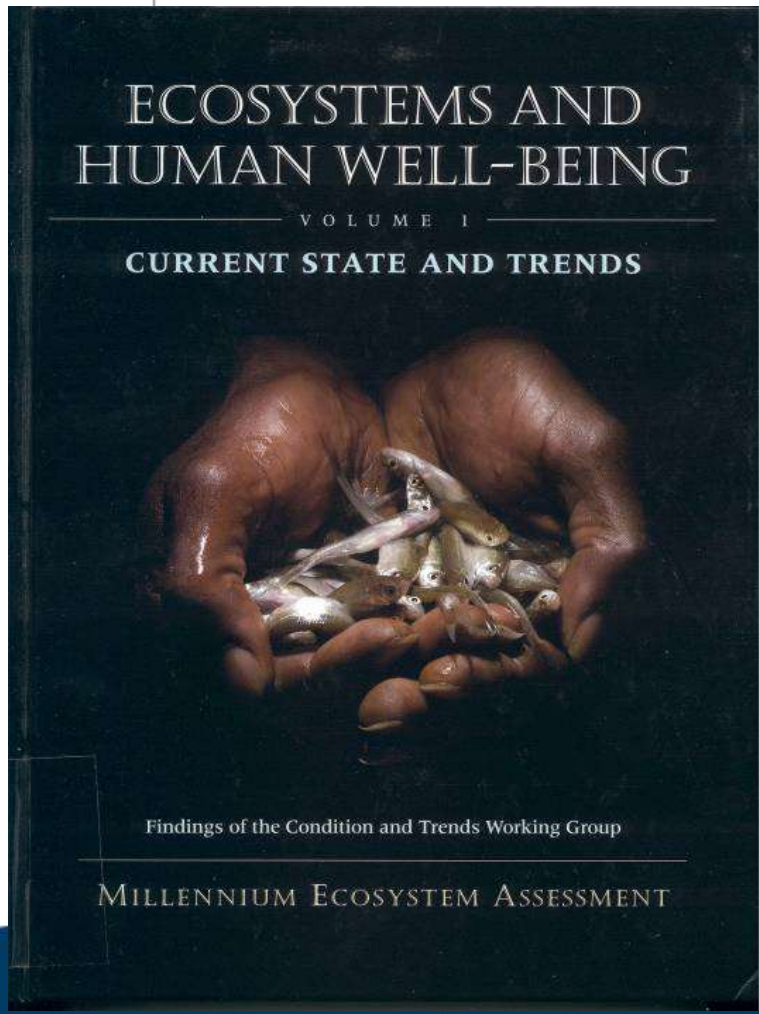
Introduction

- The fundamental question is no longer, Do these measures have an impact on biodiversity, that we should protect according the directives, but has the loss of habitat and biodiversity an impact on
  - the economy
  - Human well-being
- Or, is nature more than just species?

The value of the world's ecosystem services and natural capital

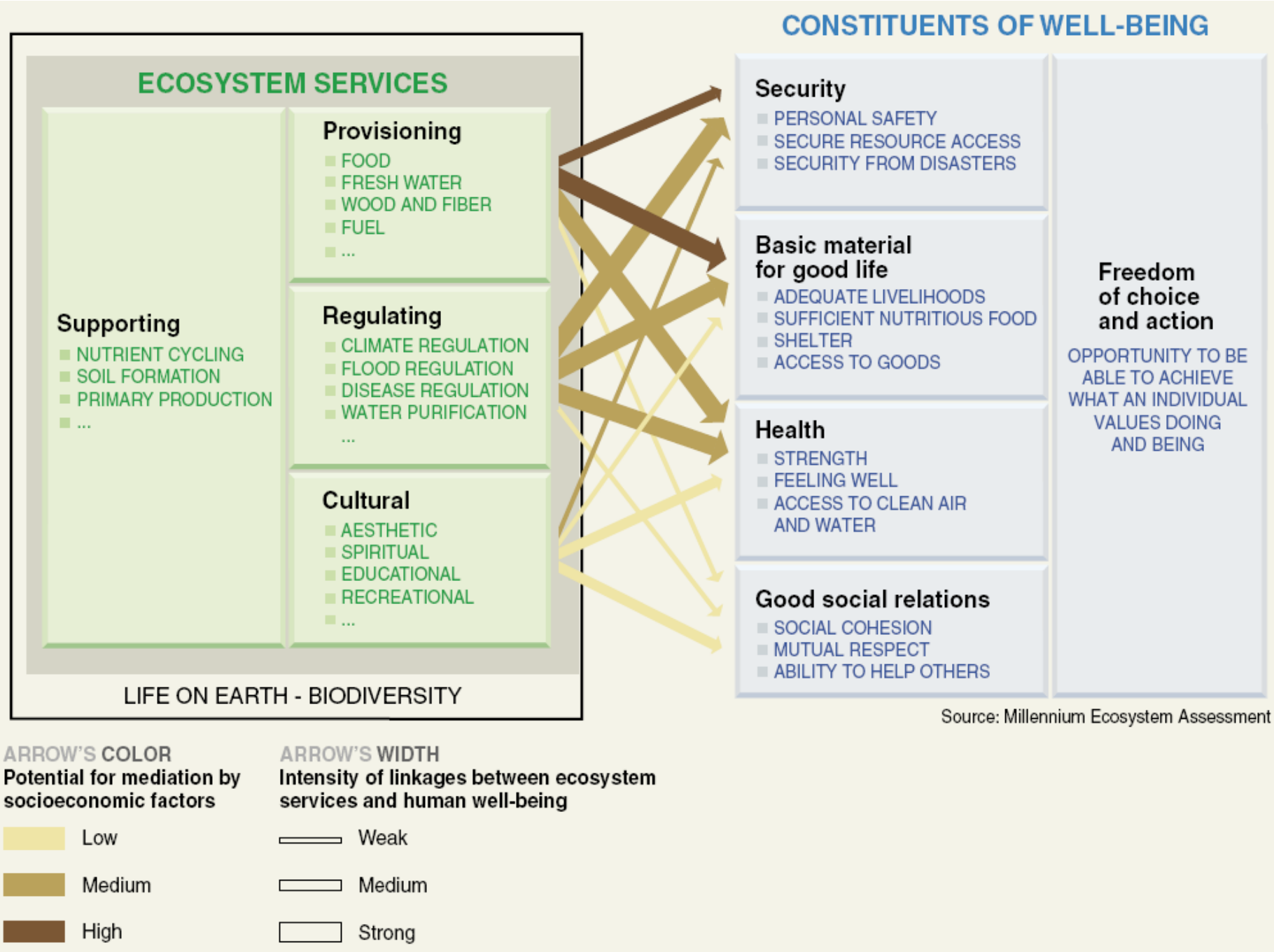
Robert Costanza*†, Ralph d'Arge‡, Rudolf de Groot§, Stephen Farber‖, Monica Grasso†, Bruce Hannon¶, Karin Limburg#*, Shahid Naeem**, Robert V. O'Neill††, Jose Paruelo‡‡, Robert G. Raskin§§, Paul Sutton‖‖ & Marjan van den Belt¶¶

- Since the influential publication of Bob Costanza et al. in Nature in 97 and the MA in 2005 is became clear that ecosystem services are important.

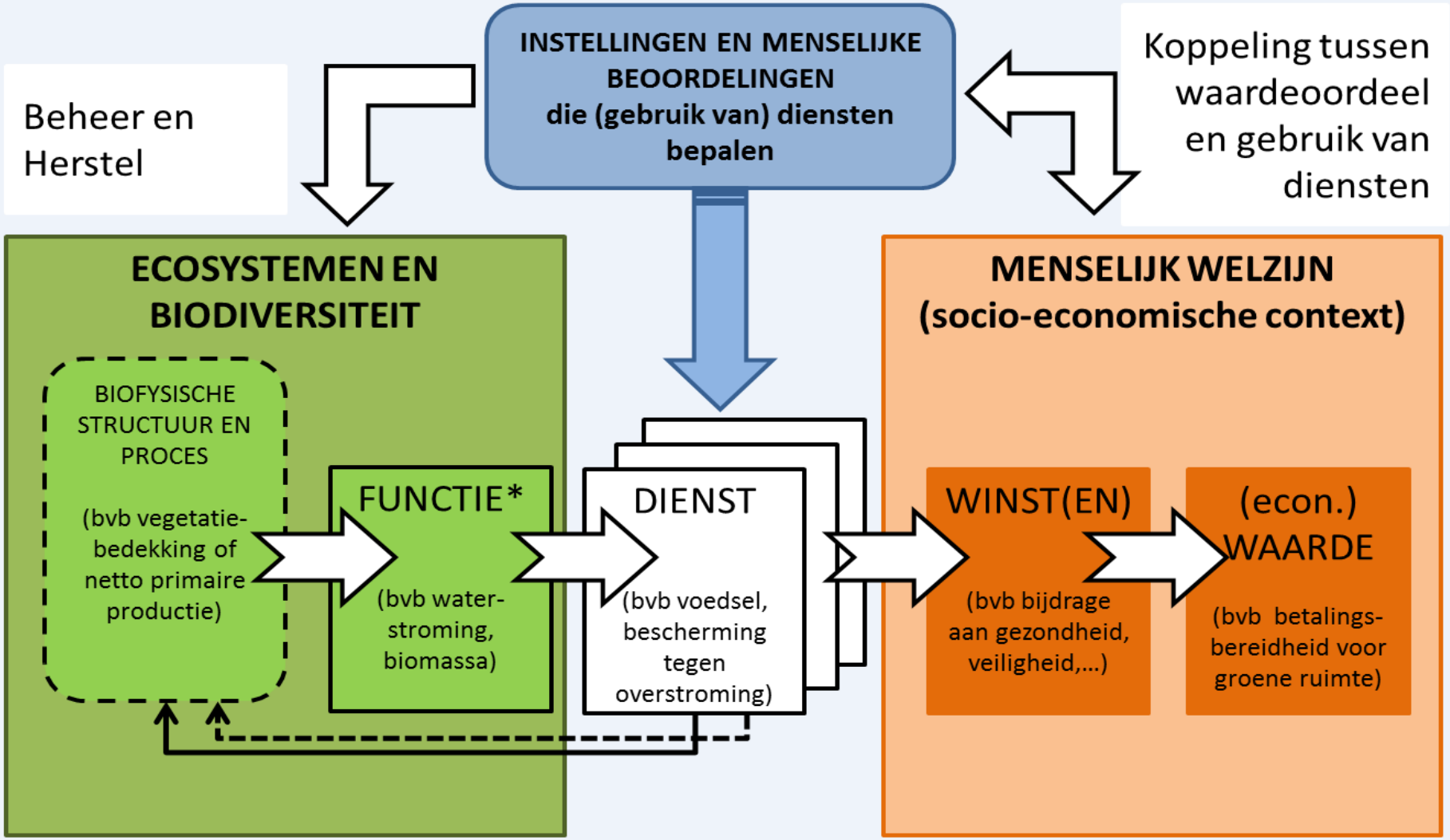


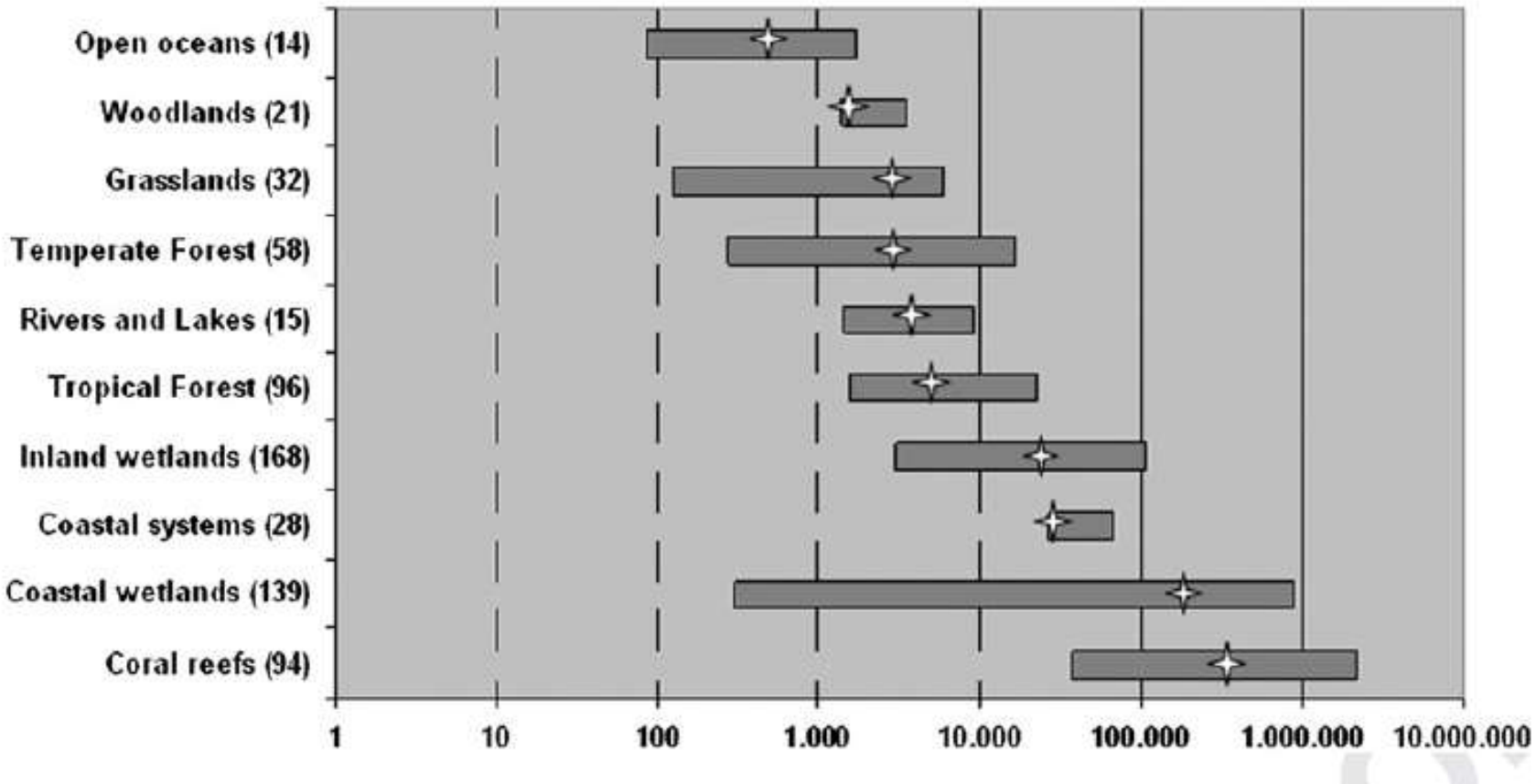
- Ecosystem services are

- "***The direct and indirect contributions of ecosystems to human well being***" (TEEB, 2010)



Source: Millennium Ecosystem Assessment


Beheer en Herstel
INSTELLINGEN EN MENSELIJKE BEOORDELINGEN die (gebruik van) diensten bepalen
Koppeling tussen waardeoordeel en gebruik van diensten
ECOSYSTEMEN EN BIODIVERSITEIT
BIOFYSISCHE STRUCTUUR EN PROCES
(bvb vegetatie-bedekking of netto primaire productie)
FUNCTIE*
(bvb water-stroming, biomassa)
DIENST
(bvb voedsel, bescherming tegen overstroming)
MENSELIJK WELZIJN (socio-economische context)
WINST(EN)
(bvb bijdrage aan gezondheid, veiligheid,...)
(econ.) WAARDE
(bvb betalings-bereidheid voor groene ruimte)
* Verzameling van structuren en processen die een dienst leveren



- De Groot et al. 2013. *Ecosystems Services*


Living With Environmental Change
UK National Ecosystem Assessment
Shared Document Area
Thursday, February 20, 2014
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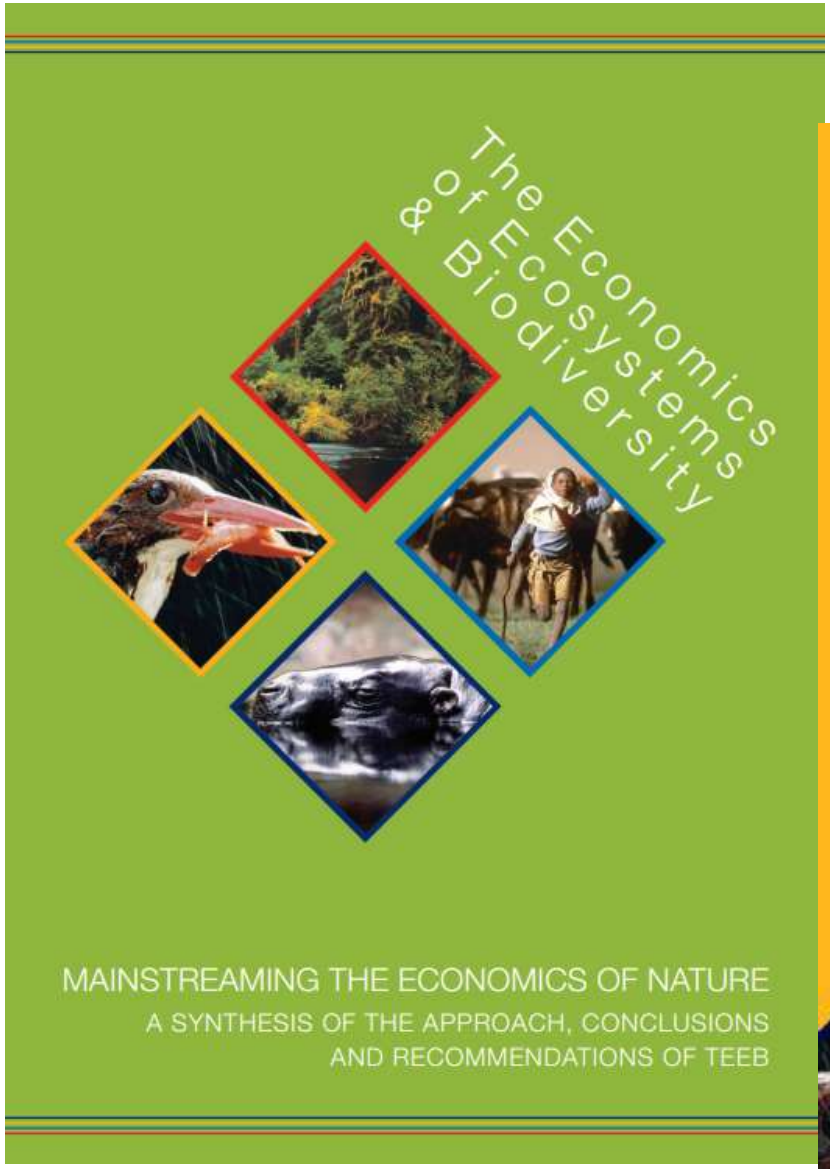
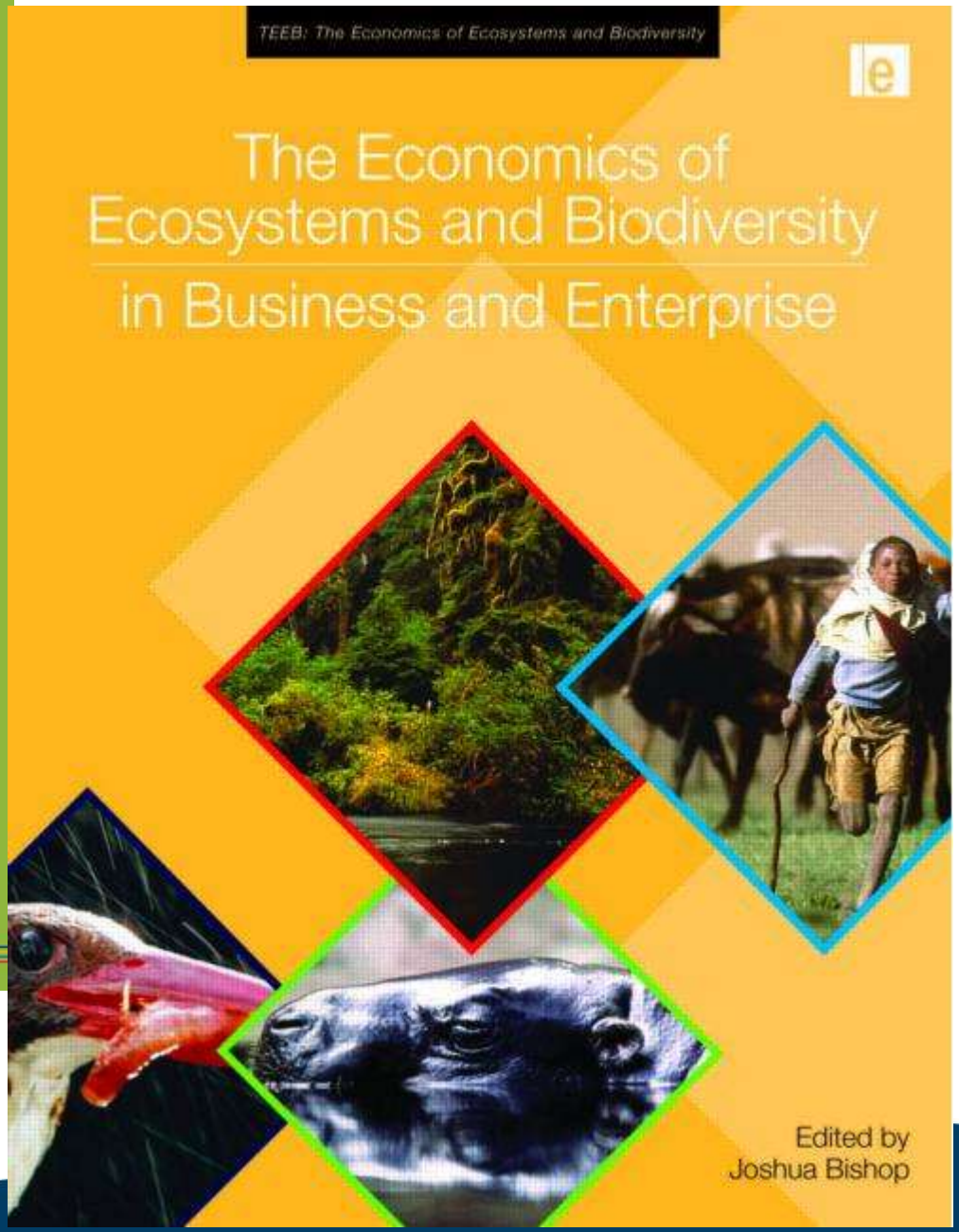
NEW! Follow-on Phase
Ecosystem Assessment Concepts
News
Meetings & Events
Getting Involved
Resources
Understanding nature's value to society
News
UK NEA Follow-on Phase: New report released, 16 July 2013
The value of potential marine protected areas in the UK to divers and sea anglers - Final Report. Read more
Announcement of Opportunity
What is the UK National Ecosystem Assessment?
The UK National Ecosystem Assessment (UK NEA) was the first analysis of the UK's natural environment in terms of the benefits it provides to society and continuing economic prosperity. Part of the Living With Environmental Change (LWEC) initiative, the UK NEA commenced in mid-2009 and reported in June 2011. It was an inclusive process involving many government, academic, NGO and private sector institutions.
The Synthesis of the Key Findings for the UK NEA was launched on the 2 June 2011
UK National Ecosystem Assessment





Universiteit Antwerpen

CEDA Information Paper, May 2013

Central Dredging Association

Ecosystem Services and Dredging and Marine Construction

THE CORPORATE ECOSYSTEM SERVICES REVIEW

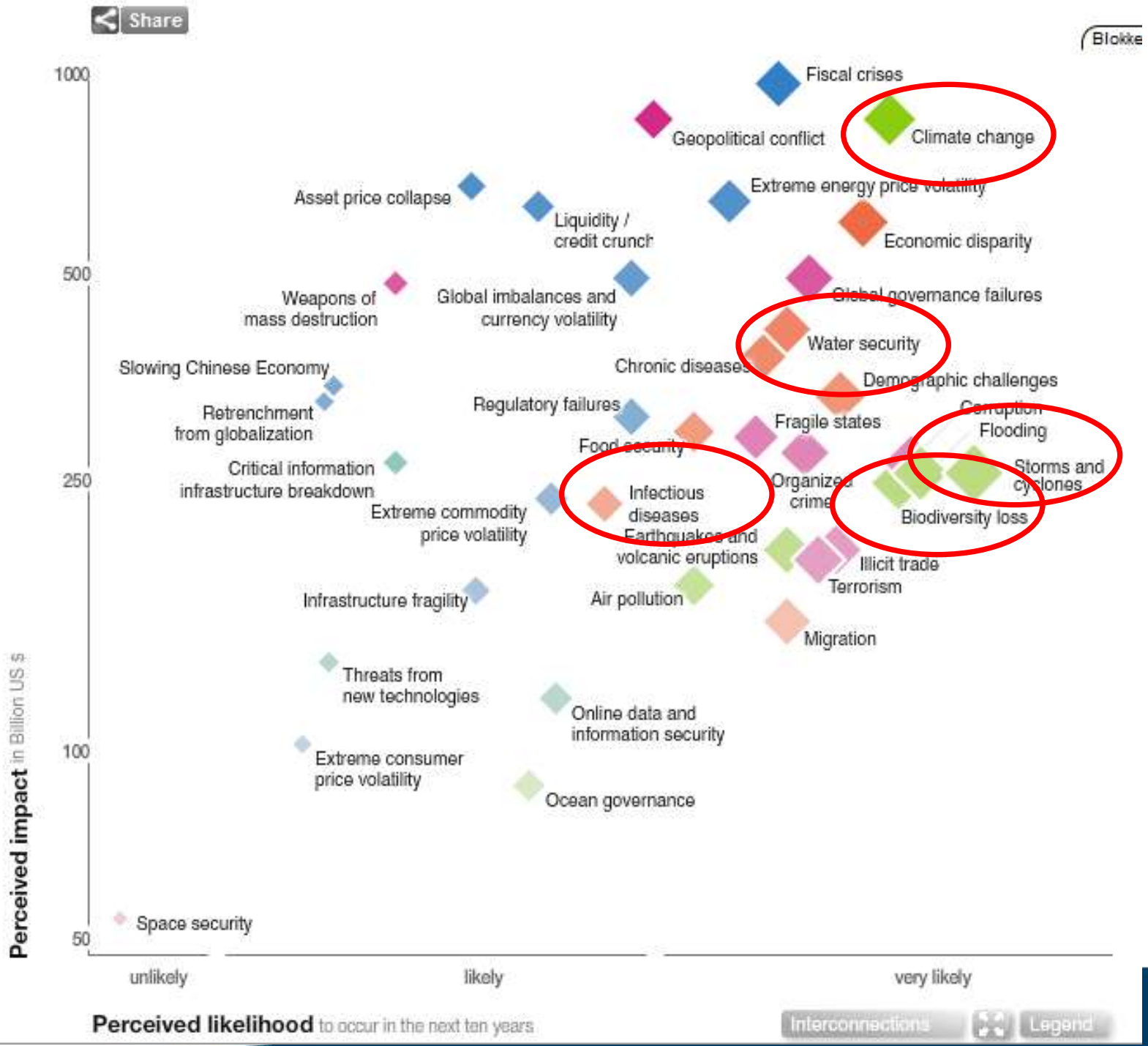
Guidelines for Identifying Business Risks and Opportunities Arising from Ecosystem Change

Version 1.0

World Business Council for Sustainable Development

Meridian Institute

WORLD RESOURCES INSTITUTE


Share
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1000
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250
100
50
Perceived impact in Billion US $
Fiscal crises
Geopolitical conflict
Climate change
Asset price collapse
Liquidity / credit crunch
Extreme energy price volatility
Economic disparity
Weapons of mass destruction
Global imbalances and currency volatility
Global governance failures
Water security
Slowing Chinese Economy
Chronic diseases
Demographic challenges
Retrenchment from globalization
Regulatory failures
Fragile states
Corruption
Flooding
Food security
Critical information infrastructure breakdown
Organized crime
Storms and cyclones
Infectious diseases
Extreme commodity price volatility
Biodiversity loss
Earthquakes and volcanic eruptions
Illicit trade
Terrorism
Infrastructure fragility
Air pollution
Migration
Threats from new technologies
Online data and information security
Extreme consumer price volatility
Ocean governance
Space security
unlikely
likely
very likely
Perceived likelihood to occur in the next ten years
Interconnections
Legend

wbcsd business solutions for a sustainable world

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WBCSD welcomes new online business platform on natural capital

Geneva, February 19, 2014 - Valuing natural capital doesn't come naturally for many decision-makers. A new online resource helps show the way, from making the case to benchmarking, implementing and collaborating with other businesses.

The Natural Capital Business Hub offers a searchable database of case studies, tools and resources to help companies evaluate the business case for action on natural capital. Unveiled today at the 6th Annual GreenBiz Forum, the Hub is a free dynamic online resource designed to help companies uncover opportunities to enhance their bottom lines by integrating the value of natural capital into their strategy, operations, accounting and reporting.

NATURAL CAPITAL BUSINESS HUB
Showcasing leadership • Supporting collaboration • Driving action

Case studies from more than 40 companies are showcased on the Hub, representing more than $1.4 trillion in revenues. This includes many WBCSD members such as American Electric Power (AEP), CEMEX, CH2M HILL, Coca- Cola, Dow Chemical, Duke Energy, Kering, Kimberly-Clark, SABMiller, Shell, Unilever, Veolia and Weyerhaeuser.

"We are very supportive of the Hub and look forward to leveraging it as a one-stop shop," says Eva Zabey, Manager, Natural Capital, WBCSD. "It helps consolidate efforts around natural capital in business, and we warmly welcome this effort spearheaded by Corporate Eco Forum and The Nature Conservancy."

In addition, the Hub offers an online interactive version of the WBCSD's Eco4Biz making the overview of existing tools and approaches even more user-friendly, features Action2020 as a valuable platform to prioritize business solutions, and features Pitch for Nature - a two-minute video that emerged from a collaborative effort of 25+ organizations.

Tweet 0 Recommend 0

- As a result, this value has largely been left unaccounted for in business decisions and market transactions. **This is starting to change. Some of the world's largest companies are awakening to the profound business value of Earth's natural assets—and the business imperative of safeguarding them.** Without healthy ecosystems, cheap and abundant water and raw materials can become so costly they erase profits and threaten entire business models. Local communities where companies operate can become unstable, unsafe or otherwise inhospitable. And without natural barriers to protect workers and facilities from increasingly extreme weather patterns and other disasters, even the best-run companies can be hit with catastrophic losses.

- NATURAL GOODS & SERVICES ON WHICH THE GLOBAL ECONOMY DEPENDS

- ♦ CLEAN WATER AND AIR
- ♦ AFFORDABLE RAW MATERIALS AND COMMODITIES
- ♦ FERTILE SOIL TO GROW CROPS
- ♦ ABUNDANT FISH STOCKS
- ♦ BUFFERS TO FLOODS, DROUGHTS, FIRES AND
- EXTREME WEATHER
- ♦ BARRIERS TO THE SPREAD OF DISEASE
- ♦ BIOLOGICAL INFORMATION TO PROPEL SCIENTIFIC
- AND MEDICAL BREAKTHROUGHS

Rivers in hydromorphological equilibrium as natural transportation routes

Key message 1

- The ecosystem delivers a whole series of ecosystem services
  - Habitats and species play a crucial role in delivering these services
- Habitat loss led to a loss of ecosystem services
- A loss of ecosystem services has direct AND indirect societal and economic consequences

- A number are compensated by investments in infrastructural works (at high costs), others not leading to direct losses (eg fisheries) or long term problems (eg loss of filter function and export of nutrients/pollutants)
- The concept of ecosystem services is being adopted in both economic and environmental international gremia

Next step? Adaptation is crucial

- Changes will occur:
  - Sea level rise
  - Changing precipitation patterns
  - Changing discharges/ water availability
  - Increasing temperature
  - Changing human activities (economic,..)
  - ….
- Next to mitigation, **adaptation** is necessary. These measures must be taken that reduce the negative impact of CC or that makes our society more resilient towards these changes.

REVIEW

doi:10.1038/nature12859

Ecosystem-based coastal defence in the face of global change

Stijn Temmerman[1], Patrick Meire[1], Tjeerd J. Bouma[2], Peter M. J. Herman[2], Tom Ysebaert[2,3] & Huib J. De Vriend[4]

The risk of flood disasters is increasing for many coastal societies owing to global and regional changes in climate conditions, sea-level rise, land subsidence and sediment supply. At the same time, in many locations, conventional coastal engineering solutions such as sea walls are increasingly challenged by these changes and their maintenance may become unsustainable. We argue that flood protection by ecosystem creation and restoration can provide a more sustainable, cost-effective and ecologically sound alternative to conventional coastal engineering and that, in suitable locations, it should be implemented globally and on a large scale.

From concept to implementation
from ecosystem service to adaptation

- What is needed?
  - Systems approach
    - Whole river
    - Catchment
    - All facets of the system
  - What are the fundamental problems (to what do we have to adapt?)
    - Changes in tidal characteristics
    - Water shortage/ floods
    - To high temperatures
    - Changing productivity patterns
    - ……

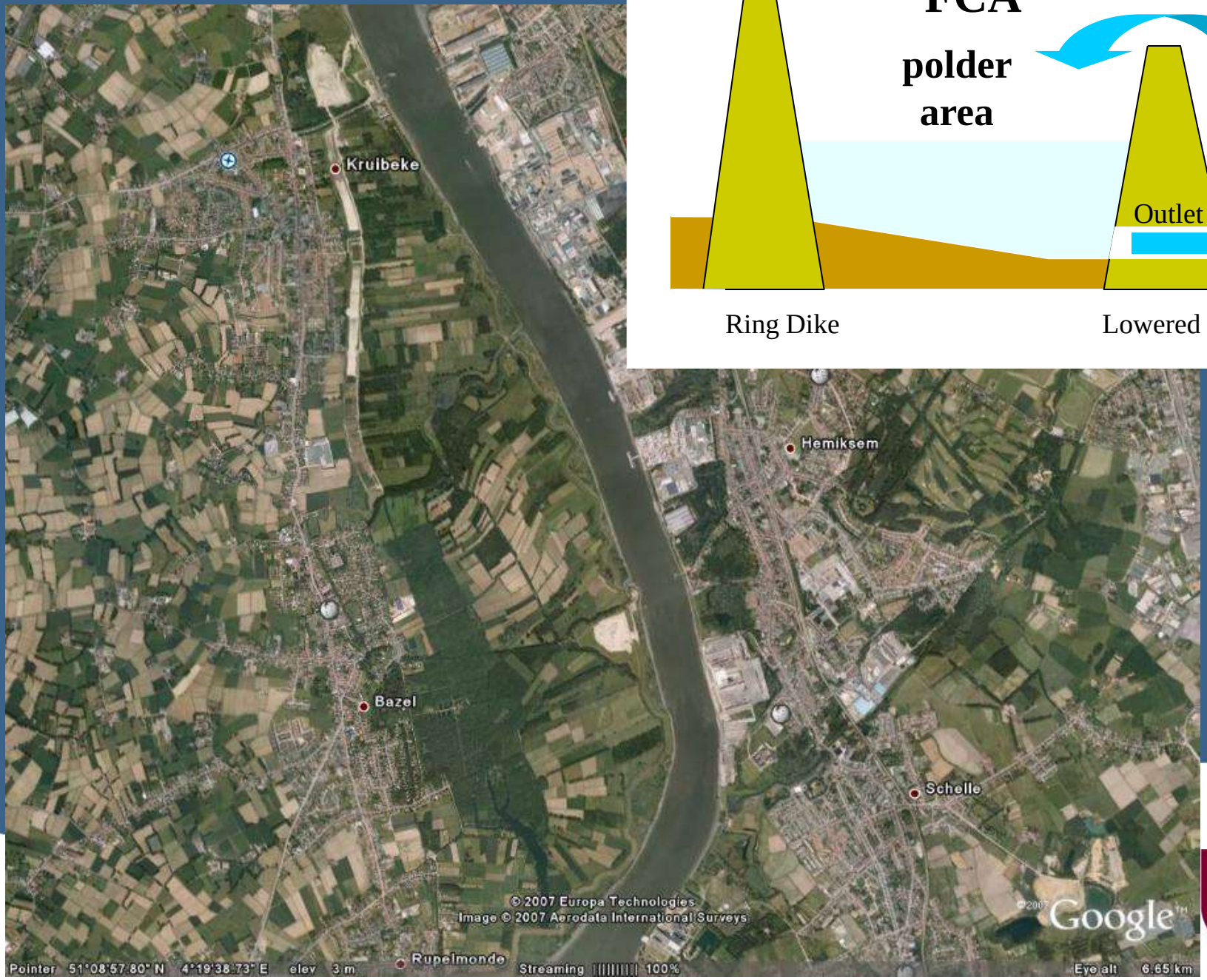
Formulating objectives

- No longer only environmental standards but objectives at the systems level
  - Reducing the increase of high waters
  - Storing a volume of water
  - Reaching a level of cooling
  - Reducing an amount of pollutants (nutrients/fine dust,…)
  - Guarantee a level of productivity
  - Reduce erosion
- Fundamental change compared to classical environmental policies

- But also
  - A given volume of "harvest" (water, wood, food,…)
  - Good conditions for navigation
  - ….
- This must be translated in scenario's of "hard" and "soft" measures
- These scenario's can be integrated in a societal cost benefit analysis

Sigmaplan

- Dikes/quaywalls
- Flood control areas
- Flood control areas with reduced tides
- Managed retreat
- Wetlands


Kruibeke
Bazel
Hemiksem
Schelle
Rupelmonde
© 2007 Europa Technologies
Image © 2007 Aerodata International Surveys
Google
Pointer 51°08'57.80" N 4°19'38.73" E elev 3 m
Streaming 100%
Eye alt 6.65 km

FCA
estuary
polder
area
Outlet
Ring Dike
Lowered CIA dike

Required surface of different habitats

	Habitattype	opp (ha)
Tidal habitats	Buitendijks brak	740
	Buitendijks zoet	1040
	Binnendijks bos alluviaal	570
Non tidal habitats	Binnendijks anderen	370
	Binnendijks grasland dotter (RBB)	840
	Binnendijks grasland anderen	910
	Binnendijks riet/ruigte	560
	Binnendijks plas/oever	240

Results for different measures

	Costs	Safety benefits	Other	Payback
Storm surge barrier	387	740	- 2	41
Overschelde	1597	660	pm	/
Dykes	241	691	-	27
Floodpains (CIA)	177	648	-22	22
Combined scenario X	132	737	-9	16

Million euro

Controlled inundation + reduced tidal area

	combined scenario X	
	CIA	RTA
Costs	132	139
Safety benefits until 2100	737	730
Other effects		
agriculture	-12	-14
forestry	-	-10
visual intruision	-5	-5
Ecosystem benefits: regulating services	-	**53**
Ecosystem benefits: cultural services: recreation/amenity	**9**	**9**
net present value until 2100	596	622
Pay back perion (in years)	16	13

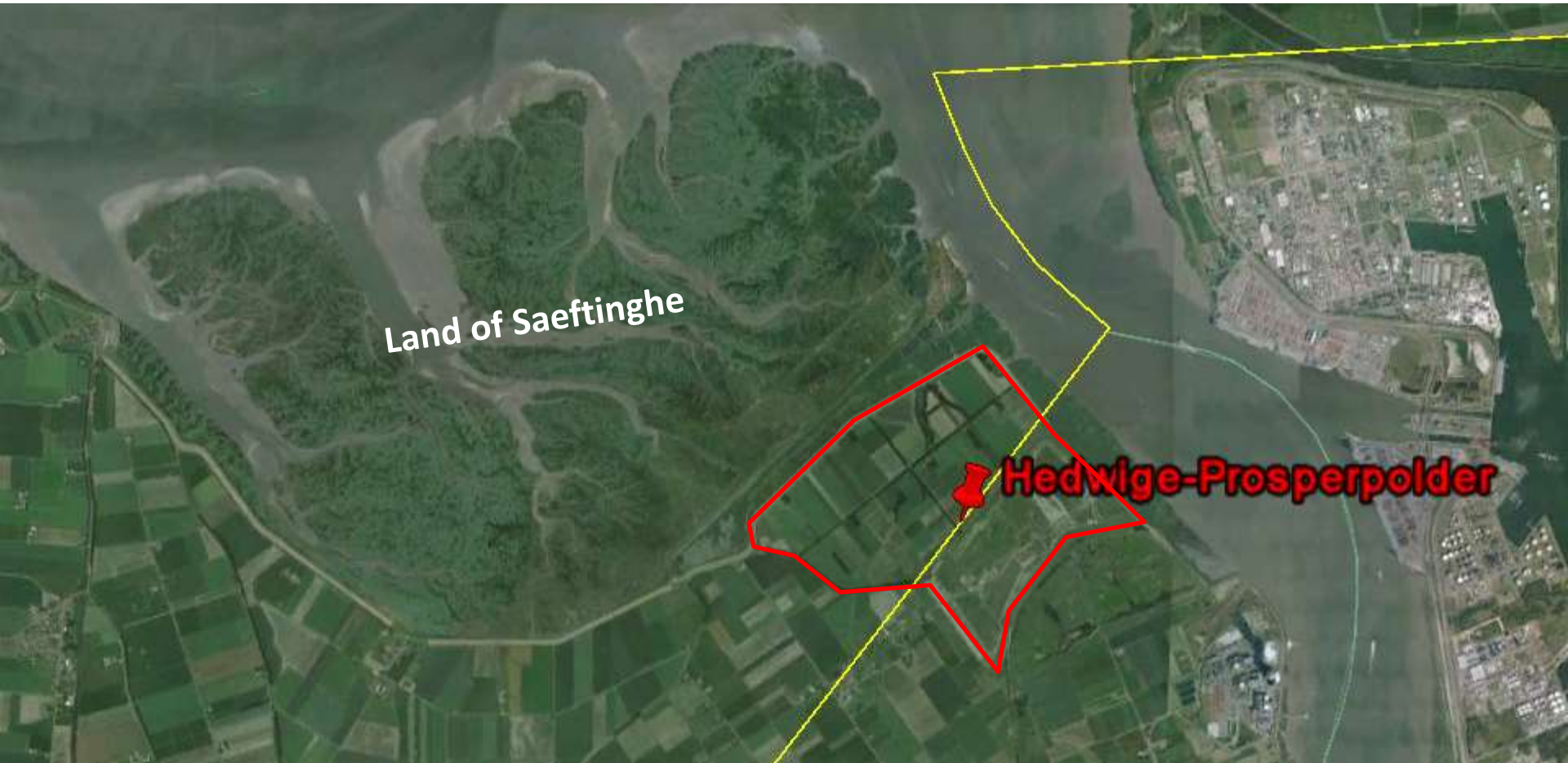
Key message 2

- The concept of ES has
  - Facilitated the communication between different stakeholders
  - Allowed a more integrated approach
  - To formulate objectives for different parts of the system
  - A cost benefit analysis taking in account also environmental aspects
  - ➔ the concept has impacted the outcome of the project!

Illustratie

Hertogin Hedwige-Prosperpolder managed retreat project

Beneficial to society?

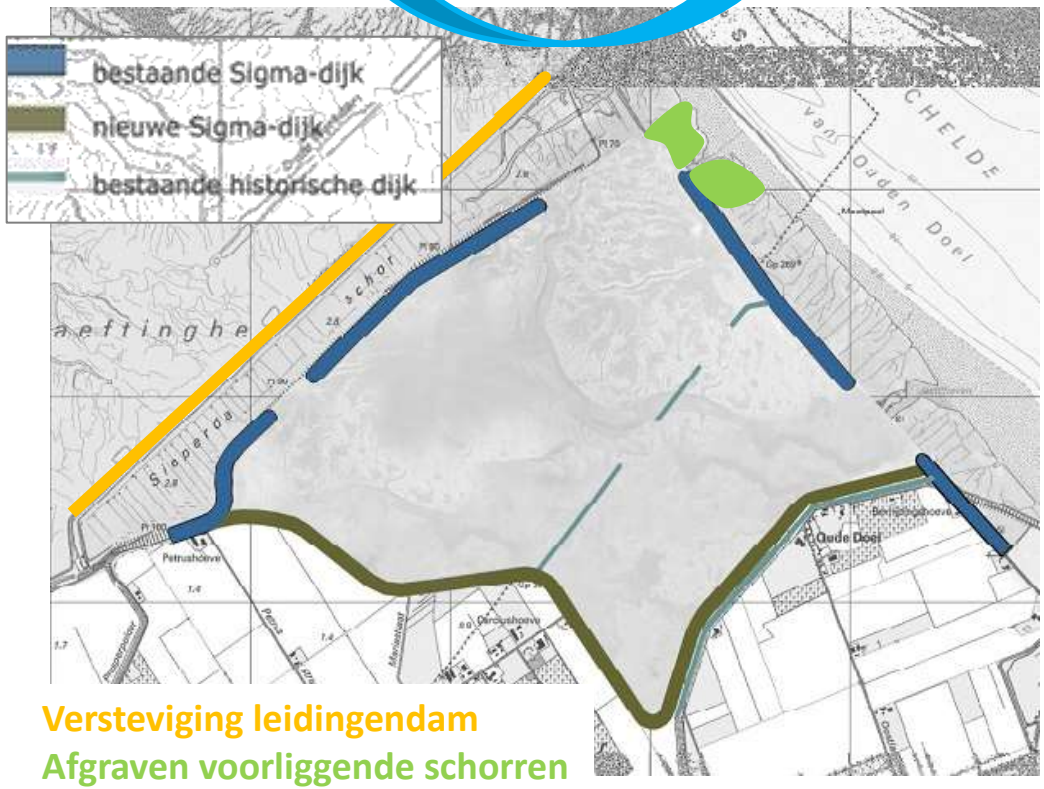


Illustratie

Hertogin Hedwige-Prosperpolder ontpolderingsproject

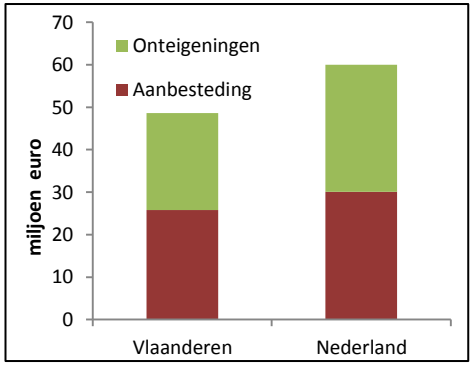
Voordelig voor de samenleving?

Project

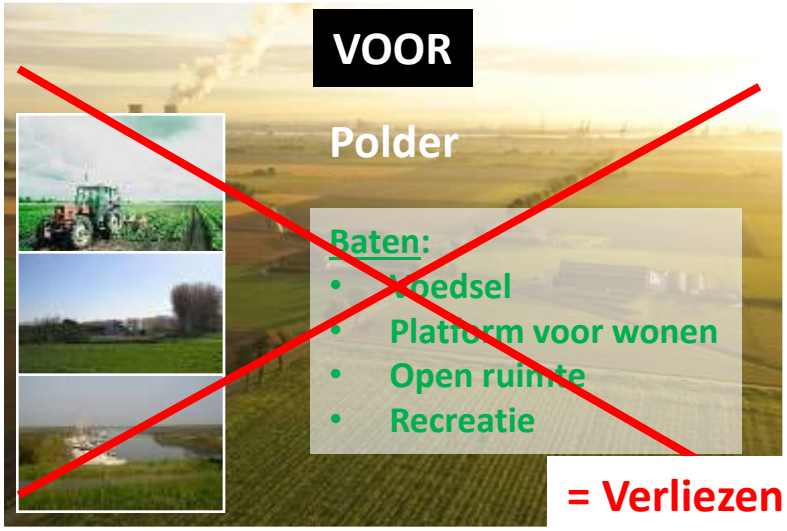


Versteviging leidingendam
Afgraven voorliggende schorren

Totale kostprijs:
±100 miljoen euro



Baten: ecosysteemdiensten

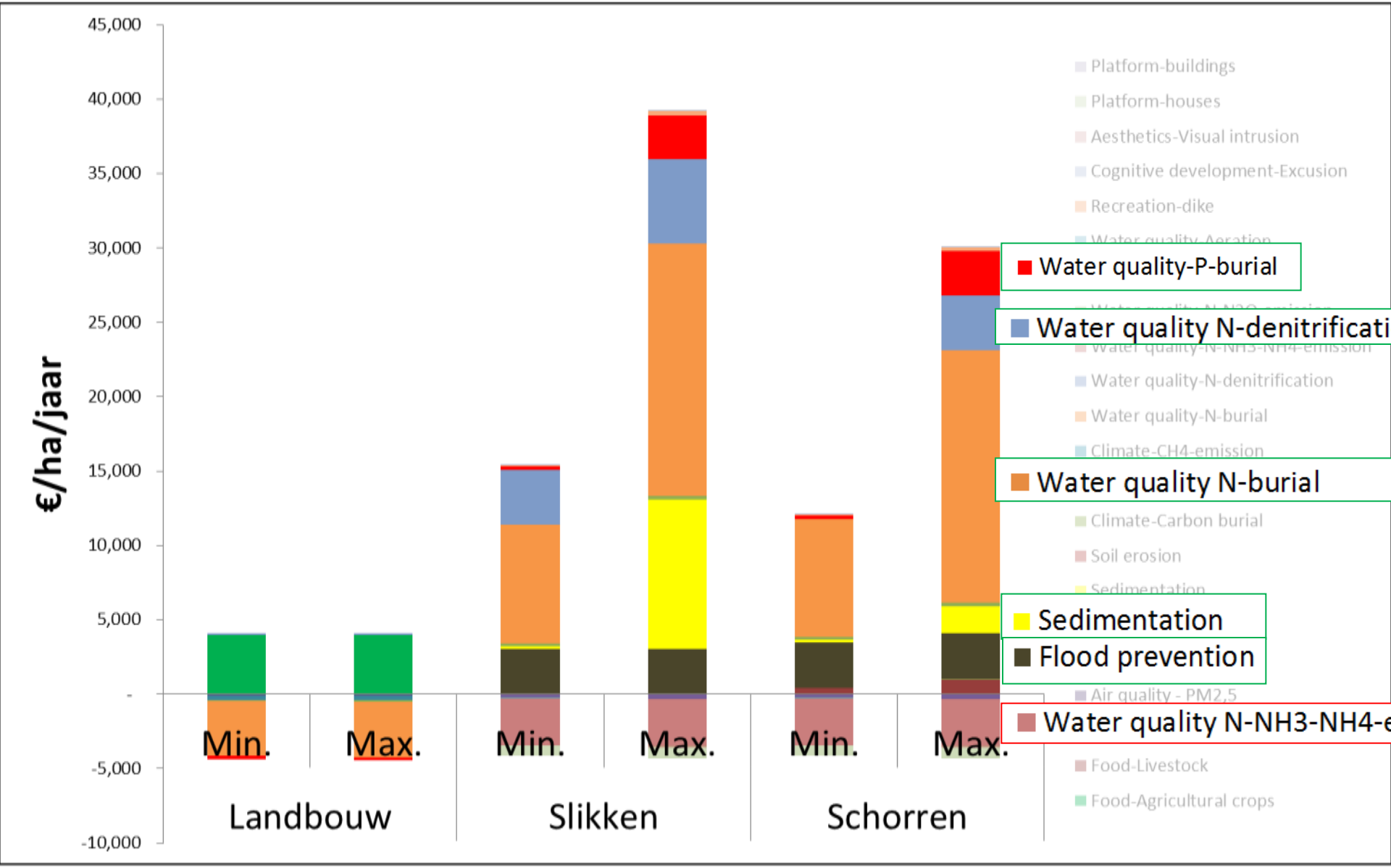


Negatieve effecten:
- Fijn stof van landbouw
- Bodem erosie landbouwgrond
- N- en P- surplus
- Uitstoot C-emissies

= Baten

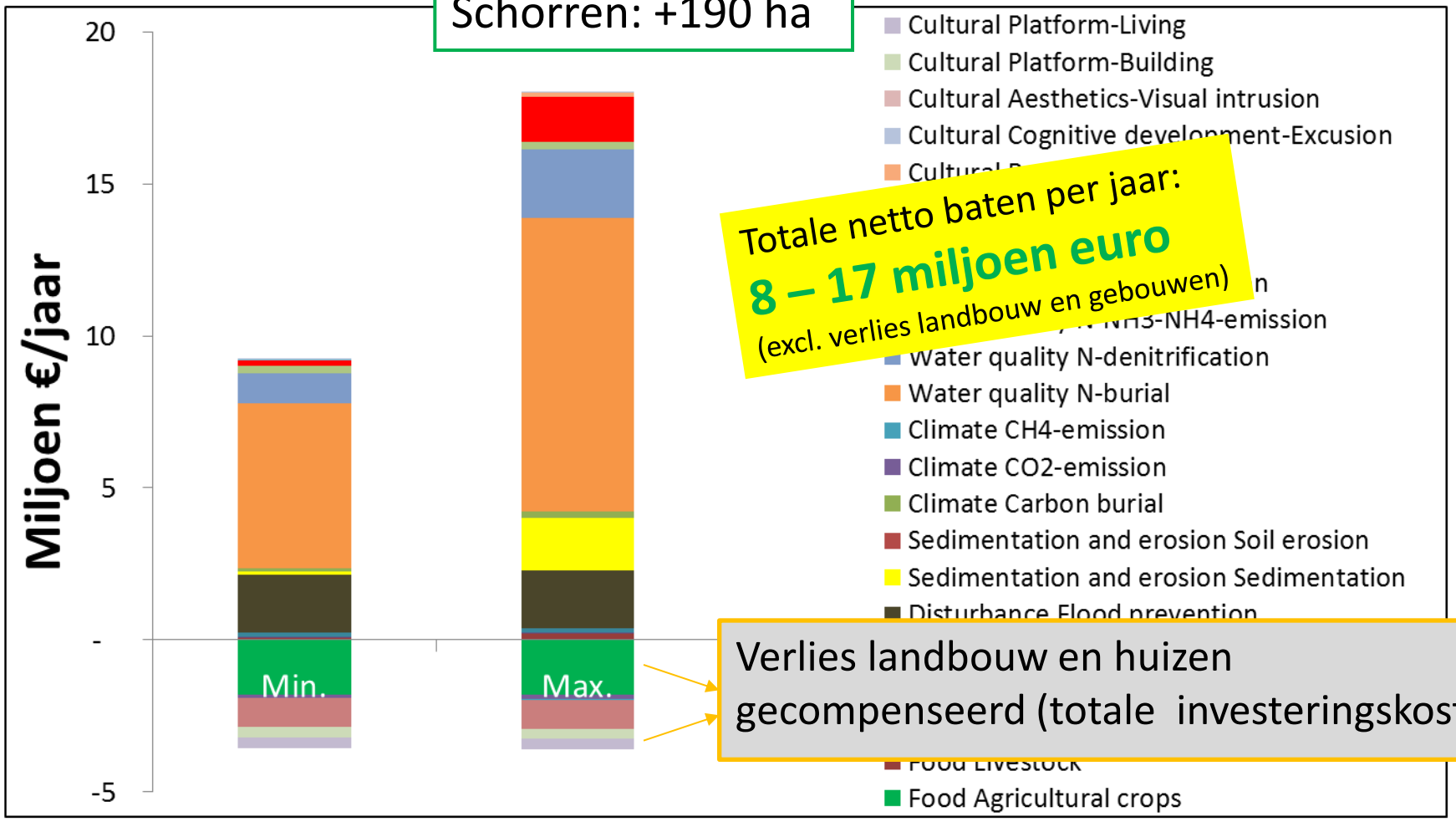
Ook negatieve effecten:
- Uitstoot C-emissies (CO_2, CH_4)
- N-emissies (N_2O, NH_3, NH_4)
- Visuele verstoring omwonenden met nieuwe dijk

ES baten en verliezen per habitat



Baten en verliezen van het project

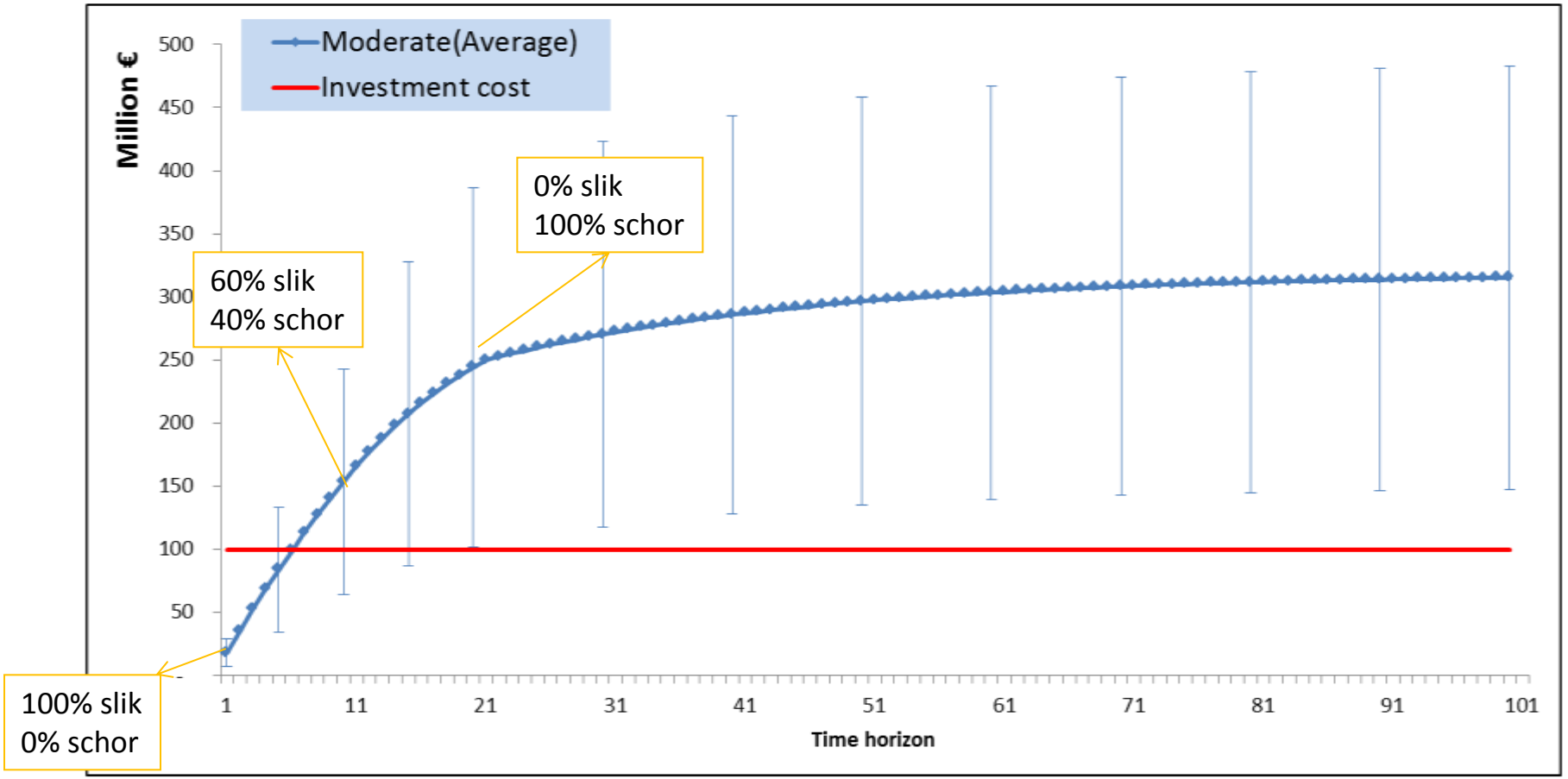
Landbouw: -450 ha
Slikken: +275 ha
Schorren: +190 ha



Totale netto baten per jaar:
8 – 17 miljoen euro
(excl. verlies landbouw en gebouwen)

Verlies landbouw en huizen gecompenseerd (totale investeringskost)

Lange termijn analyse met schorontwikkeling



Discussie

- **Niet alle baten en kosten** zitten vervat in de economische analyse (vanwege onvoldoende informatie voor monetarisering of ontbreken bruikbare methode)
  - Nieuw habitat (cf. doelstellingen Natura 2000)
  - Ondersteuning voor fauna en flora
    - Vogels, cf. doelstellingen Bird Directive
    - Kraamkamerfunctie voor vissen en schaaldieren
  - Hydrologie (nieuw pompsysteem voor drainage omliggende polders, effecten grondwater)
  - Wetenschappelijke kennis
  - Recreatie: horeca mogelijkheden, ecolodges, verlies Prosper jachthaventje
  - Cultuur historische dijk relicten, hoeves
  - Hinder tijdens de constructie werken (fijn stof, geluid)
  - …

  → Voornamelijk baten, wat het positief resultaat nog versterkt

Key message 3

- Nature restoration is not only an ecological gain but has important added value through the delivery of ecosystem services which makes the projects economically beneficial
- The use of the concept of ecosystem services led to a different type of projects and a different decision making.

What with management?

- Mowing macrophytes in rivers


VAN RAAK


VAN RAAK

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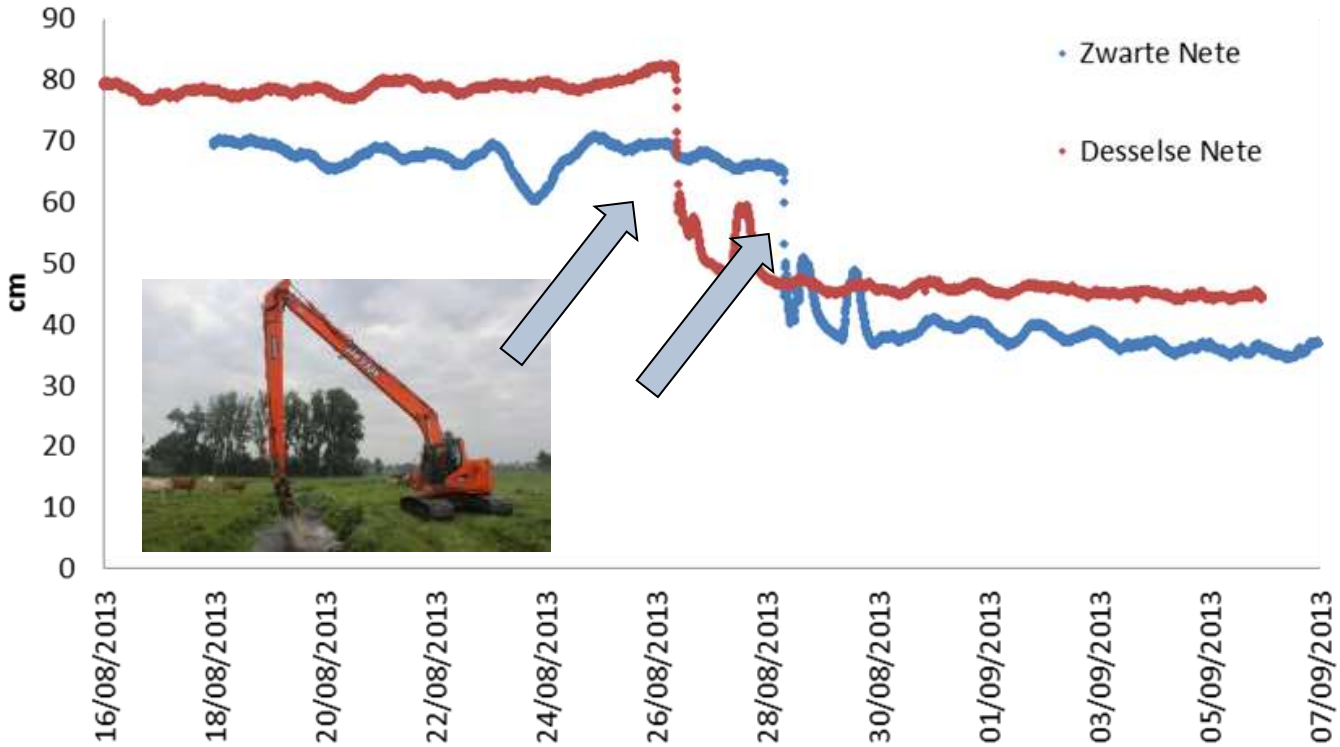
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Zwarte Nete
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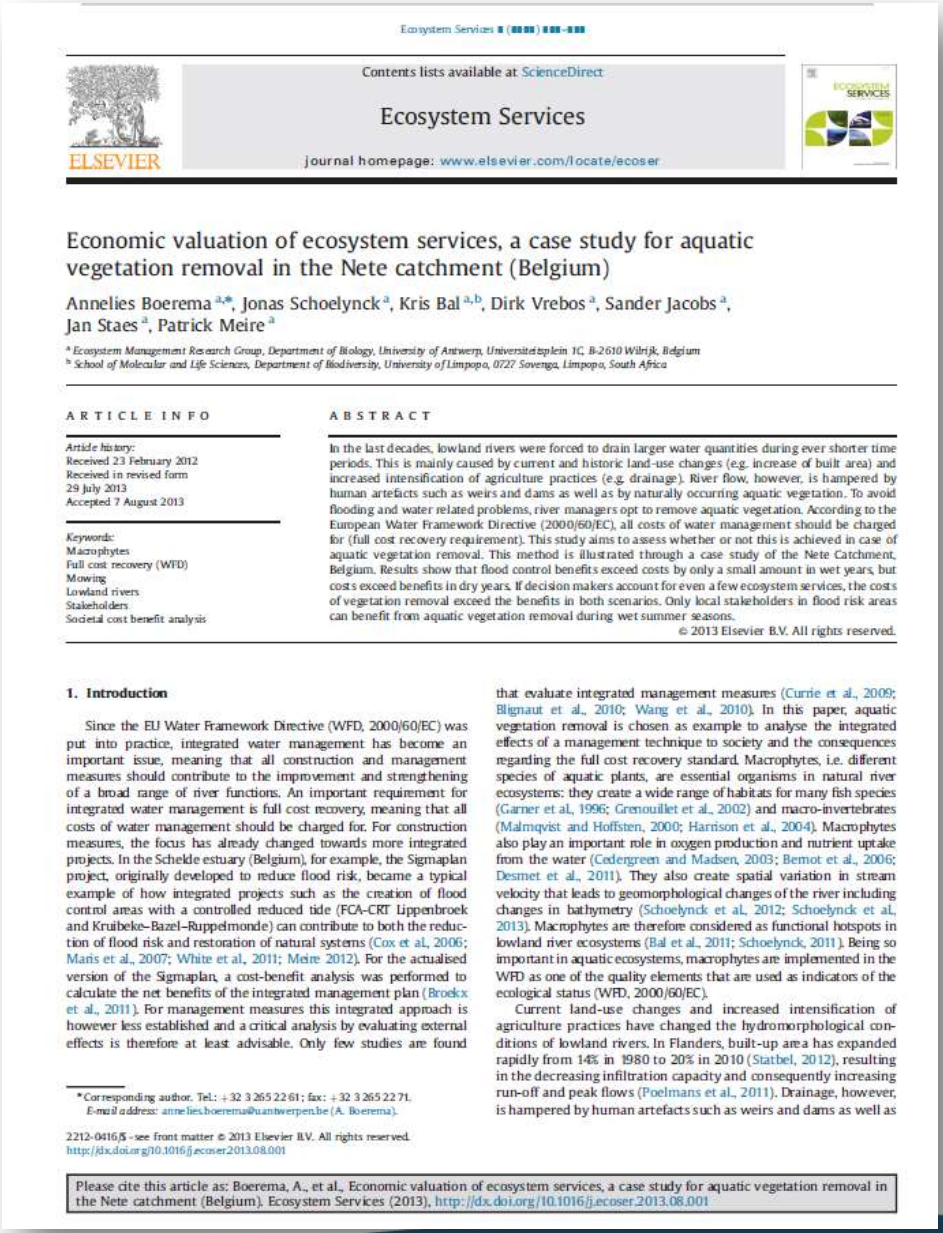
A difficult balance between water management and ecology.

Annelies Boerema et al, 2013

- Cost-benefit analysis mowing in the Nete Catchment
- All possible ESS
- Division over stakeholders



Ecosystem Services ∎ (∎∎∎) ∎∎∎–∎∎∎

Contents lists available at ScienceDirect

Ecosystem Services

journal homepage: www.elsevier.com/locate/ecoser

Economic valuation of ecosystem services, a case study for aquatic vegetation removal in the Nete catchment (Belgium)

Annelies Boerema [a,*], Jonas Schoelynck [a], Kris Bal [a,b], Dirk Vrebos [a], Sander Jacobs [a], Jan Staes [a], Patrick Meire [a]

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[b] School of Molecular and Life Sciences, Department of Biodiversity, University of Limpopo, 0727 Sovenga, Limpopo, South Africa

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Mowing
Lowland rivers
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Societal cost benefit analysis

ABSTRACT

In the last decades, lowland rivers were forced to drain larger water quantities during ever shorter time periods. This is mainly caused by current and historic land-use changes (e.g. increase of built area) and increased intensification of agriculture practices (e.g. drainage). River flow, however, is hampered by human artefacts such as weirs and dams as well as by naturally occurring aquatic vegetation. To avoid flooding and water related problems, river managers opt to remove aquatic vegetation. According to the European Water Framework Directive (2000/60/EC), all costs of water management should be charged for (full cost recovery requirement). This study aims to assess whether or not this is achieved in case of aquatic vegetation removal. This method is illustrated through a case study of the Nete Catchment, Belgium. Results show that flood control benefits exceed costs by only a small amount in wet years, but costs exceed benefits in dry years. If decision makers account for even a few ecosystem services, the costs of vegetation removal exceed the benefits in both scenarios. Only local stakeholders in flood risk areas can benefit from aquatic vegetation removal during wet summer seasons.

1. Introduction

Since the EU Water Framework Directive (WFD, 2000/60/EC) was put into practice, integrated water management has become an important issue, meaning that all construction and management measures should contribute to the improvement and strengthening of a broad range of river functions. An important requirement for integrated water management is full cost recovery, meaning that all costs of water management should be charged for. For construction measures, the focus has already changed towards more integrated projects. In the Schelde estuary (Belgium), for example, the Sigmaplan project, originally developed to reduce flood risk, became a typical example of how integrated projects such as the creation of flood control areas with a controlled reduced tide (FCA-CRT Lippenbroek and Kruibeke–Bazel–Ruppelmonde) can contribute to both the reduction of flood risk and restoration of natural systems (Cox et al., 2006; Maris et al., 2007; White et al., 2011; Meire 2012). For the actualised version of the Sigmaplan, a cost-benefit analysis was performed to calculate the net benefits of the integrated management plan (Broekx et al., 2011). For management measures this integrated approach is however less established and a critical analysis by evaluating external effects is therefore at least advisable. Only few studies are found that evaluate integrated management measures (Currie et al., 2009; Blignaut et al., 2010; Wang et al., 2010). In this paper, aquatic vegetation removal is chosen as example to analyse the integrated effects of a management technique to society and the consequences regarding the full cost recovery standard. Macrophytes, i.e. different species of aquatic plants, are essential organisms in natural river ecosystems: they create a wide range of habitats for many fish species (Garner et al., 1996; Grenouillet et al., 2002) and macro-invertebrates (Malmqvist and Hoffsten, 2000; Harrison et al., 2004). Macrophytes also play an important role in oxygen production and nutrient uptake from the water (Cedergreen and Madsen, 2003; Bernot et al., 2006; Desmet et al., 2011). They also create spatial variation in stream velocity that leads to geomorphological changes of the river including changes in bathymetry (Schoelynck et al., 2012; Schoelynck et al., 2013). Macrophytes are therefore considered as functional hotspots in lowland river ecosystems (Bal et al., 2011; Schoelynck, 2011). Being so important in aquatic ecosystems, macrophytes are implemented in the WFD as one of the quality elements that are used as indicators of the ecological status (WFD, 2000/60/EC).

Current land-use changes and increased intensification of agriculture practices have changed the hydromorphological conditions of lowland rivers. In Flanders, built-up area has expanded rapidly from 14% in 1980 to 20% in 2010 (Statbel, 2012), resulting in the decreasing infiltration capacity and consequently increasing run-off and peak flows (Poelmans et al., 2011). Drainage, however, is hampered by human artefacts such as weirs and dams as well as

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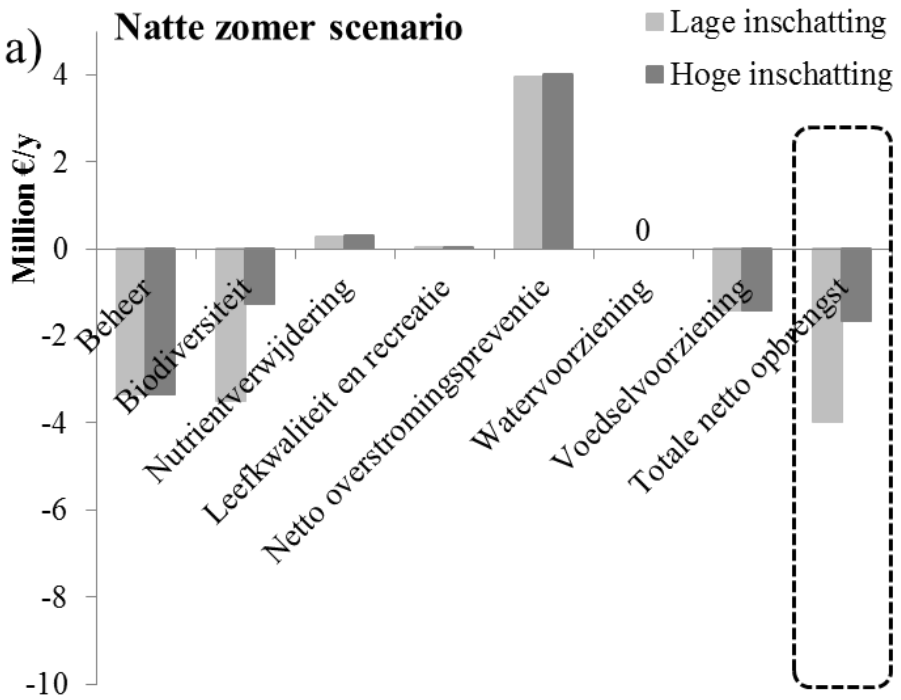
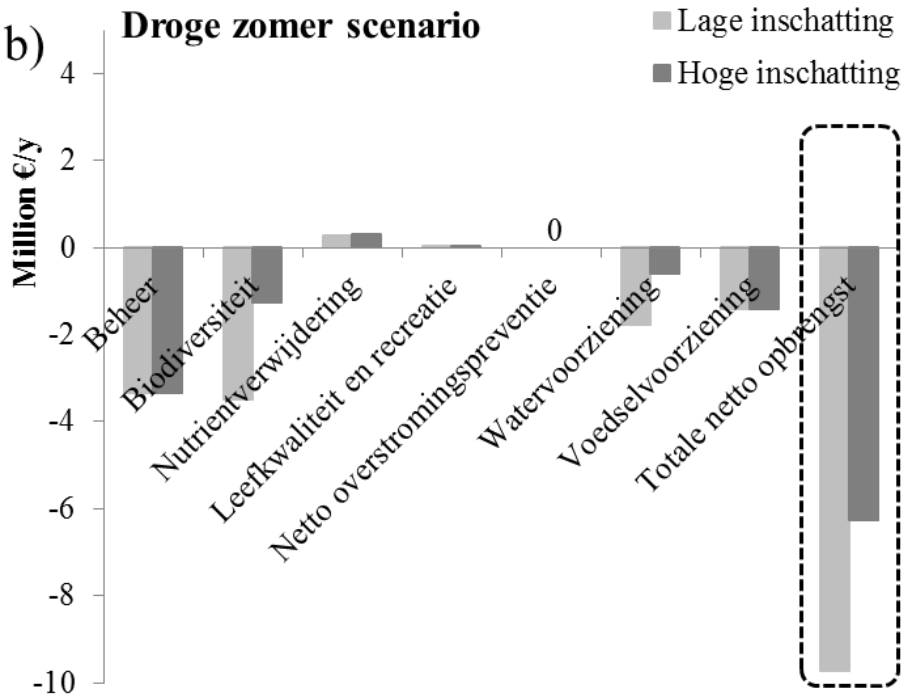
A difficult balance between water management and ecology.

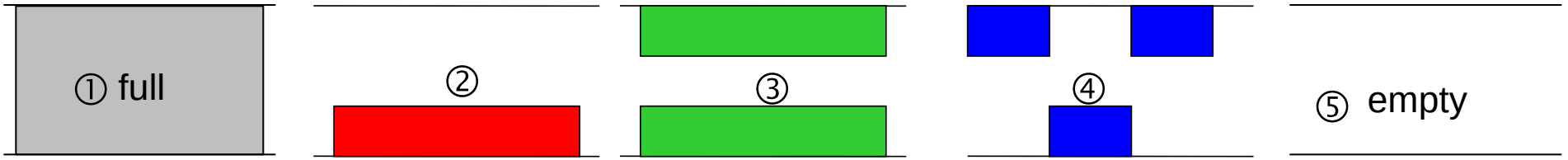




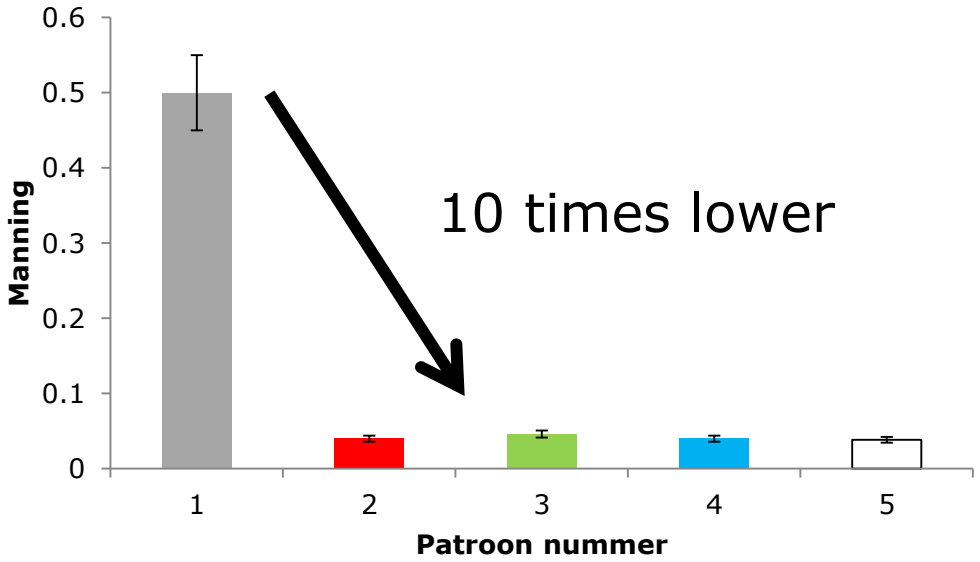
"we conclude that aquatic vegetation removal in the Nete catchment is not economically efficient, costs and benefits are not equally shared and the management technique as applied today is not sustainable"

Boerema et al. Economic valuation of ecosystem services, a case study for aquatic vegetation removal in the Nete Catchment, Belgium. Ecosystem Services In press

Can we come up with an optimal mowing strategy?



Average Manning n for each pattern



Key message 4

- Use of the concept of ecosystem services allowed to detect an economically unsound management measure and to make a much broader analysis of the issue
- ➔ could have a significant impact on future decision making and lead to different management strategies

Insight is needed

Research into ecosystem services:

- Which ES are delivered where?
- What are crucial processes determining the delivery of ES?
- What is the value?
- ……

natuurwaardeverkenner

NL | EN

Home Scenario Achtergrond FAQ Contact

Een ecosysteem levert goederen en diensten aan de mens, die een effect hebben op de welvaart of het welzijn van een maatschappij. Met de natuurwaardeverkenner bent u in staat om het belang van deze diensten te verkennen en te schatten hoe door veranderingen in landgebruik deze diensten worden beïnvloed.

Omdat de Vlaamse overheid het belang inziet van ecosysteemdiensten (ESD) en hun rol voor beter geïnformeerde beleidsbeslissingen, liet het Departement Leefmilieu, Natuur en Energie een team van economen en ecologen van VITO en de universiteiten van Antwerpen en Amsterdam een studie uitwerken waarmee het belang en de **economische waarde van ESD** voor Vlaanderen kon worden aangetoond.

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Ecosysteemdiensten

- Impact van ecosysteem op menselijk welzijn
- Belang van groen voor recreatie, gezondheid
- Invloed open ruimte op klimaatswijziging, luchtkwaliteit, waterkwaliteit

Waarderen

- Kwalitatief scoren hoe belangrijk iets is in een gebied
- Kwantitatief berekenen in welke mate diensten worden beïnvloed
- In geldtermen uitdrukken wat hiervan de maatschappelijke waarde is

Zelf aan de slag

- Raadplegen van publieke scenario's
- Impact van projecten doorrekenen
- Resultaten bediscussiëren met andere gebruikers

Natuurwaardeverkenner

Landgebruik
Gebied 1

Ligging
Gebied 1

Diensten
Gebied 1

Berekening
Resultaat
Resultaat exporteren
Start forumdiscussie

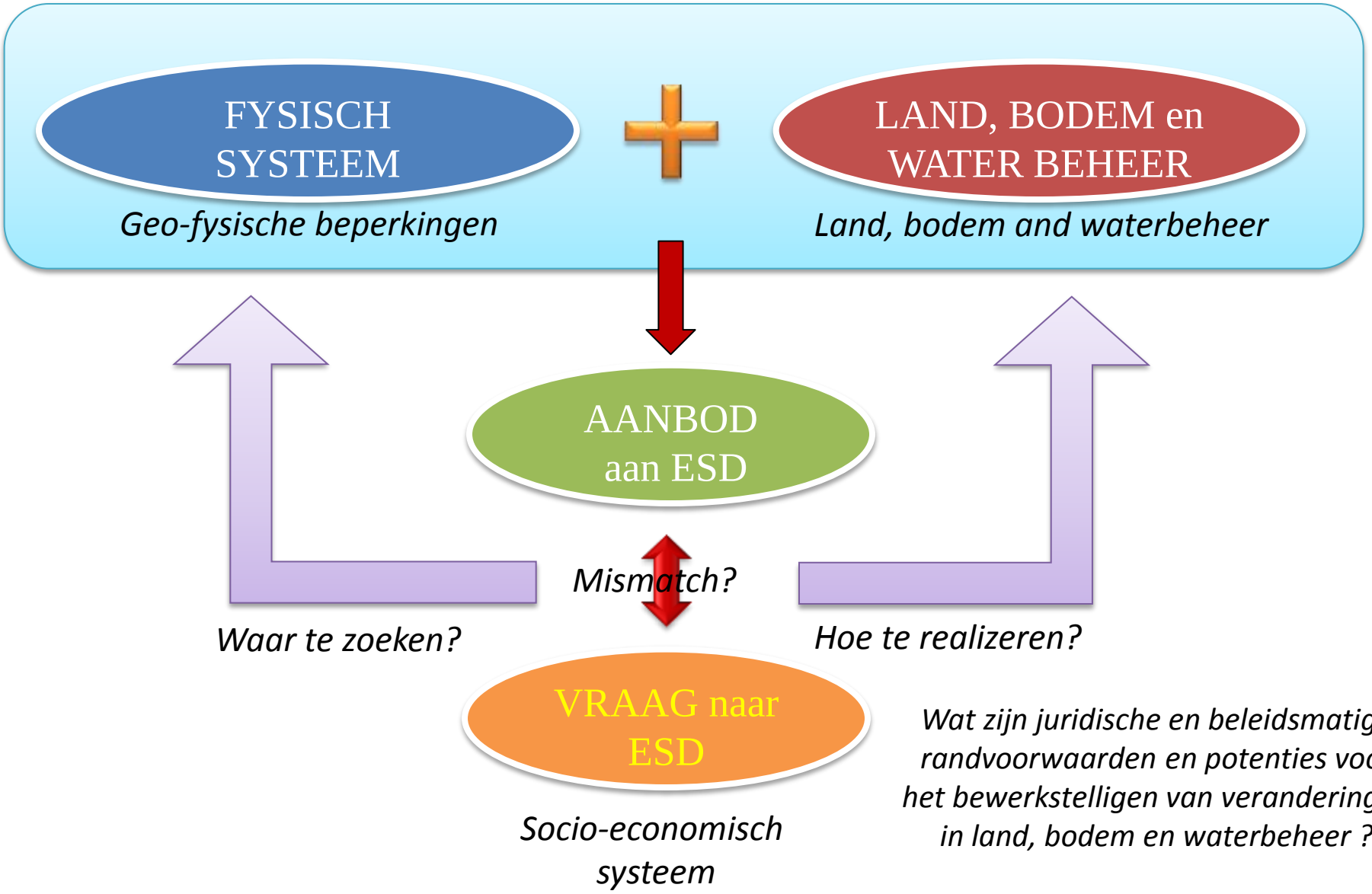
Stuurgroep - Landgebruik - Gebied 1

Naam gebied: Gebied 1
Oppervlakte: 20.0 ha

Landgebruik	Huidig	Toekomst
Zeekust en estuaria	0.0	0.0
Bloem- en soortenrijke graslanden	0.0	10.0
Bossen en struiken	0.0	10.0
Heide en landduinen	10.0	0.0
Moerassen	0.0	0.0
Rivieren en stilstaande wateren	0.0	0.0
Akker of weiland	10.0	0.0
Stedelijk landgebruik	0.0	0.0
Totaal	**20.0 (Ok)**	**20.0 (Ok)**

Opslaan | Annuleren

Rationale ECOPLAN

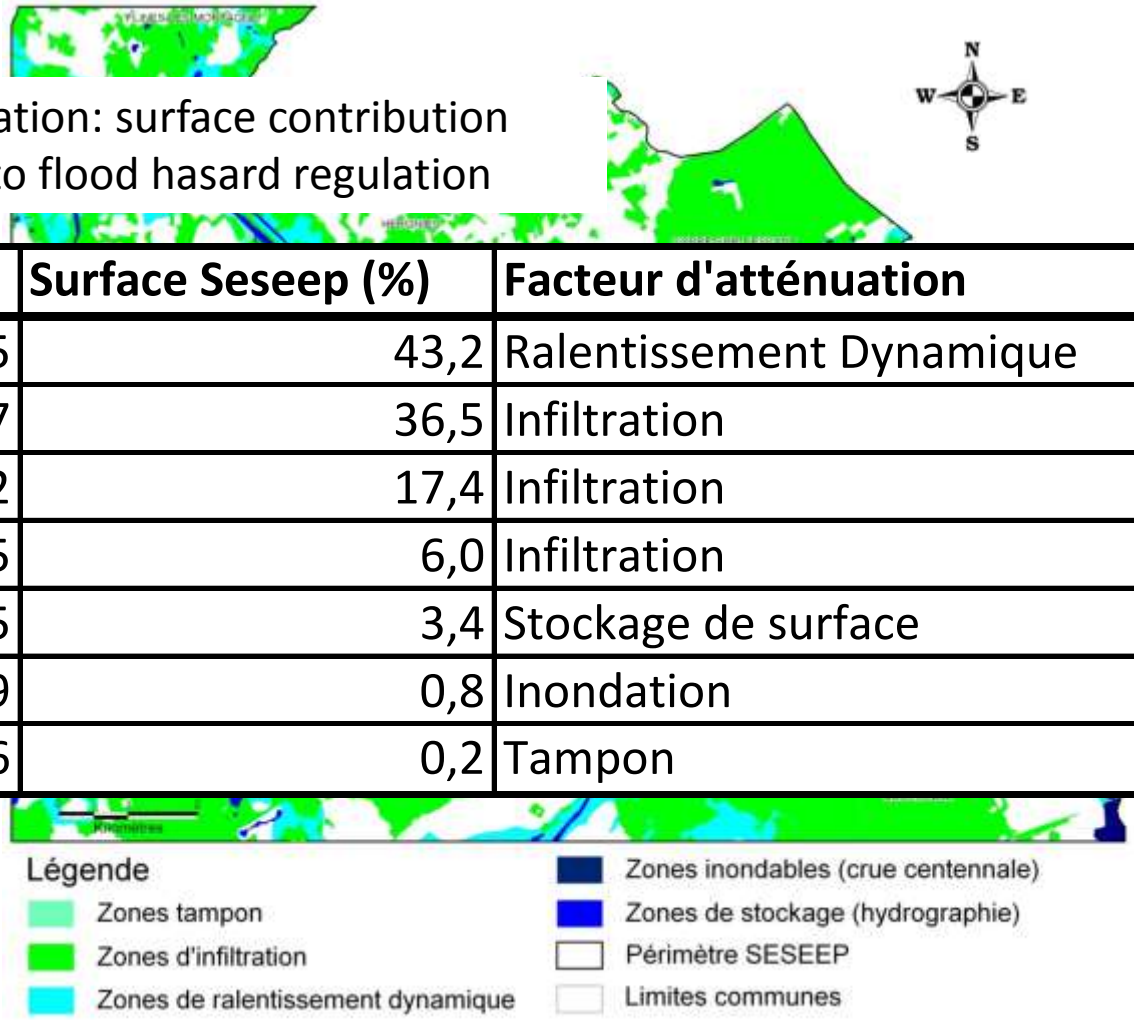


Wat zijn juridische en beleidsmatige randvoorwaarden en potenties voor het bewerkstelligen van veranderingen in land, bodem en waterbeheer ?

SESEEP Projet: Flood mitigation by means of geomorphological control of surface runoff and permanent infiltration (forest, wetland, grassland)

Quantification: surface contribution (sq.km) to flood hasard regulation

	Surface km²	Surface Seseep (%)	Facteur d'atténuation
Alluvions récentes	67,15	43,2	Ralentissement Dynamique
Forêts	56,67	36,5	Infiltration
Prairies	27,02	17,4	Infiltration
Champs captants	9,35	6,0	Infiltration
Hydrographie	5,35	3,4	Stockage de surface
Zone inondable	1,19	0,8	Inondation
Zone humide	0,26	0,2	Tampon



Map: Eric Masson (MESHS-TVES EA 4477)
Data: SIGALE 2009, RGA 2010, AEAP 2013, BRGM 2013, ONF 2013, PRNSE, IGN

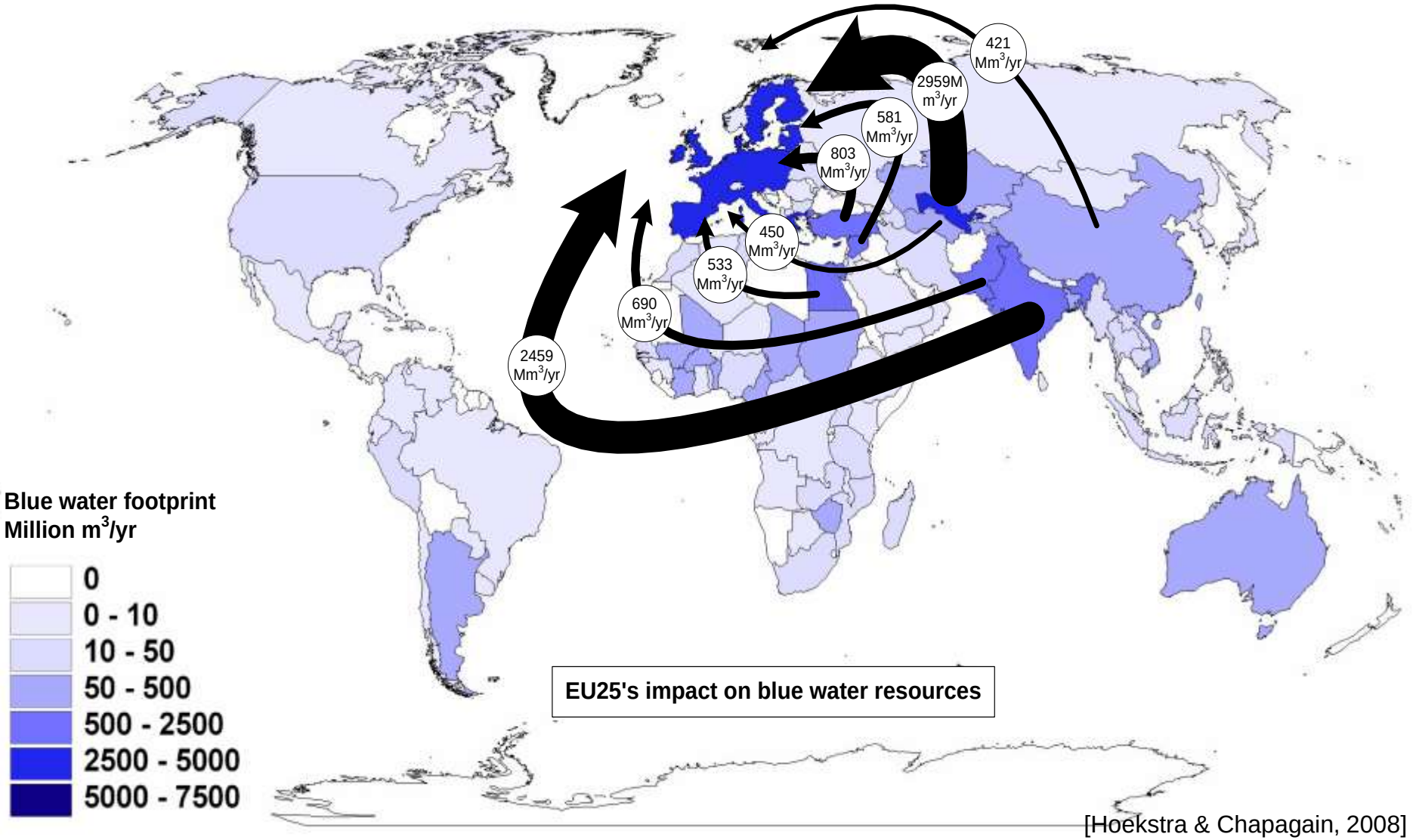
Key message 5

- The knowledge of ES is increasing very fast also in the Schelde basin
- Tools are developed that will allow a better integration of ES in the developing plans, scenario's and policies

Ecosystem Services and international trade

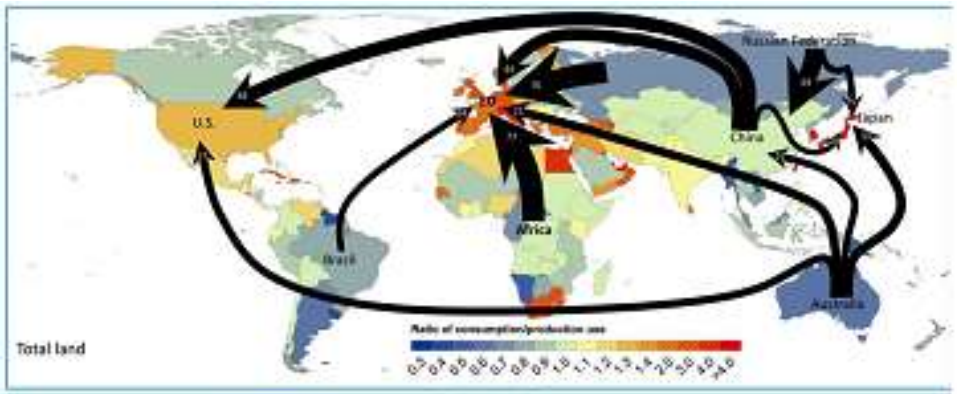
- Through transports large quantities of goods are moved form one place to another
- This transport is however not only the product itself , but also
  - Virtual water
  - Ecosystem services

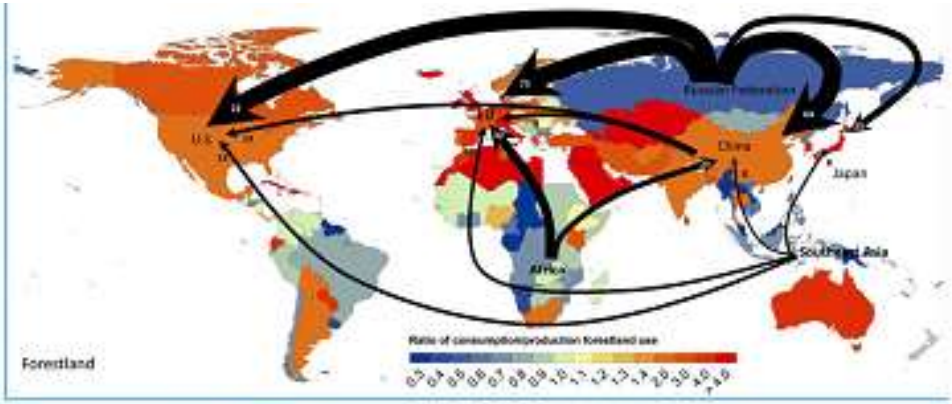
Water footprint of EU's cotton consumption (blue water)

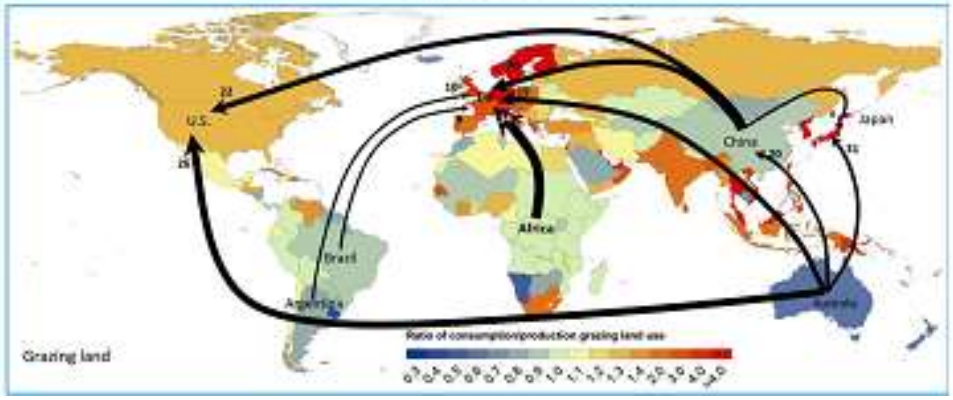


[Hoekstra & Chapagain, 2008]

Land used for export production (in Mha)



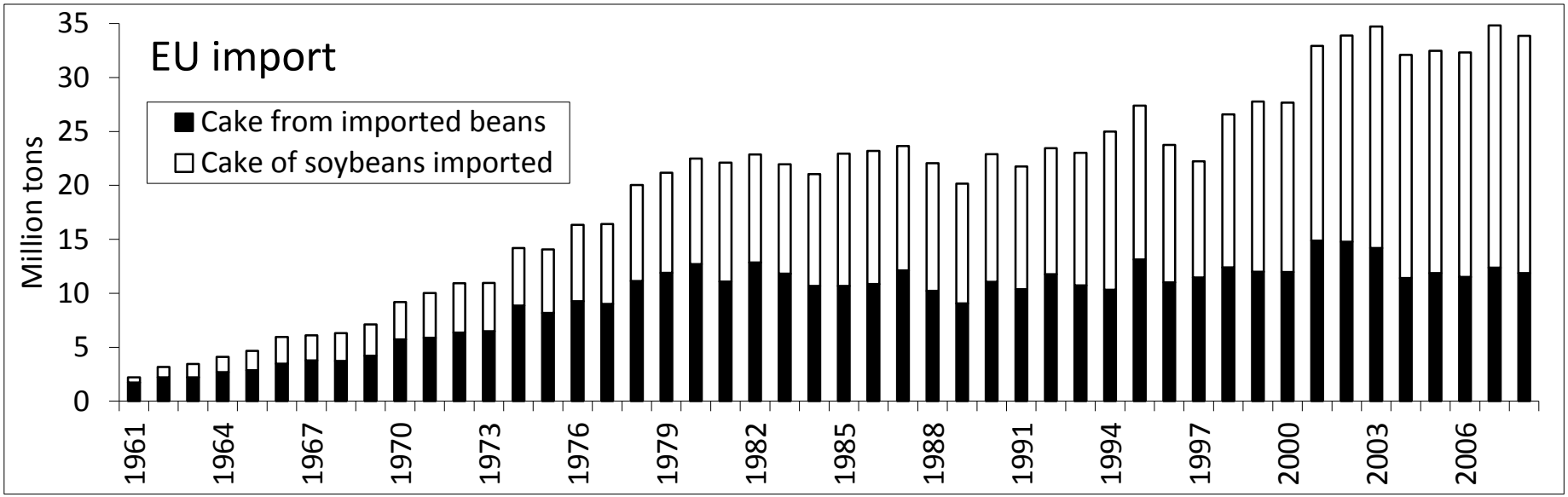


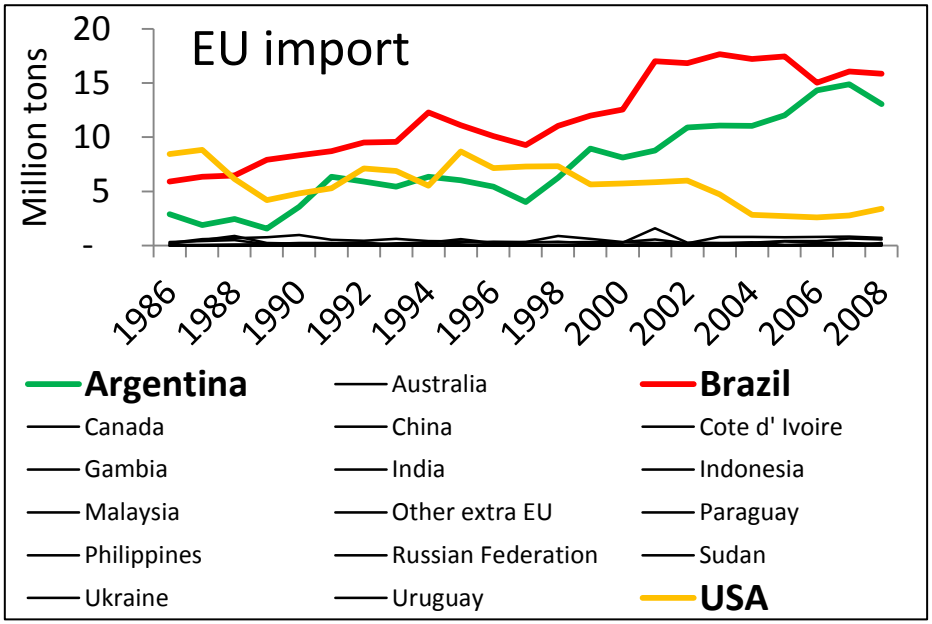


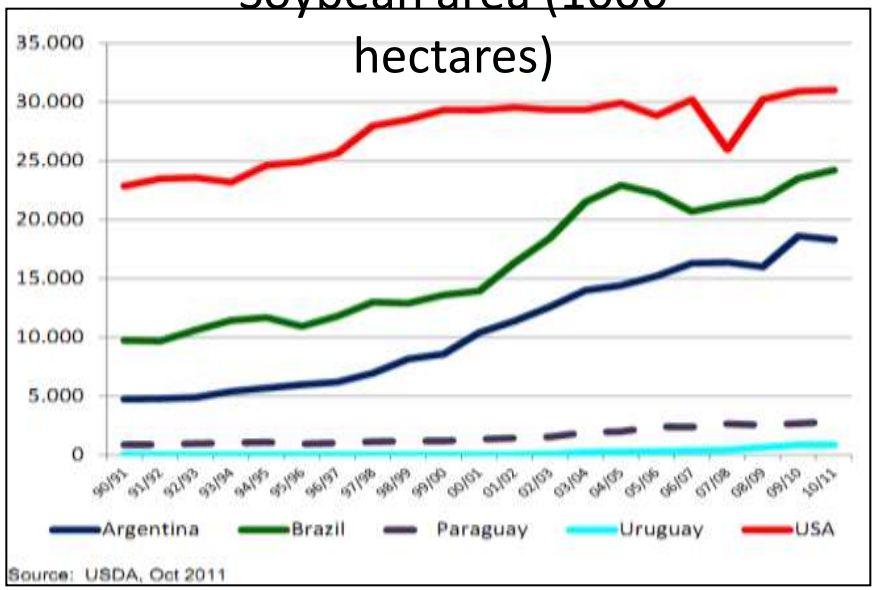
The maps highlight total land, cropland, grazing land and forest land displaced through export production. The thickness of the arrows and numbers next to the arrows represent the amount of land used as inputs for the production of imported and exported goods.

Yu, Y., K. Feng, and K. Hubacek. 2013. Tele-connecting local consumption to global land use. Global Environmental Change ***23****:1178-1186.*

Global soy trade







EU-27

Total import 2008:
34 mio tonnes

=> - 25 billion $/y

=> + 2 billion $/y

*re-forestation
*urbanisation

16 mio tonnes
(2008)

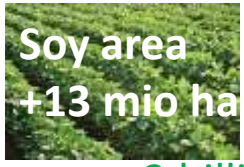
13 mio tonnes
(2008)

Brazil (B)

Total production 2008:
60 mio tonnes

Argentina (A)

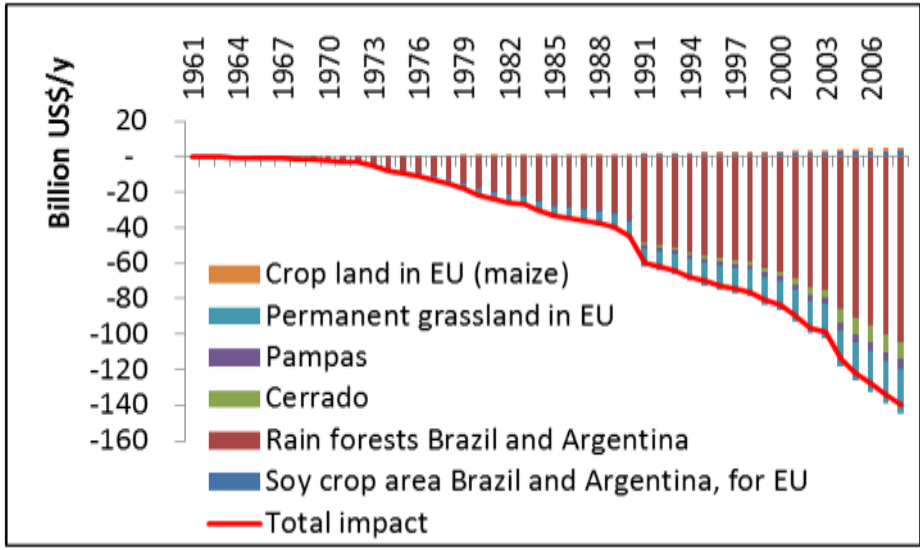
Total production 2008:
46 mio tonnes



=> + 3 billion $/y

=> - 100 billion $/y

=> - 15 billion $/y



Loss: -135 billion $/y

Context

- Direct consequences in the exporting countries:
  - Land use changes (deforestation)
  - Water use and contamination
  - Air pollution
  - …
- Indirect consequences:
  - Losses in fish production
  - Decreasing drinking water availability
  - Health issues
  - …

$\Rightarrow$ **socio-economic losses not counted for** in the market price of the exported product!

= market failure (importing products is too cheap, not all costs are paid for)

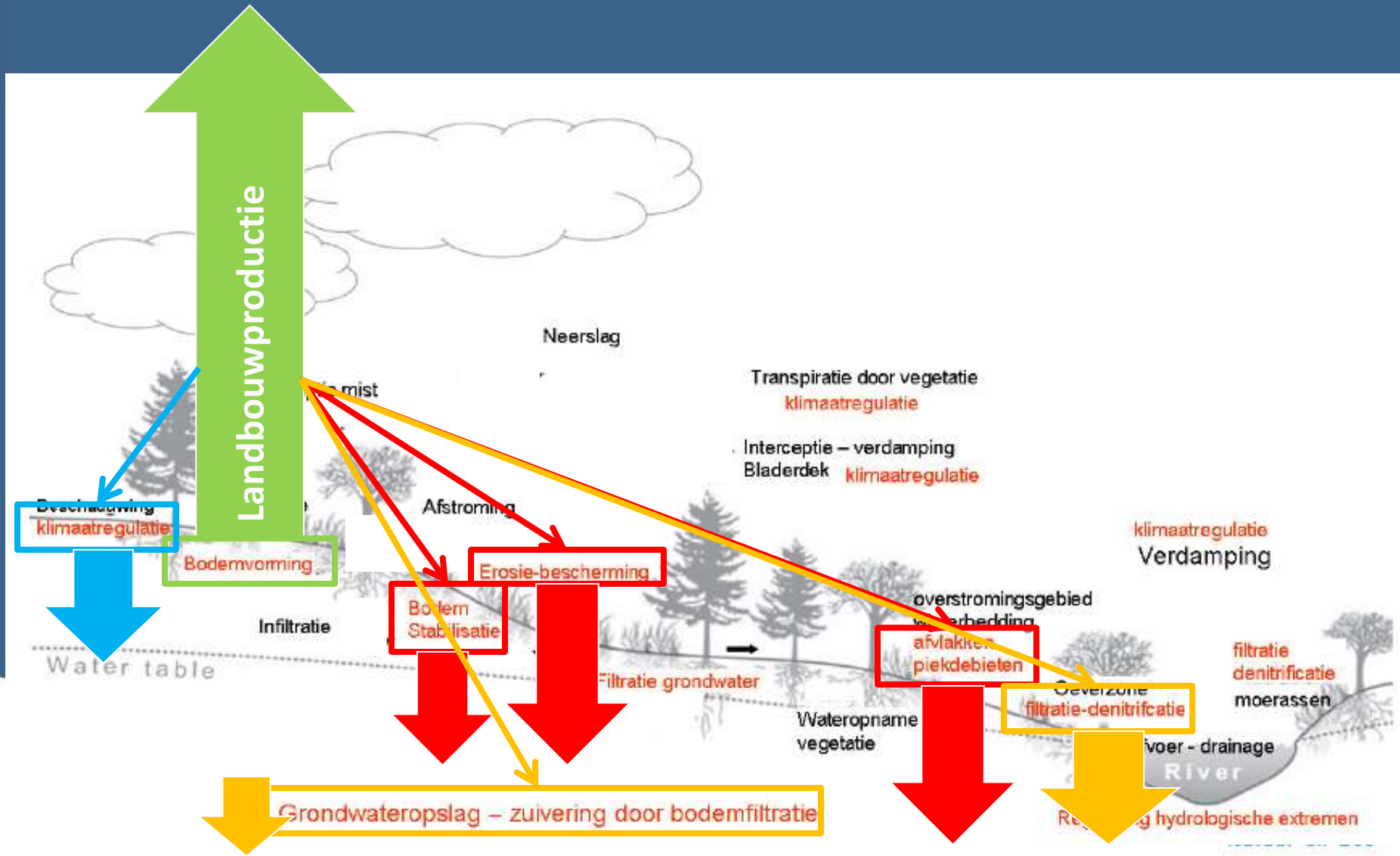
Key message 6

- The concept of ecosystem services can help to detect hidden environmental costs and will allow decision making even on global trades towards more sustainability.

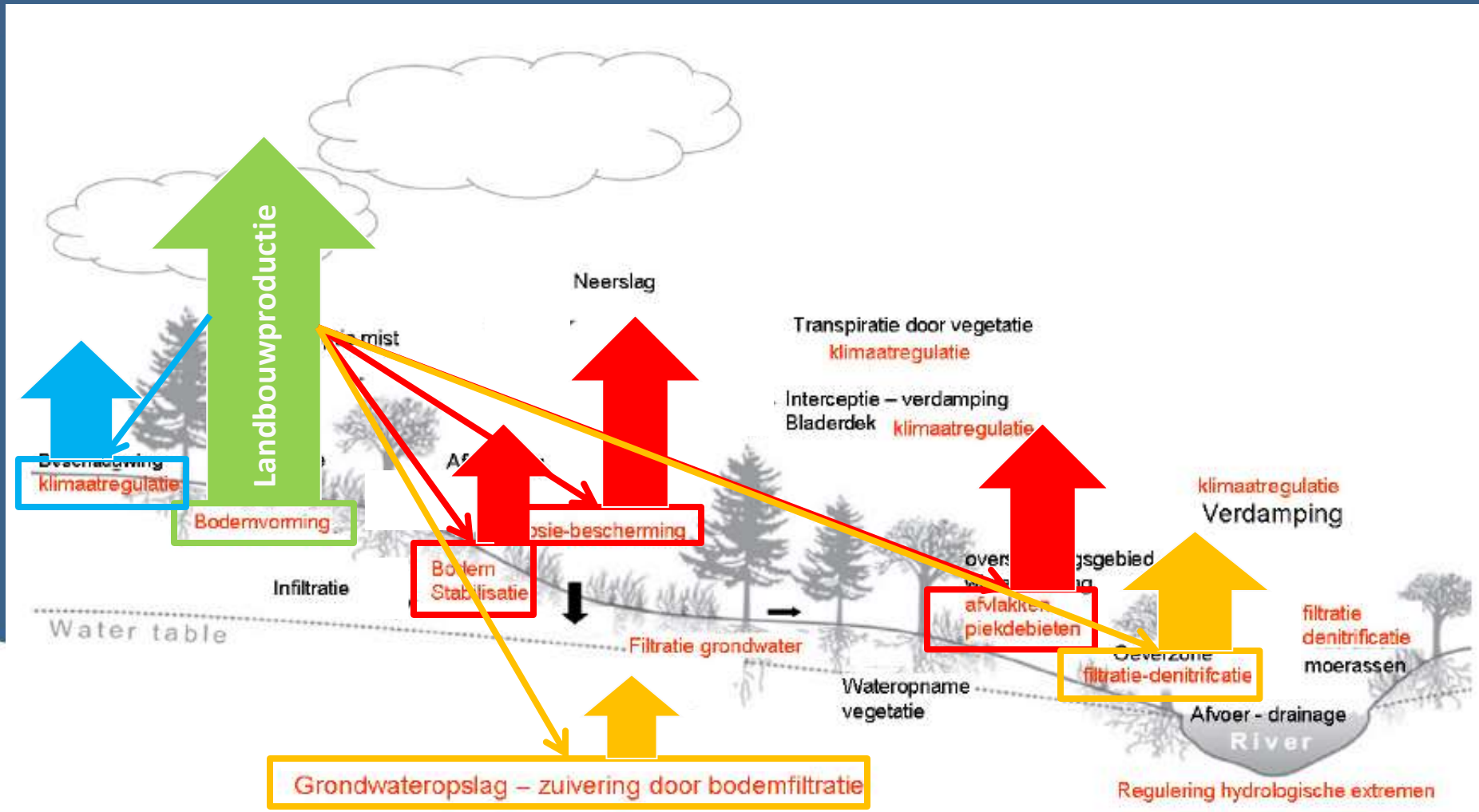
The Schelde and its catchment in 2050

- As part of a transition towards a sustainable society the concept of ES will play an important role in:
  - Spatial planning and land use choices
  - Ways to manage the environment (eg maintenance measures)
  - Choices of production and/or consumption patterns

ESD landbouw versus lokale , regionale en globale regulerende ESD



Duurzaam beleid in functie van alle lokale , regionale en globale ESD = maximale winst



Conclusions

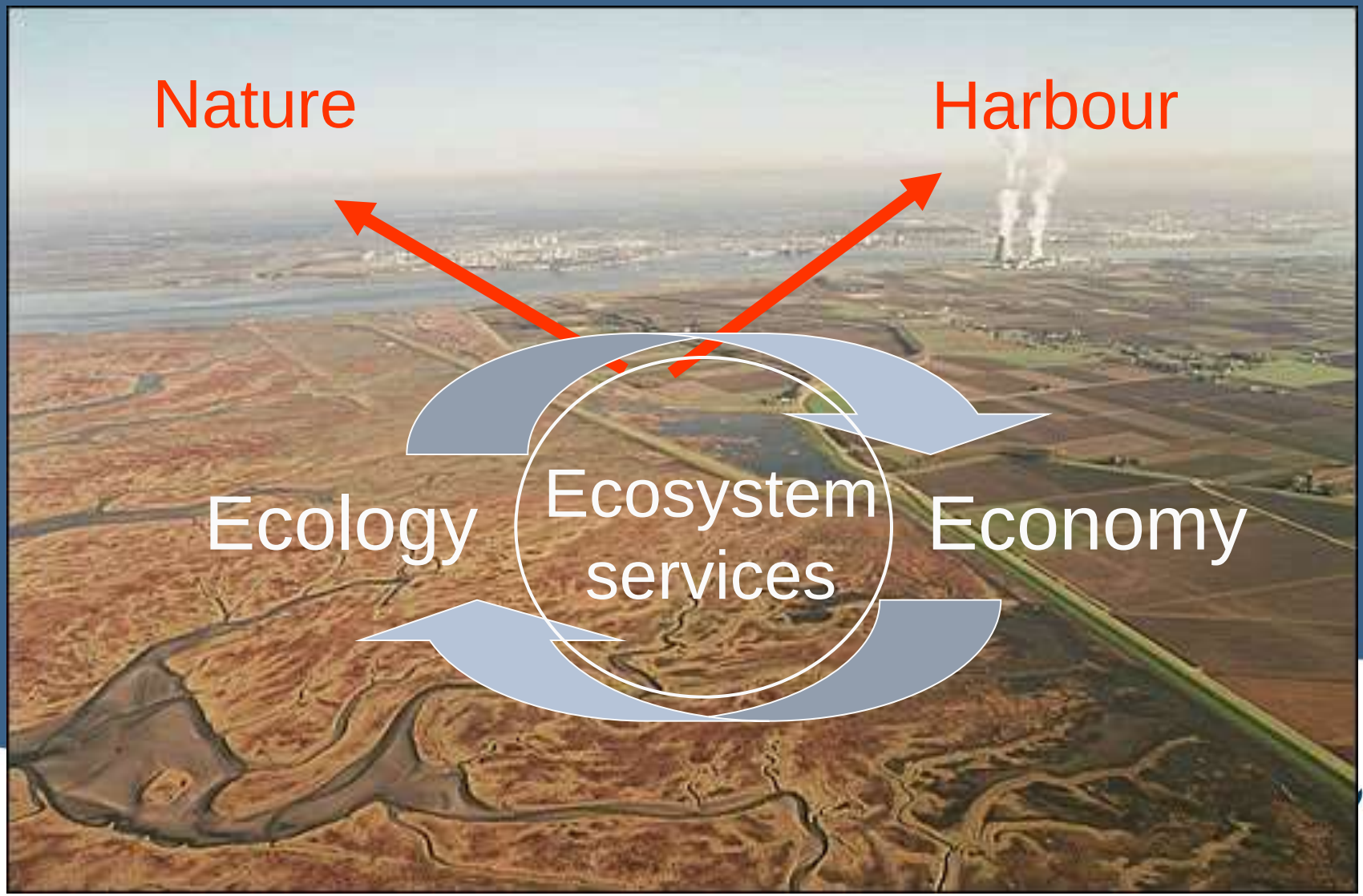
- Ecosystems deliver a whole range of ES
- A loss of habitats means a los of ES
- A loss of ES means an economic loss

- Restoration must not only aim at protection of biodiversity but also at ES
- This must lead to mitigation of negative trends and such this is an important part of the adaptation strategy
- Ecological restoration is both economically as well as societal an investment with high economic return

- It is crucial to define objectives in a broad way, including objective for ES

- A good system monitoring is essential as a basis to describe the development of the system, toe begrijpen en de processen te kwantificeren als basis voor een goed beheer
- Het is uitermate belangrijk om het belang van het herstel van het Schelde ecosysteem op een correcte manier te communiceren en te wijzen op het belang van ecosysteemdiensten

Ecosystem services



Thanks for your attention

Dank aan allen die bijgedragen tot deze presentatie
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Katrien Van der Biest