

The Economics of Ecosystems & Biodiversity



June 28, 2011
Tunis, Tunisia

The Economics of Ecosystems & Biodiversity

Mainstreaming the Economics of Nature

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Leipzig, Germany





Outline

- Introducing TEEB
- TEEB's perspective
- In Practice: two forestry examples
- Relevance for MENA and Key Recommendations
- Outlook and Announcements



Introducing TEEB

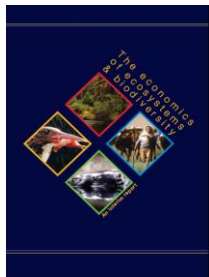


TEEB's genesis

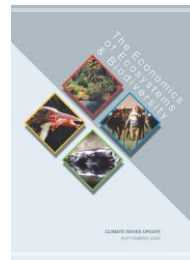


Potsdam Initiative – Biological Diversity 2010

“...the economic significance of the global loss of biological diversity...”



TEEB Interim Report
CBD COP-9, Bonn, May 2008



TEEB Climate Issues Update
Strömstad September 2009.



TEEB Main Reports
Nov. 2009 – Oct. 2010





The TEEB Community...

- UNEP for hosting TEEB



- TEEB Scientific Coordination Team at UFZ



- over **500** contributors across partner institutions, universities, individuals...
 - an international and diverse “Community” of economists, ecologists and practitioners ...
 - sharing best practices, tools, methods and experience
 - and making TEEB a “Global Public Good”



The nature of TEEB

TEEB is **not**...

- ...a research project (no new methods developed).
- ...a plaidoyer for indiscriminate commodification/commerce of nature.

TEEB aims at:

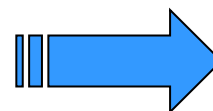
- A **synthesis** of existing knowledge on economics of ecosystems and biodiversity.
- Prepared for **different users** in public politics and business.
- Active and worldwide **dissemination** to these users.
- Making nature **economically visible**.



TEEB's main reports



Science & Economics Foundations



Policy Evaluation for National Policy-Makers



Evaluation & Decision Support for Local and Regional Policy



Business Risks & Opportunities



Synthesis



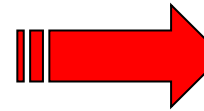
TEEB's main reports



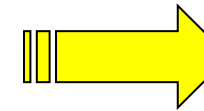
Science & Economics
Foundations



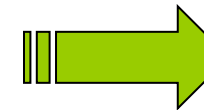
Policy Evaluation
for National Policy-
Makers



Evaluation & Decision
Support for Local and
Regional Policy



Business Risks
& Opportunities



Synthesis



TEEB's perspective

for environmental governance in general



Making Nature economically visible...

...through the concept of **ecosystem services**.

•Nature's many contributions





Making Nature economically visible...

...through the concept of **ecosystem services**.

- Nature's many contributions
 - to our economies
 - => **commodities**



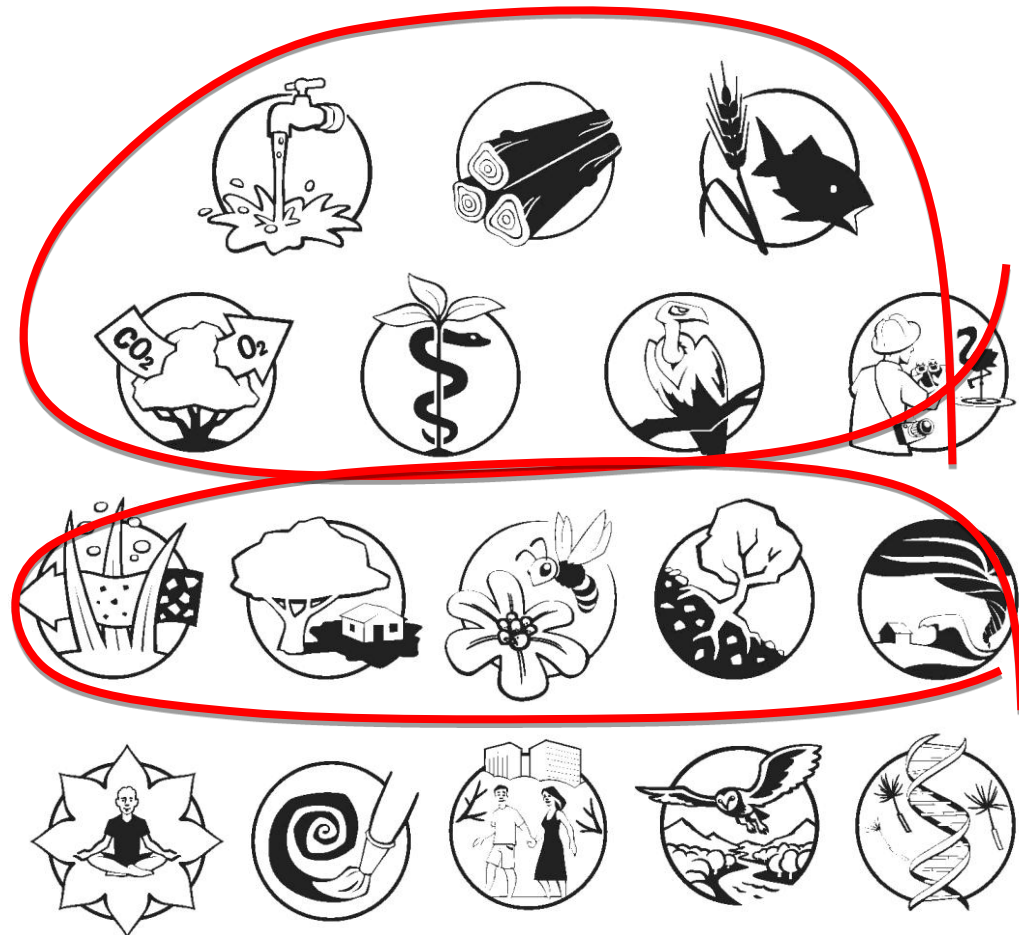


Making Nature economically visible...

...through the concept of **ecosystem services**.

• Nature's many contributions

- to our economies
=> **commodities**
- to our existence
=> **regulating services**



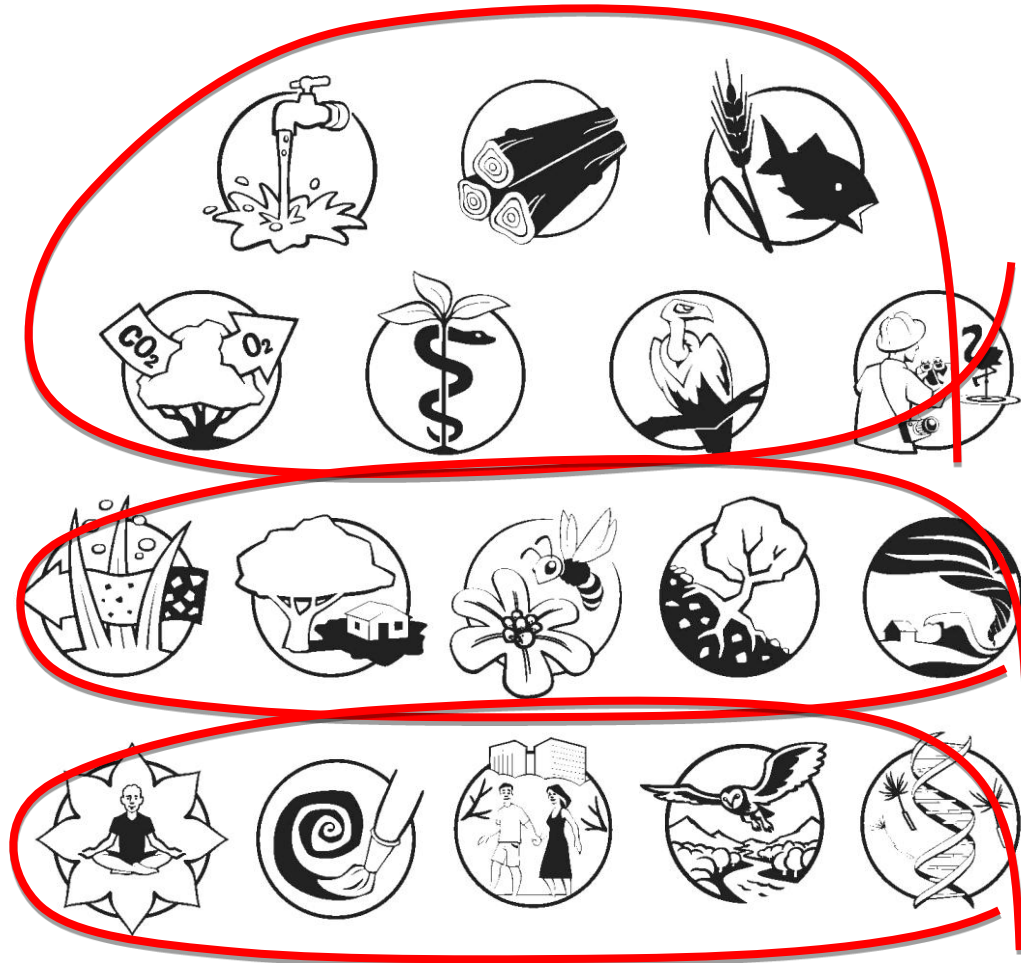


Making Nature economically visible...

...through the concept of **ecosystem services**.

• Nature's many contributions

- to our economies
=> **commodities**
- to our existence
=> **regulating services**
- and to our well being
=> **intrinsic values**





Why? The Case for TEEB

We cannot risk taking nature's contribution for granted

- **poor use leads to development opportunities lost**
 - wetland management in **Sorou Valley, Burkina Faso**
 - Kala Oya water tank system, **Sri Lanka**
- **overuse leads to vicious circle of (poverty–degradation)**
 - pressures on **Malawi's** most productive lake: Lake Chilwa
- **collapse can cause tremendous irreversible damage:**
 - Amazon 'waterpump' for **Argentina's** granary



Courtesy : Yann-Arthus Bertrand, GoodPlanet



Why? The Case for TEEB



- **it can help save municipal costs**
 - Quito's drinking water comes cheaper from 2 national parks
 - Kampala's wetlands effectively treat sewage

Source: all examples are TEEBcases (teebweb.org)



Why? The Case for TEEB



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- **it can protect against natural hazards**
 - mangroves protect against typhoons in northern Vietnam



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- **it can boost the local economy**
 - it pays to protect sharks in the Maldives





Why? The Case for TEEB



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- **it can protect against natural hazards**
 - mangroves protect against typhoons in northern Vietnam
- **it can boost the local economy**
 - it pays to protect sharks in the Maldives
- **it can help tackle poverty**
 - woodland restoration secures essential services to agro-pastoral communities in Tanzania



TEEB's approach (1/2)

- 1. Recognizing value:** a feature of all human societies and communities
- 2. Demonstrating value:** in economic terms, to support decision making
- 3. Capturing value:** introduce mechanisms that incorporate the values of ecosystems into decision making



TEEB's approach (1/2)



1. Recognizing value: a feature of all human societies and communities



2. Demonstrating value: in economic terms, to support decision making



3. Capturing value: introduce mechanisms that incorporate the values of ecosystems into decision making

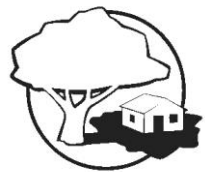


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TEEB's approach (2/2)

Six steps for effectively appraising ecosystem services

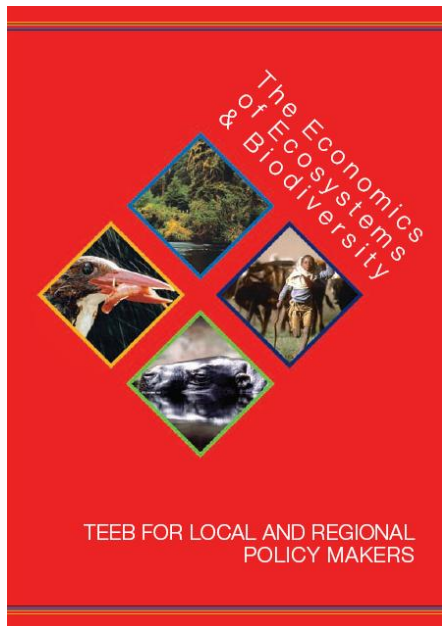
Not a fixed recipe: guidance for **process design**.



TEEB's approach (2/2)

Six steps for effectively appraising ecosystem services

Not a fixed recipe: guidance for **process design**.



1. ... **specify and agree** the policy issue with stakeholders.
2. ... **identify** which ecosystem services are most relevant.
3. ... define the **information needs** and select **appropriate methods**.
4. ... (physically) **assess** ecosystem services.
5. ... identify and appraise **policy options** and
6. ... assess their **distributional impacts**.

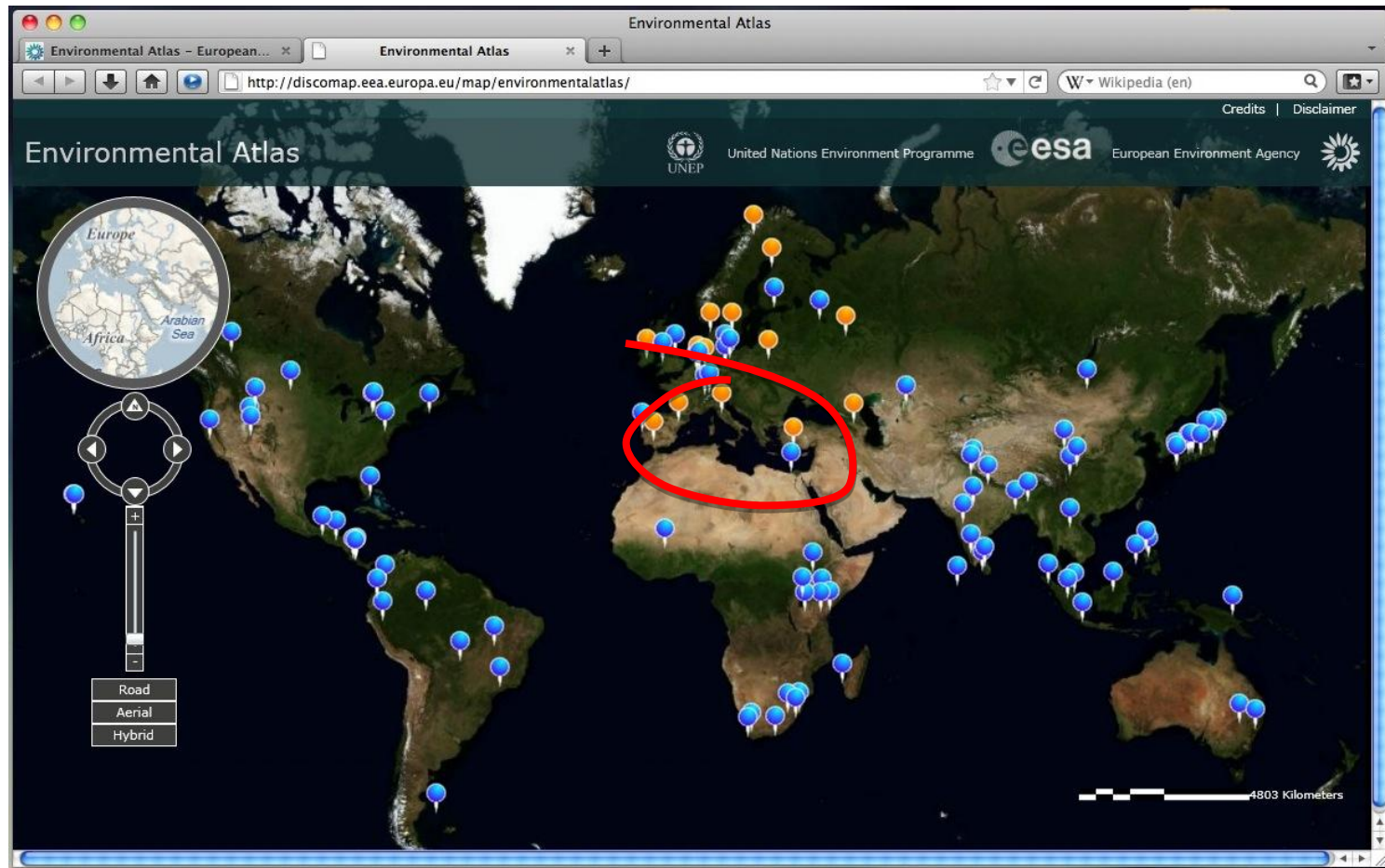


In Practice

two examples from forestry



TEEB cases (blue pins)



<http://www.eea.europa.eu/atlas>



TEEB cases

- TEEB cases database contains factsheets on processes where ecological-economic assessments were both **carried out** and **taken up by policy**.
- Middle East and North Africa not yet present: **time to get to business!**
- However: several TEEB cases with focus on typical MENA-Forest issues available
 - Commercial over-logging, poaching
 - Challenges to Conservation of Protected Areas
 - Links with empowerment / poverty reduction



TEEB cases



Forest valuation stimulates green development policies in the Province of Aceh, Indonesia

Compiled by: Johannes Förster and Augustin Berghöfer (UFZ) mainly based on van Beukering et al. 2003

Short title: Forest valuation stimulates green development policies in the Province of Aceh, Indonesia

Key Message: It has been demonstrated through ecosystem services valuation that sustainable management and conservation of tropical forests in Aceh, Indonesia, has greater benefits than deforestation. Motivated by the growing potential for markets in ecosystem services (e.g. water, carbon storage), the new government of Aceh has launched a green development strategy and declared a moratorium on logging.

Suggested citation: TEEBcase Forest valuation stimulates green development policies in the Province of Aceh, Indonesia based on van Beukering et al. (2003 and 2008), compiled by Förster J. and Berghöfer, A. (2010) available at: TEEBweb.org.

Reviewer: Jane Dunlop, Pieter van Beukering, Godfrey Yeung

What was the problem?

The Leuser ecosystem in Aceh (a province in northern Sumatra, Indonesia), comprises one of the largest remaining continuous forest ecosystems in Southeast Asia, covering over 25,000 sq kms. This ecosystem has an outstanding richness of biodiversity which is partly protected by the Gunung Leuser National Park (ca. 8000 sq kms) and buffer zones. Due to years of conflict and political instability, not all logging concessions were logged and deforestation was slow compared to other regions. In more recent years, however, an end to conflict and a need for timber for reconstruction after the tsunami of 2004 has put pressure on the forests in the form of both legal and illegal logging.

The forests, wetlands and coastal ecosystems provide important ecosystem services that sustain the livelihood of the rural and urban population in Aceh. In areas where forests are logged, both urban and rural populations are exposed to a greater risk of floods and erosion as well as the loss of sustaining forest services (water purification, bush meat, wild plant materials, medicines and food). Furthermore, the revenue from precious hardwood timber is in large part captured by non-local companies.

Several attempts and strategies by local and international NGOs and donors to protect the forest in and around the Leuser National Park have had either little success or have failed for more than a decade. This is mainly due to lack of interest by policy makers, powerful elites and companies in sustainable forest management and conservation.

Which ecosystem services were examined? And how?


The management of the Leuser National Park recognized that presenting the facts about the declining numbers in the orang-utan population were not influencing the decisions of local

Version 1.1 Last update: October 2010; Further information at: www.teebweb.org |

- TEEB's database contains factsheets on **processes** where ecological-economic assessments were both **carried out** and **taken up** by policy or local management.
- The TEEBcase "Forest valuation in Sumatra" (Förster & Berghöfer, based on van Beukering et al. 2003, 2008) shows well the potential and challenges of **recognizing, demonstrating** and **capturing value** in forest management.



TEEB cases




Integrating Ecosystem Services into Spatial Planning in Sumatra, Indonesia

Authors: Thomas Barano, Emily McKenzie, Nirmal Bhagabati, Marc Conte, Driss Ennaanay, Oki Hadian, Nasser Olwero, Heather Tallis, Stacie Wolny, Ginny Ng

Short title: Integrating ecosystem services into spatial planning in Sumatra, Indonesia

Key Message: District and provincial government policy makers in Sumatra, Indonesia are integrating ecosystem services and biodiversity into Sumatra's next land-use plan. This ecosystem-based spatial plan guides local government planners in decisions on whether, and where, to award concessions for economic activities, such as oil palm and pulp and paper plantations. An ecosystem service mapping and modeling tool called InVEST was used to assess the quantity and location of high quality habitat, carbon storage and sequestration, annual water yield, erosion control, and water purification under two scenarios, representing implementation of the current government spatial plan and an 'Ecosystem Vision' of sustainable land use that better balances environmental, social and economic considerations. This information is helping to design and locate the best areas for conservation activities such as forest restoration, sustainable finance mechanisms such as payments for carbon and watershed services, and best management practices for forestry and plantations.

Suggested citation: TEEBcase by Thomas Barano, Emily McKenzie, Nirmal Bhagabati, Marc Conte, Driss Ennaanay, Oki Hadian, Nasser Olwero, Heather Tallis, Stacie Wolny, Ginny Ng (2010) Integrating Ecosystem Services into Spatial Planning in Sumatra, Indonesia, available at: TEEBweb.org.



Courtesy: Nirmal Bhagabati Courtesy: Nirmal Bhagabati

Last update: September/2010 TEEB case available online at: TEEBweb.org

- TEEB's database contains factsheets on **processes** where ecological-economic assessments were both **carried out** and **taken up** by policy or local management.
- The TEEBcase "Spatial planning in Sumatra" (Barano et al., in cooperation with the Natural Capital initiative) shows how the **six steps** can be applied to inform and shape policy processes.



TEEB case: Economic Valuation in Sumatra

- Focus:
 - **Leuser ecosystem** in Aceh (Sumatra, Indonesia).
 - Among the largest **continuous forest ecosystems** in Southeast Asia (25,000 km²; 8,000km² Gunung Leuser National Park).
- Problem:
 - Reconstruction after 2004 Tsunami increases pressure on **timber** resources.
 - The National Park management commissions an **economic valuation** for different use/conservation scenarios.



TEEB case: Economic Valuation in Sumatra

- **Recognizing value:**
 - Not just the timber resource, but a **broader range of forest benefits** (e.g.: water supply, fishery, flood prevention, fire prevention, hydro, tourism, etc.)

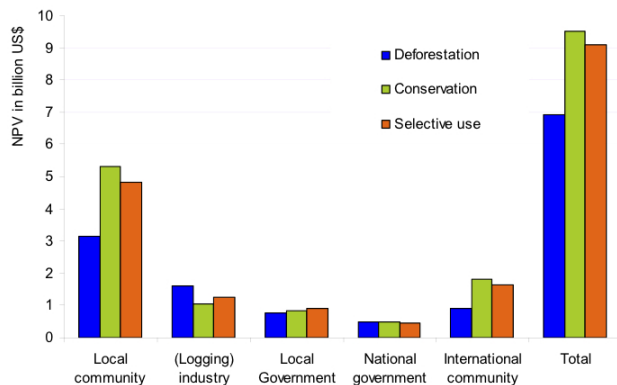


Figure 1: Benefit distribution among stakeholder under different land use scenarios in the Leuser Ecosystem (25,000 sq km), Indonesia, in Net Present Value (NPV) in billion US\$ over 30 years, at a discount rate of 4%.

- Different scenarios (conservation, selective use, deforestation)
- Explicit **distributive** dimension (costs and benefits for local community, logging industry, local government, international community)



TEEB case: Economic Valuation in Sumatra

- **Demonstrating value:**
 - Conservation and selective use scenarios have higher **total** benefits than deforestation

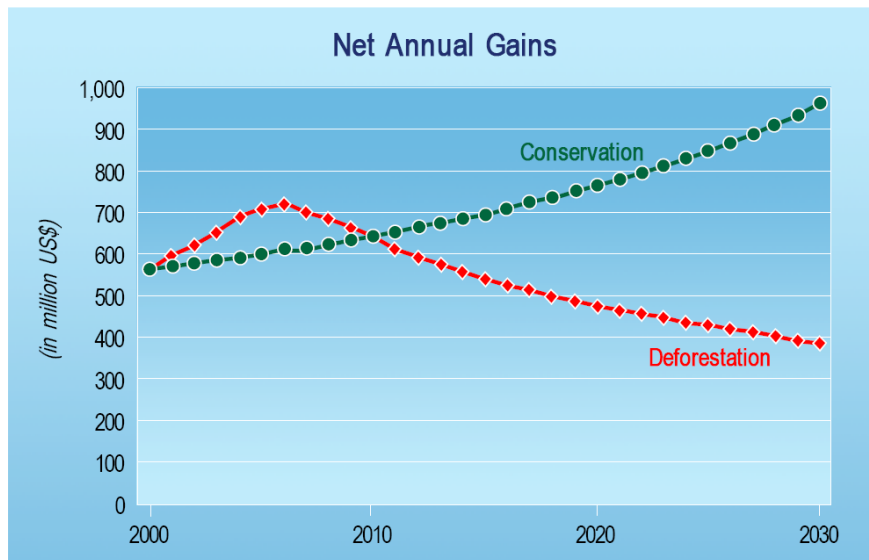


Figure 2. Net gains over time of Leuser National Park for the two scenarios.

- Local communities and local governments are **better off** with **conservation and selective use**.
- Deforestation causes **major costs** (missing flood prevention, etc.) to local communities and governments.



TEEB case: Economic Valuation in Sumatra

- **Capturing value:**
 - Local governments lacked interest in the study and did not take it up.
 - After a **change in government**, a second study (2008) was commissioned, confirming the findings.
 - **Moratorium** on logging
 - New **strategy** for conservation and selective use (Aceh Green)



TEEB case: Spatial Planning in Sumatra

- Focus:
 - **RIMBA ecosystem** in Sumatra, districts of Riau, Jambi and West Sumatra
 - Global biodiversity hotspots
- Problem:
 - **Deforestation** and peatland conversion
 - Loss of ecosystem services for **local communities**
 - Loss of **"global commons"**:
 - CO² emissions
 - endemic species



TEEB case: Spatial Planning in Sumatra

Step 1: specify and agree the policy issue with stakeholders

- “Big Bang” **decentralization** in Indonesia
- Spatial plans at district levels in **cooperation** with NGO forum

Step 2: identify which ecosystem services are most relevant

- Lowland forests affected by intense **logging** and **forest conversion**
- Biodiversity loss, water regulation damage, erosion

Step 3: information needs and methods

- Assessment with InVEST – a software **mapping** and **analyzing** ecosystem services

Photo: Ahmad Zamroni/AFP/Getty Images





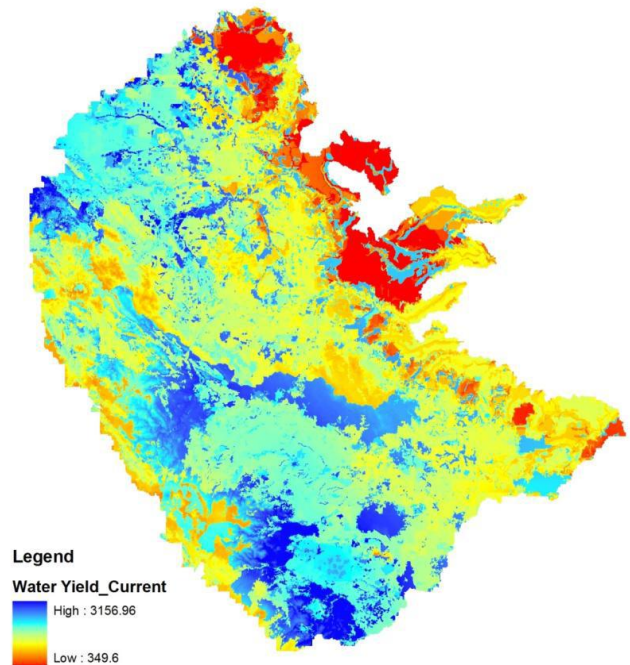
TEEB case: Spatial Planning in Sumatra

Step 4: (physically) assess ecosystem services

- Data input from the districts
- Two scenarios modeled with InVEST
 - Sumatra Ecosystem Vision
 - BAU - Business As Usual

Step 5: identify and appraise policy options

- recommendation based on the maps
 - habitat restoration
 - forest concessions
 - areas for forest carbon PES...





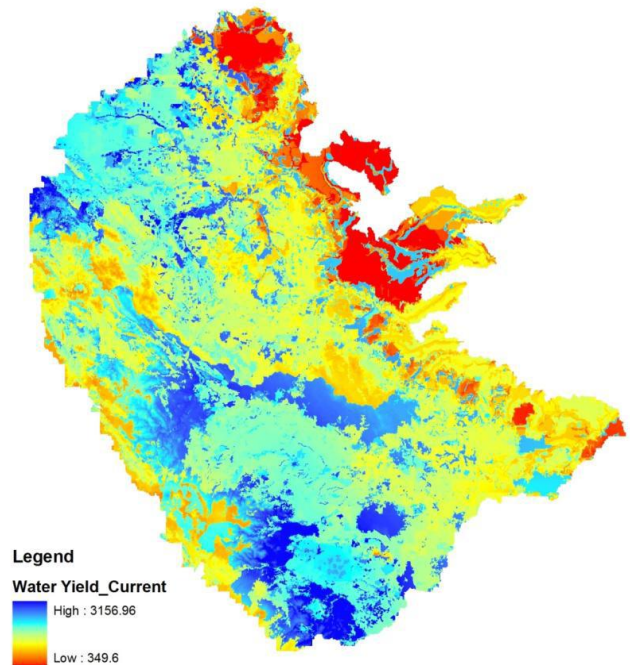
TEEB case: Spatial Planning in Sumatra

Step 6: assess distributional impact

- global / local ecosystem benefits
- social impact assessment through spatial distribution

Results

- (Process still underway)
- Coordinated conservation and spatial planning over **18 districts**
- Inclusion of **trans-boundary** ecosystem services
 - upstream-downstream relationships
 - international PES schemes
 - (...)





Relevance for MENA and Key Recommendations



Forests in MENA

- Biodiversity hotspot (*Source: Birdlife Int'l., 2010*)
- High value of forests
 - Tunisia's forests: almost **130 millions** 2001-EUR
(*Source: Hamed Daly-Hassen and Ameer Ben Mansoura, 2007*)
- Threats
 - (a. o.) from **deforestation** and agro-pastoral overuse
 - No threat-free IPA site (*Source: IUCN, 2011*)
- Link to Poverty
 - International aid
 - Subsistence and **"net development"**



Key recommendations

- ***Assess ecosystem services and consider their value in policy choices.***

Otherwise, it can be risky and costly far beyond the prospected benefits.

- ***Reform environmentally harmful subsidies in order to reward environmental stewardship.***

Well crafted schemes and instruments can make environmentally beneficial practices economically viable and catalyze private initiative for conservation.

- ***Invest in ecological infrastructure.***

It's a cost-effective way to meet policy objectives.



Outlook and Announcements

Upcoming highlights on TEEB



Outlook

- TEEB at national level
 - Initiatives in Brazil, India, the Netherlands and Norway
- TEEB at local level
 - Translating TEEB into urban and landscape planning practices
- TEEB and CBD
 - National strategies, implementation of the Convention on Biological Diversity



Announcements

- **TEEB conference 2012**
 - 350-400 international guests
 - update of regional/national initiatives
 - March 19-22, 2012, Leipzig (Germany)
 - www.teeb-conference-2012.ufz.de
- **TEEB Session in Planet under Pressure**
(to be confirmed)
 - March 26-29, 2012, London, UK
 - <http://www.planetunderpressure2012.net/>



Questions for discussion:

- Where do ecosystem services currently play a role in policy?
- What are the most common concerns or needs from lower levels in your country and how do you address them?
- Do you think the division of tasks between local, regional, national and international level is adequate and conducive to maintaining and making good use of biodiversity and ecosystem services?
- Where do you see room for improvement?
- Where do you provide incentives to the local level to protect ecosystem services?
- What has proven most successful in achieving actual implementation at the local level?
- What would be helpful agreements or recommendations from the international level so that you can better support implementation in your country?

The Economics of Ecosystems & Biodiversity



Thank You !

www.teebweb.org

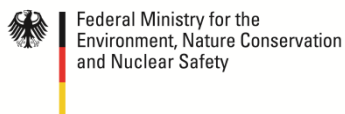
www.teeb4me.com



The Economics of Ecosystems & Biodiversity



Extras





Recognizing Value

(TEEB Approach 1 of 3)



Recognizing Value



VS.



WRONG! But not completely...

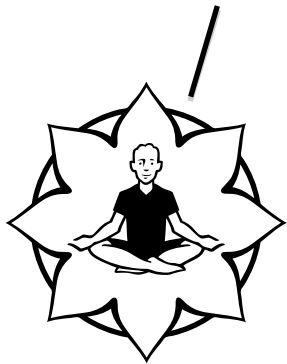
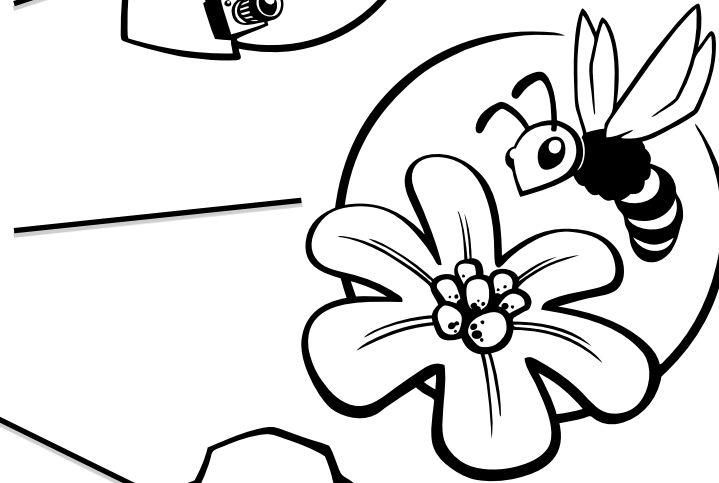


Recognizing Value





Demonstrating Value





Recognizing Value

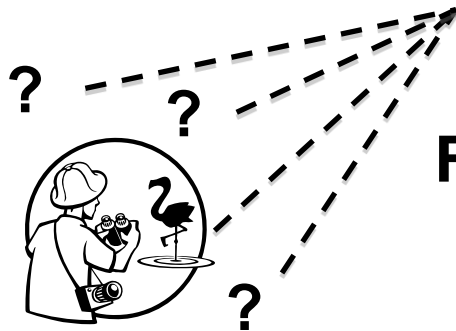


VS.

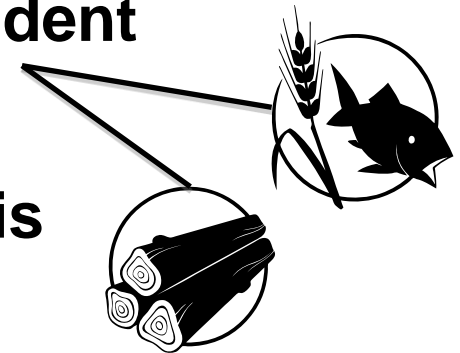


Invisible

Evident



Finding a convenient balance is difficult...

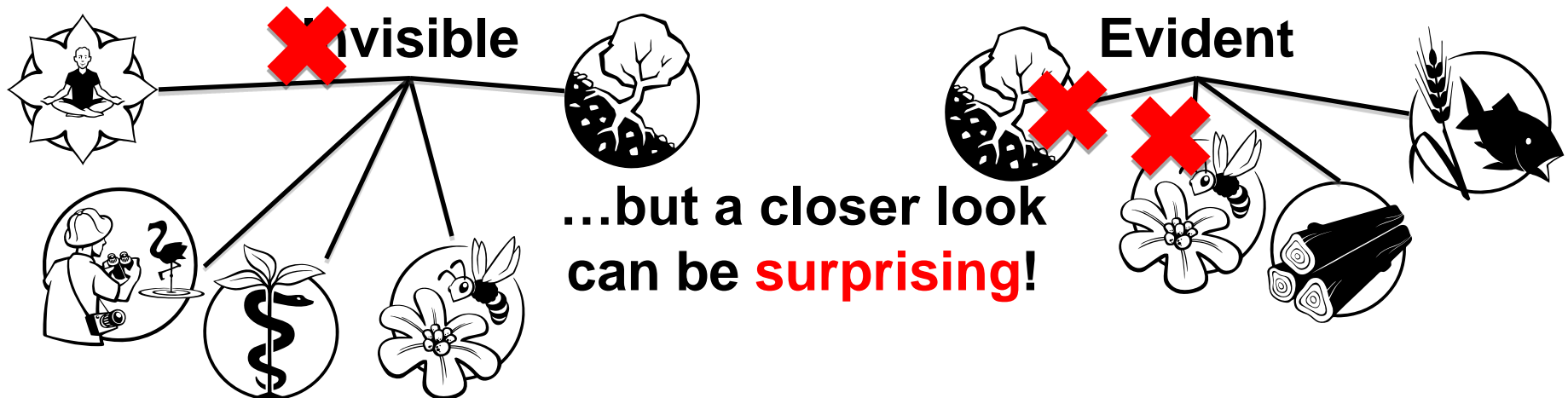




Recognizing Value



VS.





Recognizing Value

- Ecological knowledge can show how natural resources depend on one another.
- Taking decisions without considering such interdependence is risky and costly.

- It is of outmost importance to recognize that our prosperity depends on nature **as much as it depends on economic activities.**
- Economic opportunities can be both a good or a bad deal: **we do not know unless we explore their environmental consequences.**

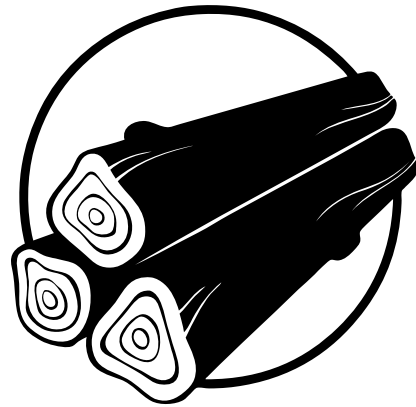


Demonstrating Value

(TEEB Approach 2 of 3)



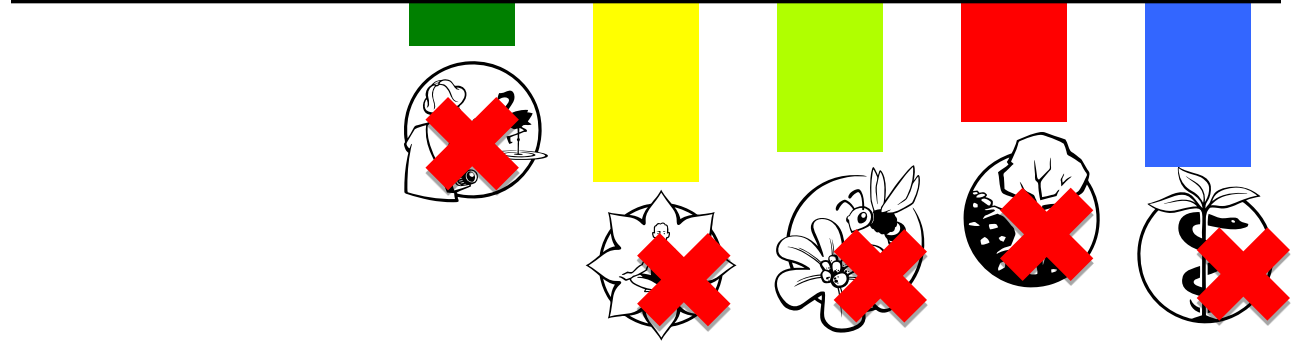
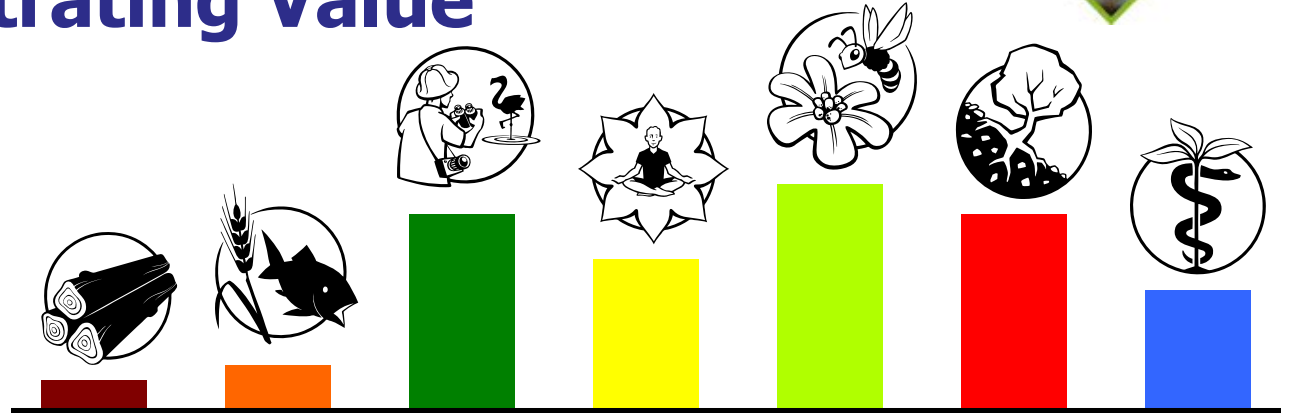
Demonstrating Value



The Economics of Ecosystems & Biodiversity

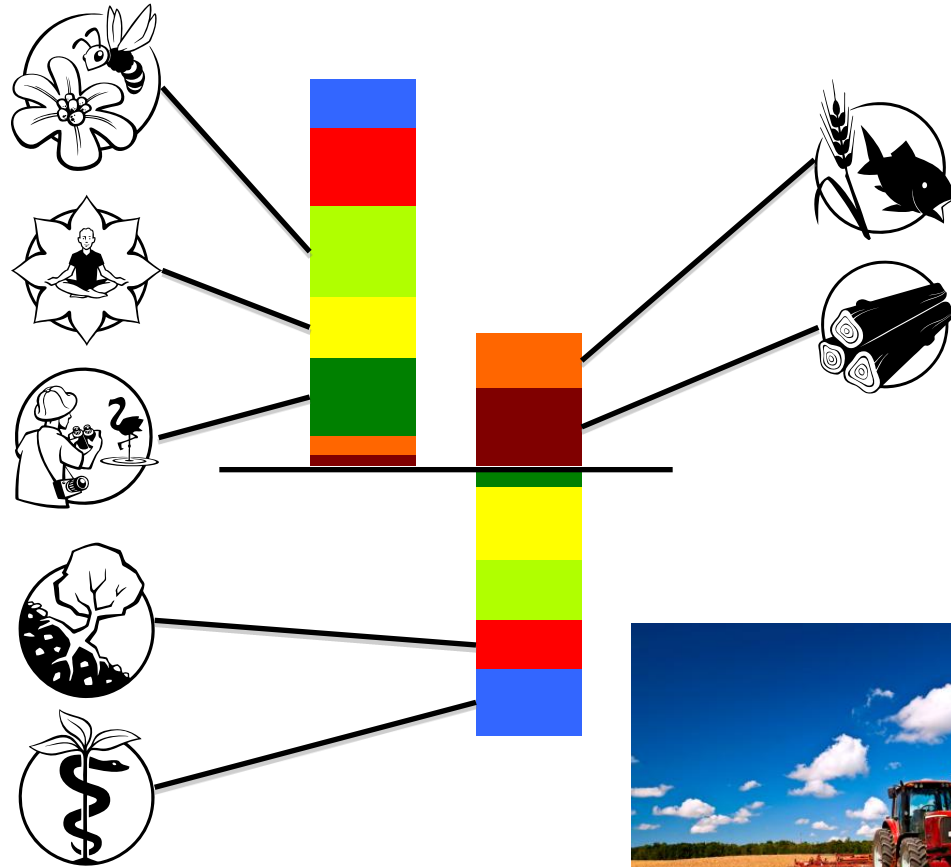


Demonstrating Value





Demonstrating Value





Demonstrating Value

- Appraising the contribution of nature to human prosperity broadens the picture we have of the consequences of our actions.

- At a closer look, caring for the environment **makes economic sense.**

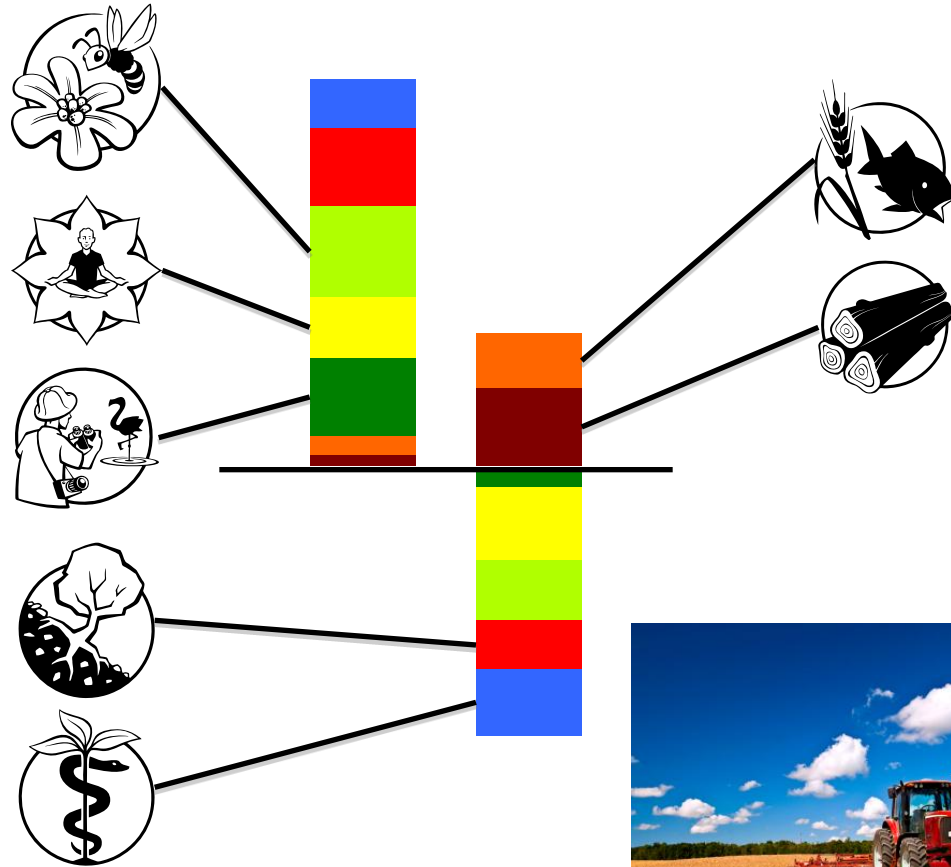


Capturing Value

(TEEB Approach 3 of 3)



Capturing Value

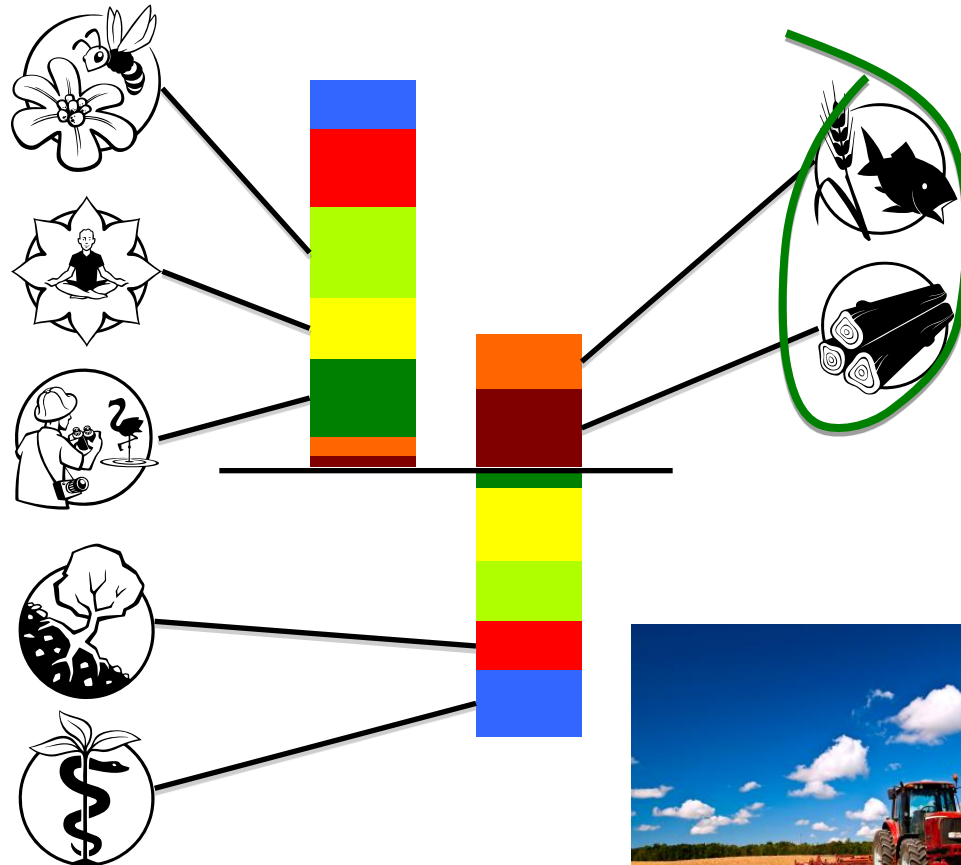




Capturing Value



Certain natural assets have a clear market value. **Economic sectors react on that.**

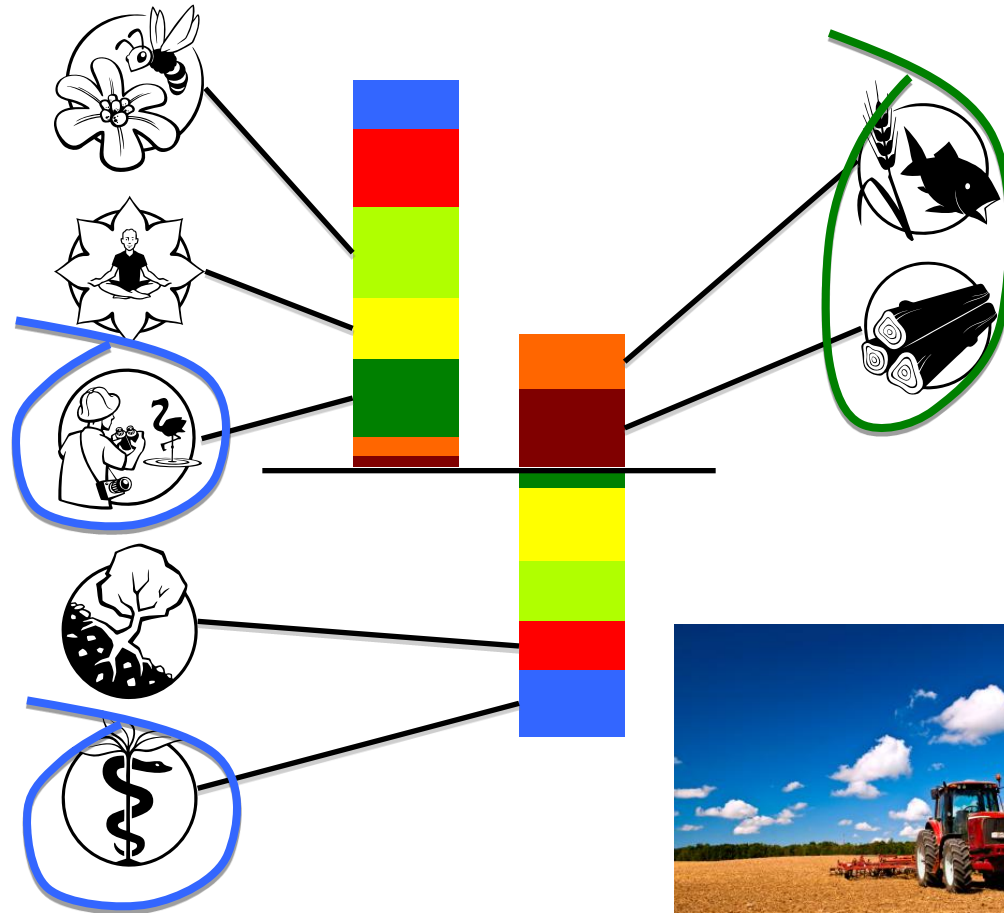




Capturing Value



Other assets
require upfront
investments.
**Economic
sectors MAY
NOT react on
that.**

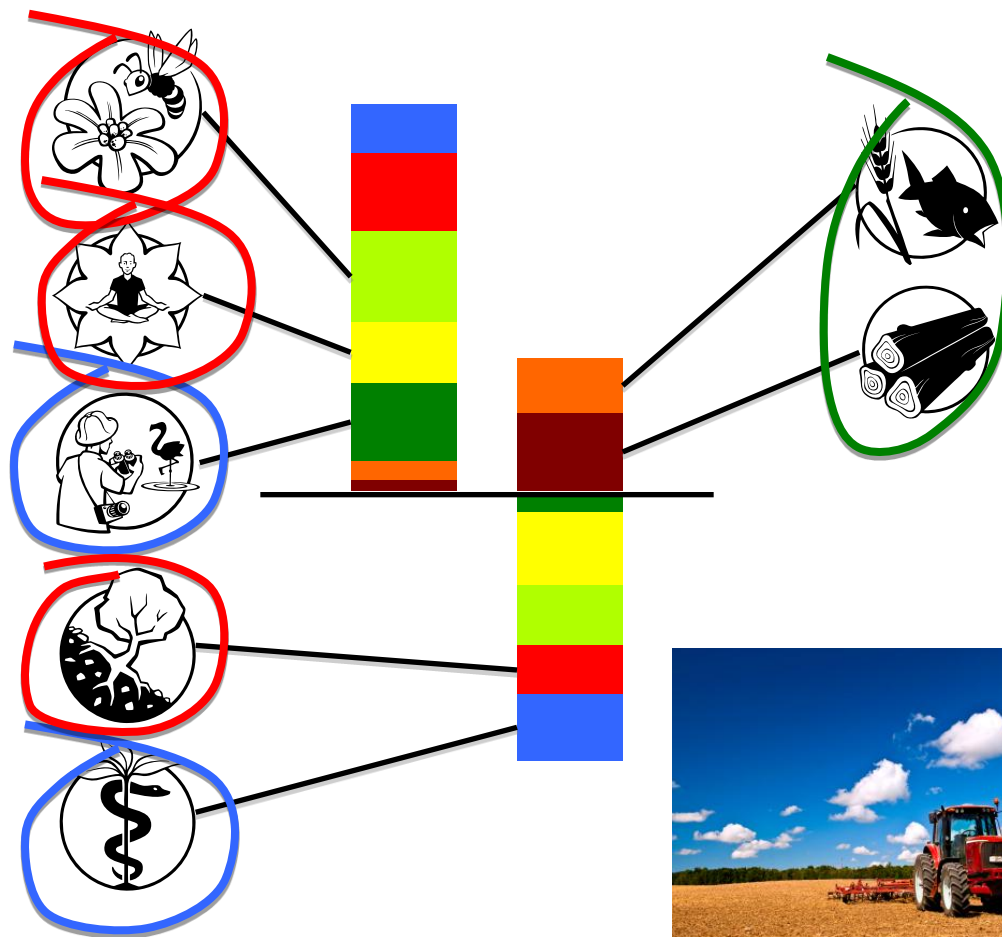




Capturing Value



Other still may show their value only when they are lost (if at all).
Economic sectors WILL HARDLY react on that.





Capturing Value

- Choices that adequately value and recognize nature's contribution to our prosperity will seldom happen spontaneously.
- **Governments must be proactive** or pay the price (and feel the cost) of neglecting nature.
 - **Instruments are available** for these purposes: tax reforms, payments for ecosystem services, liability schemes, etc.



Recommendations:

Make Nature's values visible...

The destruction of nature has now reached levels where serious social and economic costs are being felt – and will be felt at accelerating pace under “business as usual”

- **Assess and Communicate the role of biodiversity and ecosystem services in the economy**
- **Ensure public disclosure of, and accountability for, impacts on nature**



Ch.1,3,4



Ch.1



Ch.2,3



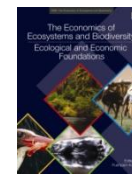
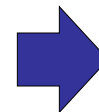
Recommendations:

Measuring better to manage better

Natural resources are economic assets, whether or not they enter the marketplace

Conventional measures of national economic performance (eg : GDP Growth) fail to reflect these stocks and their benefits flows.

- **Rapidly upgrade the System of National Accounts (SNA) to include changes in natural capital stocks and ecosystem service flows (CBD Strategic Plan – Target 2 ... in [...])**
- **URGENT : physical accounts for forest stocks / carbon storage need to be in place (e.g. for orderly development of REDD+)**



Ch.3



Ch.3,5



Recommendations:

Natural capital and poverty reduction

Ecosystem services dependency

Indonesia

99 million

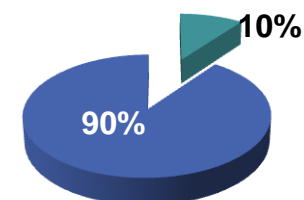
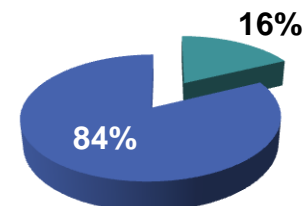
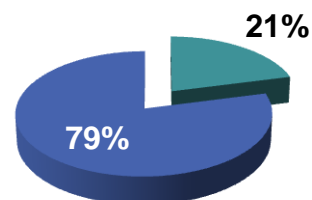
India

352 million

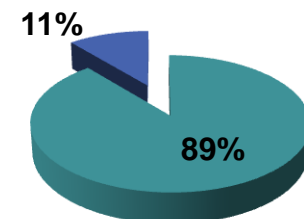
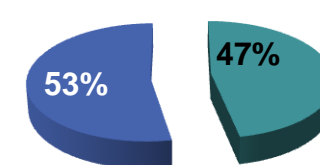
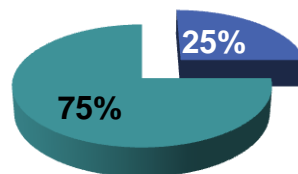
Brazil

20 million

Ecosystem services as a % of classical GDP



Ecosystem services as a % of "GDP of the Poor"



 **Ecosystem services**

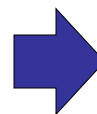


Recommendations:

Natural capital and poverty reduction

In many developing countries, poor households rely heavily on natural capital for their survival and livelihoods, and are highly vulnerable to losses of ecosystem services

- **Fully integrate into policy our dependence on ecosystem services , especially their role as a lifeline for poor households.**
- **Target development interventions & evaluate the social impacts of policies that affect the environment.**



Ch.2,3,9



Ch.1,5,10



Recommendations:

Changing economic incentives

- 'polluter pays' and 'full-cost-recovery' principles to guide incentives.
- full disclosure of subsidies, measure and report them annually, and phase them out (CBD Strategic Plan - Target 3).

Recommendations:

Conservation is Good Investment...

- Effective, equitably managed PA's, especially in the high seas
- Ecosystem valuation to justify PA's & inform conservation investment



Ch.2,6,7,8



Ch.7,9



Recommendations:

Conservation is Good Investment...

- Global spending on PAs p.a.: ~ \$6.5-10 billion
 - Need for PAs (15% land, 30% sea) p.a.: ~ \$45 billion
 - Need for Natura 2000 p.a.: ~ \$6.5 billion
 - Benefits from effective PAs p.a. : ~\$ 4-5 trillion
-
- International NGO funding:
p.a. ~ >\$1 billion
 - International gov funding (30-50% to PAs): ~\$4-5 billion p.a.
 - Market-based income to PAs ~ \$1-2 billion p.a.
 - Percentage of total ODA: ~ 2.8%



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Main Demands for TEEB

- TEEB Capacity Building for Developing Countries
- “Country” and “Regional” TEEB Analysis
- Green National Accounts (Project w/ WB, UNEP & Others)
- Estimating Business Sector Externalities
- Identifying & closing Ecology & Valuation Knowledge Gaps
- Communicating the Issue to Society at Large



Main Assets Built by TEEB

**TEEB Reports
& Databases**

**Constant review
and updates**

**TEEB
Approach**

**Collaborative
stewardship**

**TEEB
Community**

**Vibrant &
expanding**

**TEEB
Brand**

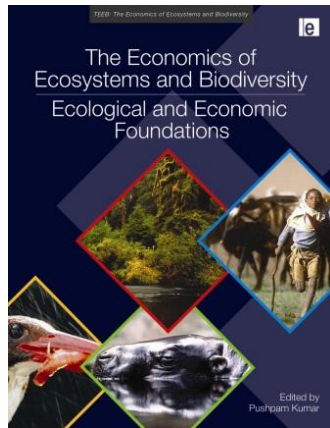
**Evolving, dynamic,
jointly owned**

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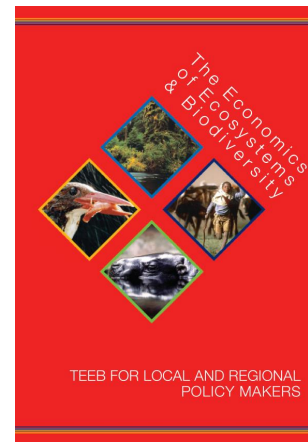


The TEEB Community

Coordinating Editors of TEEB main reports



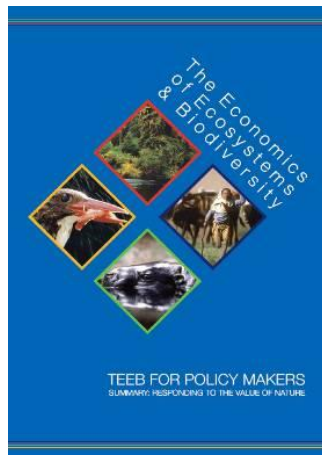
Pushpam Kumar



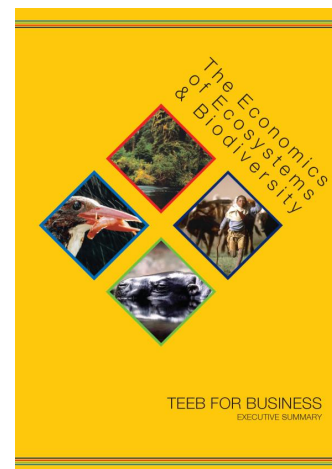
**HariPriya
Gundimeda**



**Heidi
Wittmer**



Patrick ten Brink

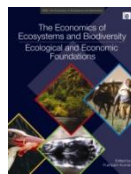
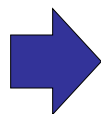
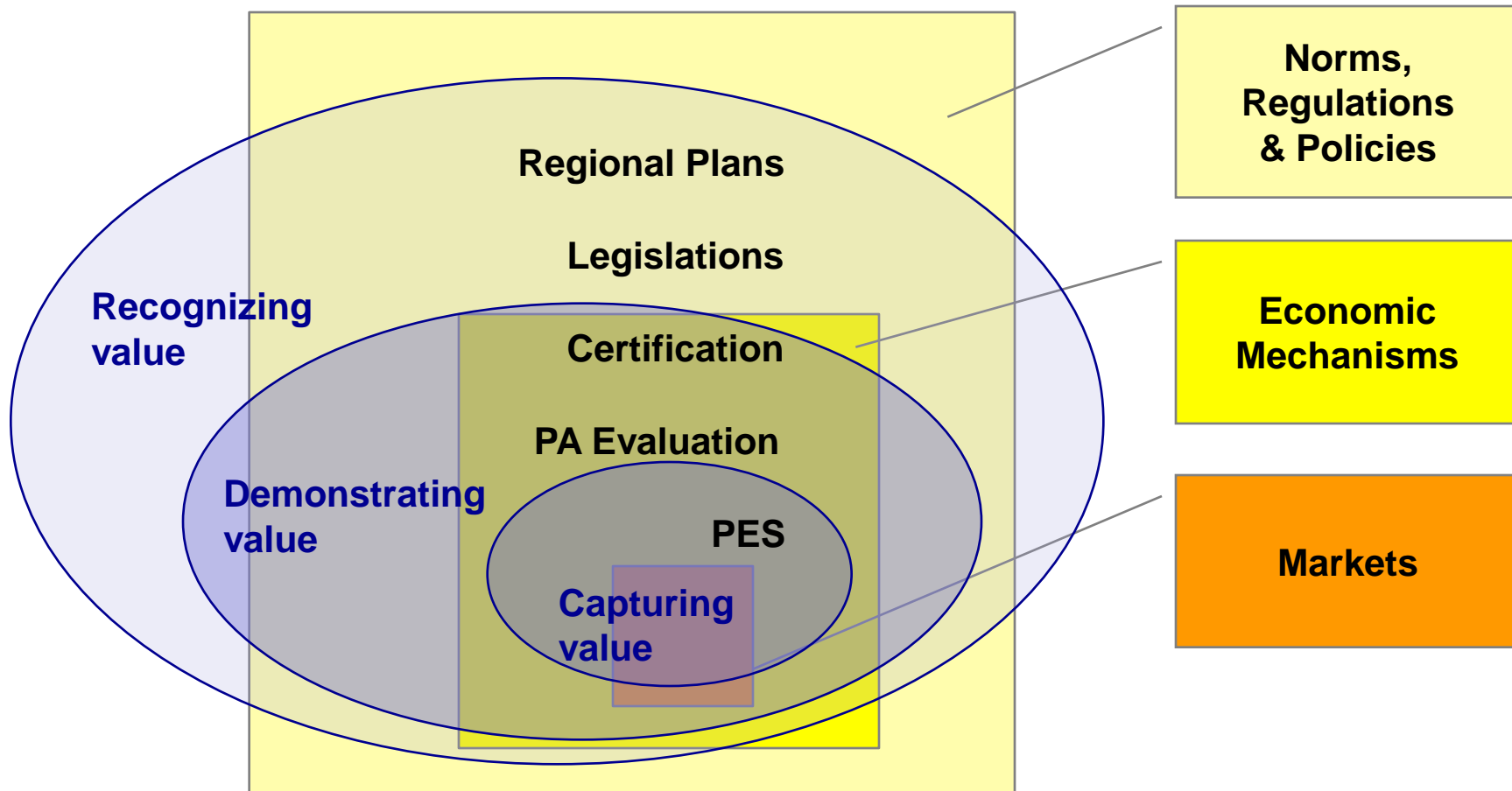


Joshua Bishop





Valuations, Operating Spaces, Responses...



Ch.5



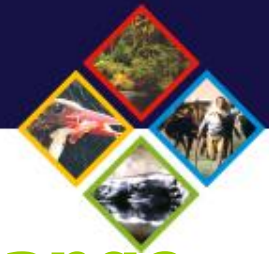
Ch.4



Ch.3



Ch.3



Recommendations:

Ecological infrastructure and climate change

Investing in ecological infrastructure makes economic sense when the full range of benefits is taken into account

It is usually cheaper to avoid degradation than to pay for restoration, but both are relevant in the context of climate change

- **Ecosystem conservation and restoration should be evaluated & pursued in support of climate change mitigation and adaptation.**
- **Within the UNFCCC process, REDD+ should be accelerated for implementation : pilot projects & capacity building in developing countries.**



Ch.5,9





Leuser Ecosystem

Table 4
Distribution of benefits to the different sectors (in million US\$)

	Deforestation		Conservation		Selective use	
	Value	Proportion (%)	Value	Proportion (%)	Value	Proportion (%)
Water supply	699	10	2419	25	2005	22
Fisheries	557	8	659	7	674	7
Flood prevention	1223	18	1591	17	1396	15
Agriculture	2499	36	1642	17	1016	11
Hydro-power	252	4	898	9	696	8
Tourism	171	2	828	9	407	4
Biodiversity	56	1	492	5	92	1
Carbon sequestration	53	1	200	2	125	1
Fire prevention	30	0	715	7	643	7
NTFP	235	3	94	1	1222	13
Timber	1184	17	0	0	825	9
Total	6958	100	9538	100	9100	100

Note: for the period 2000–2030, at a discount rate of 4%.



Leuser Ecosystem, Indonesia

Distribution of benefits to the different sectors (in million US\$)

	Deforestation		Conservation	
	Value	Proportion (%)	Value	Proportion (%)
Water supply	699	10	2419	25
Fisheries	557	8	659	7
Flood prevention	1223	18	1591	17
Agriculture	2499	36	1642	17
Hydro-power	252	4	898	9
Tourism	171	2	828	9
Biodiversity	56	1	492	5
Carbon sequestration	53	1	200	2
Fire prevention	30	0	715	7
NTFP	235	3	94	1
Timber	1184	17	0	0
Total	6958	100	9538	100

Note: for the period 2000–2030, at a discount rate of 4%.

(Beukering et al. 2003)

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Table 3. Distribution of the costs and benefits among stakeholders over the period 2000-2030 (in million US\$)

	Benefits of Conservation		Costs of Conservation		Net Benefits
Local community	4,882	57%	143	5%	3,827
Local government	1,571	18%	174	6%	1,104
Elite industry	0	0%	2,602	83%	-1,007
National government	592	7%	200	6%	282
International community	1,498	18%	0	0%	1,218
Total	8,544		3,119		5,425

Scenarios 2000 to 2030, discount rate 0% (Beukering et al. 2002)

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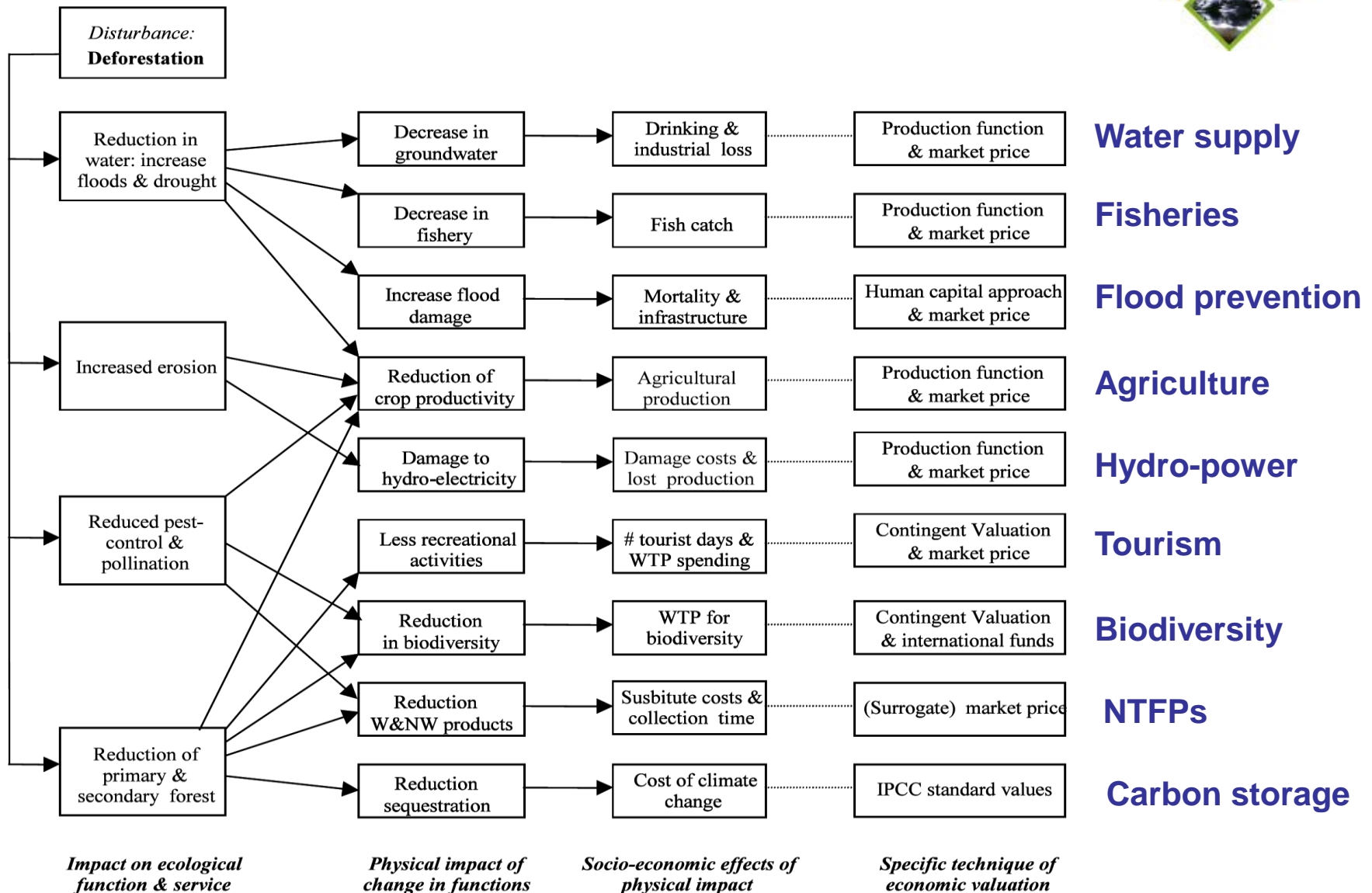


Fig. 4. Impact pathway of deforestation of the Leuser Ecosystem.

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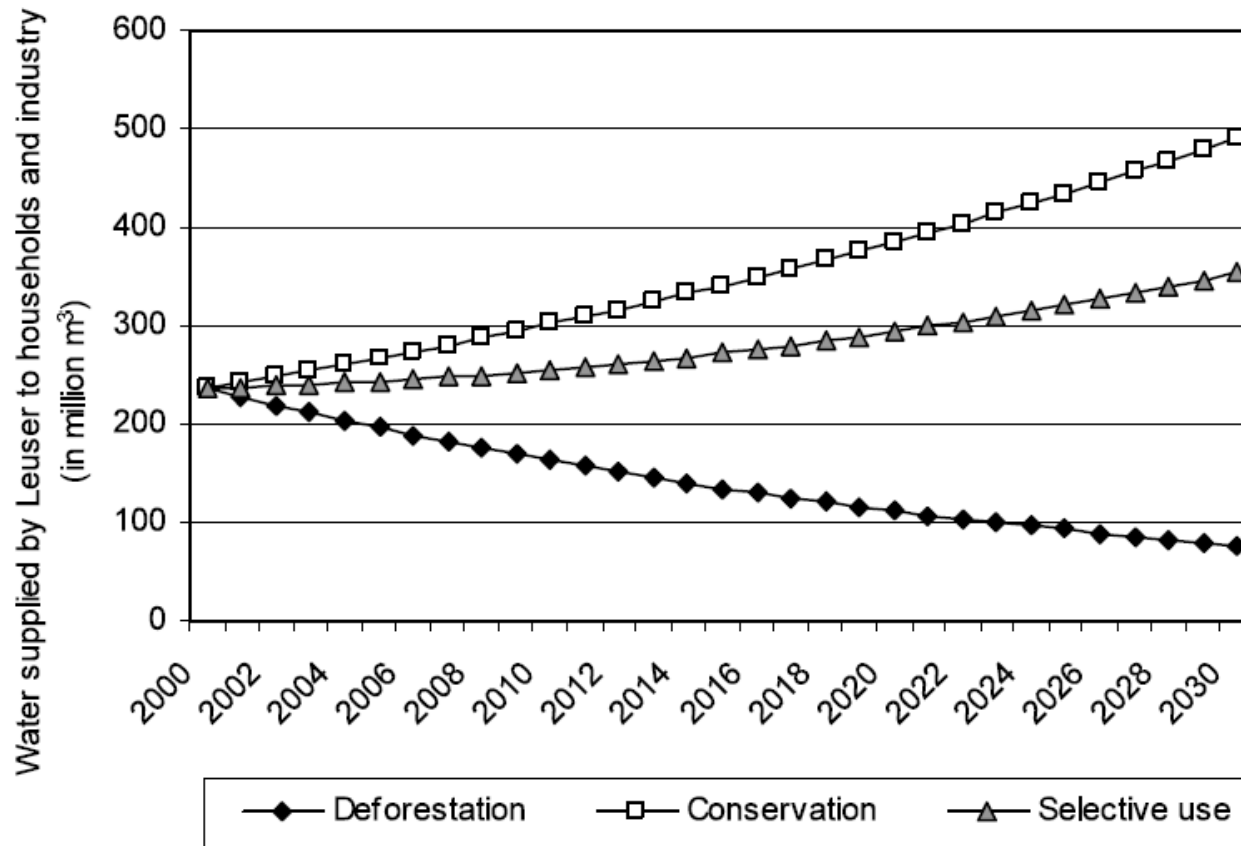


Fig. 3. Exogenously determined water supplies to households and industries.

Change in water supply (Beukering et al. 2003)

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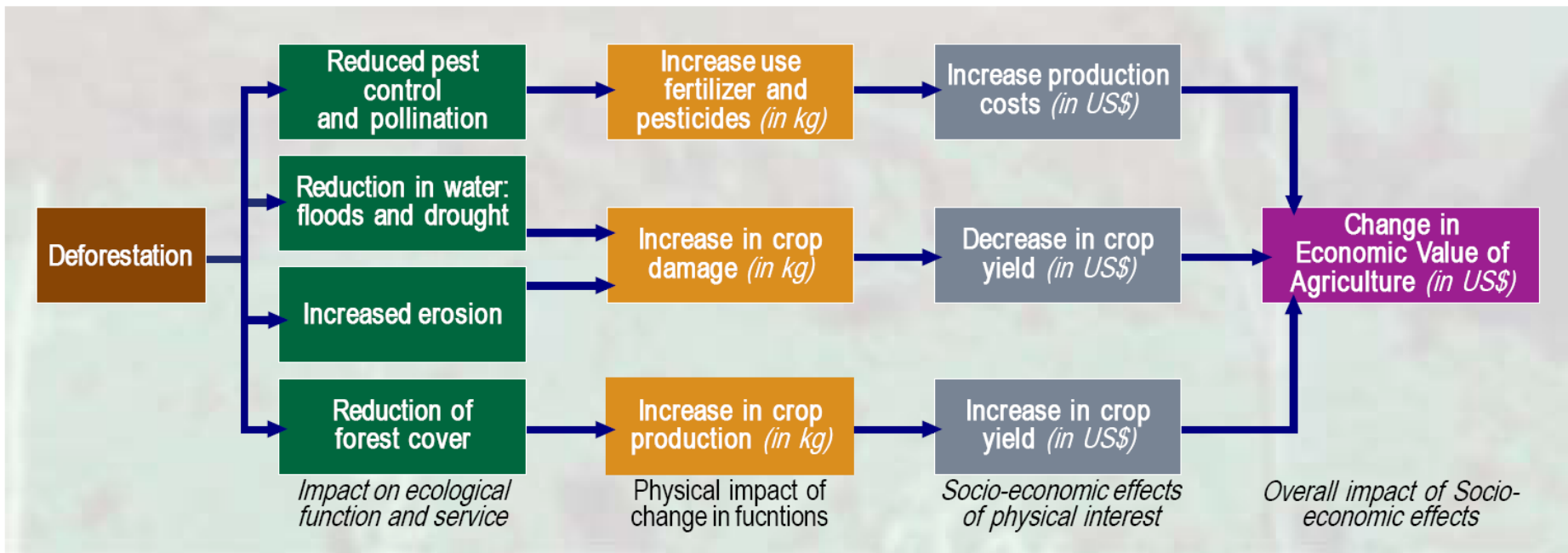


Figure 1. Overall approach applied to the agricultural sector

(Beukering et al. 2002)

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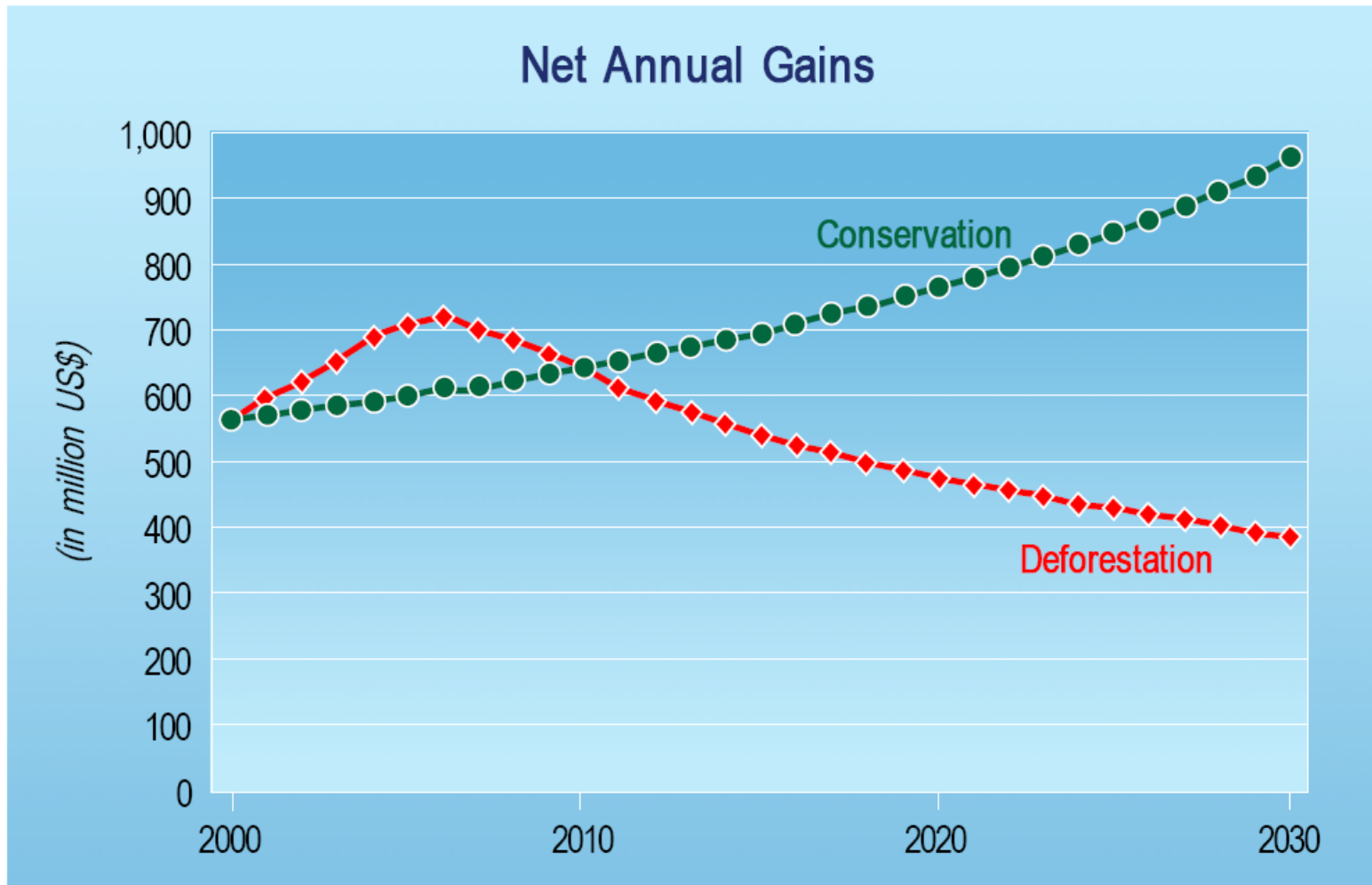


Figure 2. Net gains over time of Leuser National Park for the two scenarios.

Scenarios 2000 to 2030, discount rate 0% (Beukering et al. 2002)

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Table 1. Distribution of TEV among goods and services provided by the Leuser Ecosystem over the period 2000-2030.

	Economic Value of deforestation	Economic Value of conservation	Net Benefits of conservation	
	<i>(in million US\$)</i>	<i>(in million US\$)</i>	<i>(in million US\$)</i>	<i>(proportion)</i>
Water supply	1,601	3,730	2,129	25%
Fishery	1,351	1,404	53	1%
Flood prevention	3,269	5,174	1,905	22%
Hydro-electricity	1,000	1,643	644	8%
Tourism	350	1,645	1,294	15%
Biodiversity	150	1,484	1,334	16%
Sequestration	0	682	682	8%
Fire prevention	400	762	362	4%
Non-timber forest products	100	241	141	2%
<i>Net-benefits of conservation</i>			<i>8,544</i>	<i>100%</i>
Agriculture	7,003	5,535	-1,468	47%
Timber	1,651	0	-1,651	53%
<i>Net-costs of conservation</i>			<i>-3,119</i>	<i>100%</i>
Total Economic Value	16,875	22,299	5,424	

Scenarios 2000 to 2030, discount rate 0% (Beukering et al. 2002)

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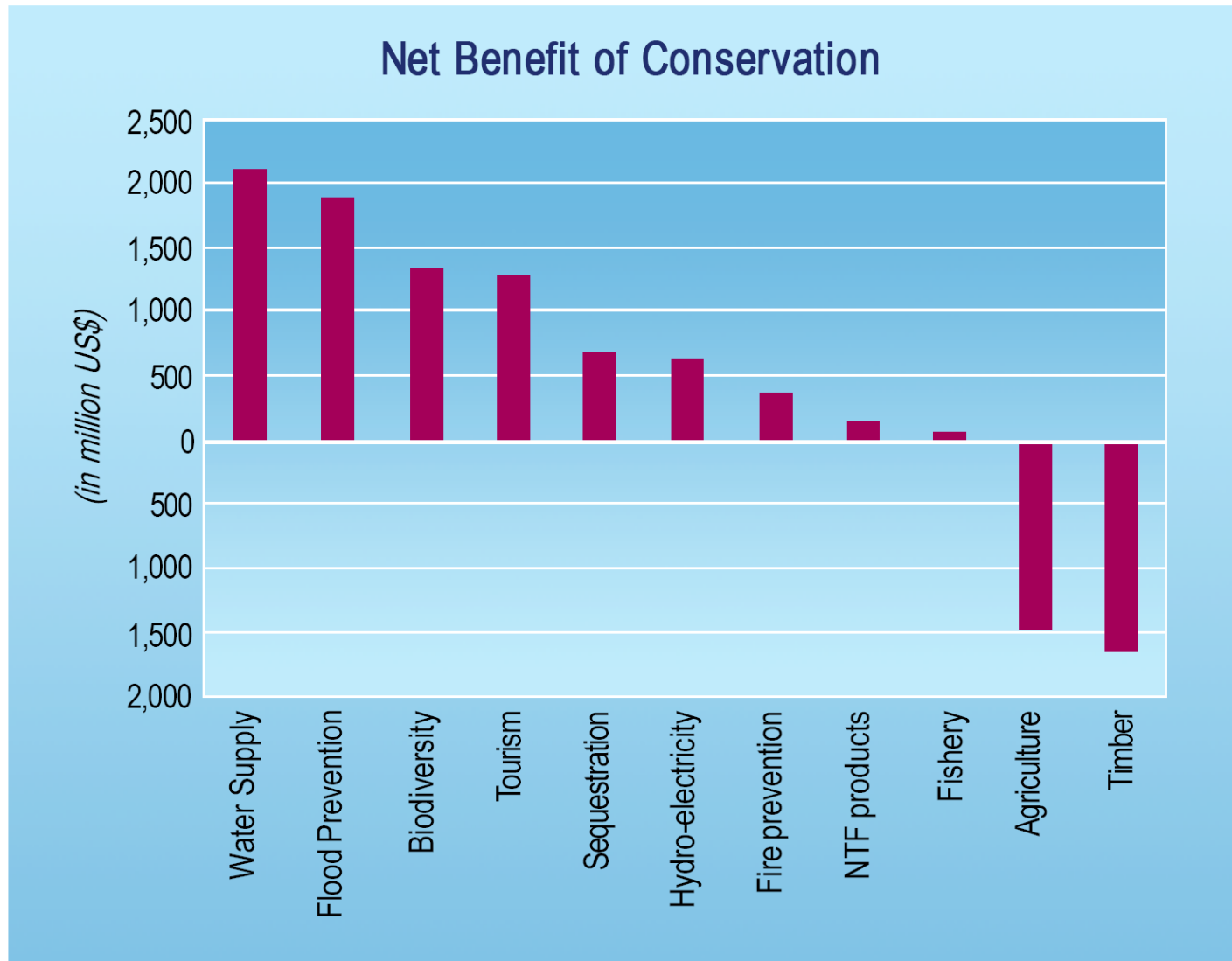


Figure 3. Net Benefits over time of Leuser National Park for the two scenarios distributed over the various categories. Scenarios 2000 to 2030, discount rate 0% (Beukering et al. 2002)

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Table 2. Distribution of the TEV among stakeholders over the period 2000-2030 (in million US\$)

	TEV Conservation		TEV Deforestation		Net Benefits
Local community	12,750	57%	8,923	53%	3,827
Local government	4,168	19%	3,065	18%	1,104
Elite industry	2,086	9%	3,093	18%	-1,007
National government	1,192	5%	910	5%	282
International community	2,102	9%	884	5%	1,218
Total	22,298		16,875		5,425

Table 3. Distribution of the costs and benefits among stakeholders over the period 2000-2030 (in million US\$)

	Benefits of Conservation		Costs of Conservation		Net Benefits
Local community	4,882	57%	143	5%	3,827
Local government	1,571	18%	174	6%	1,104
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Total	8,544		3,119		5,425

Scenarios 2000 to 2030, discount rate 0% (Beukering et al. 2002)



Extent of the problem

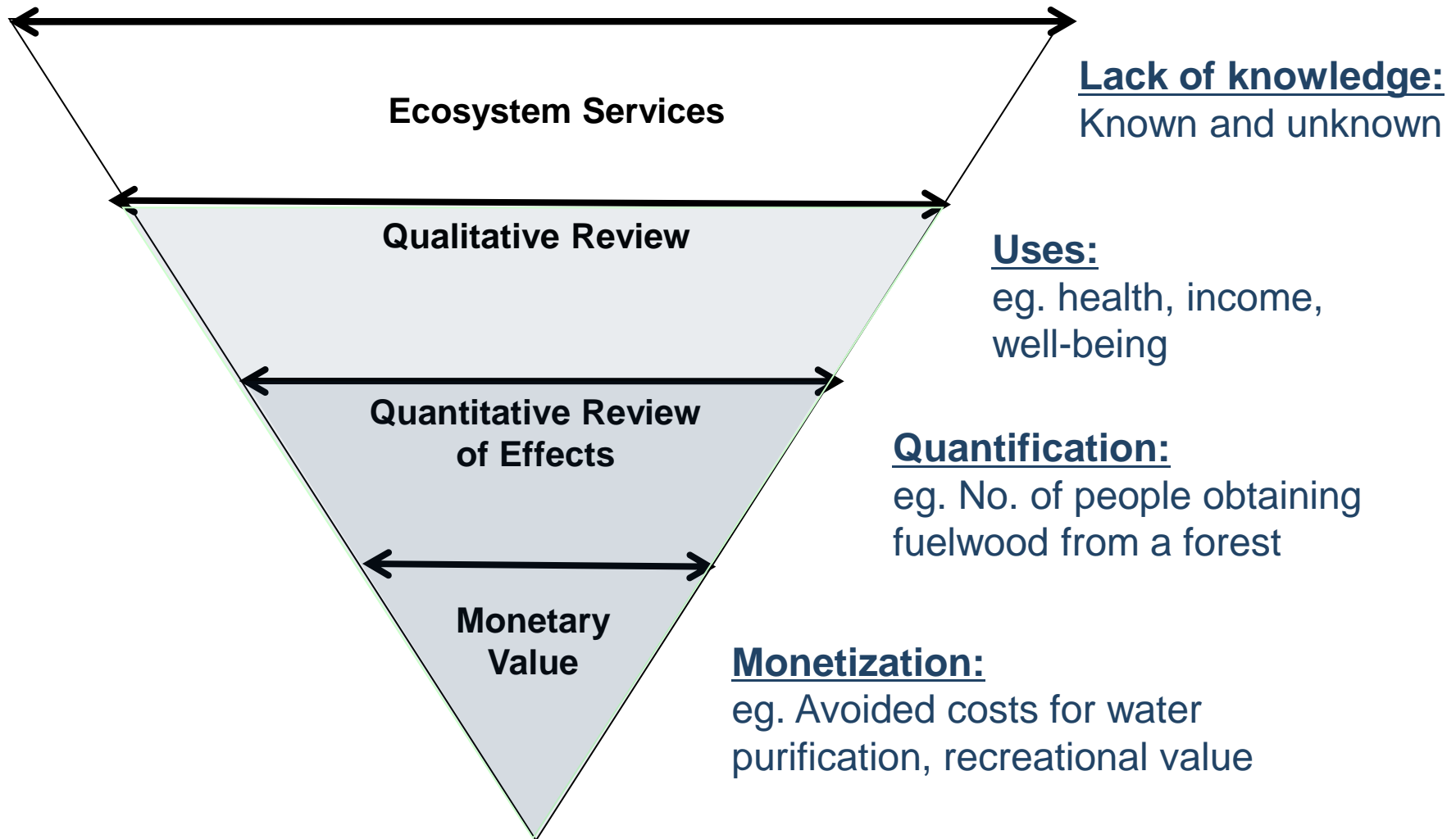


Source: Pauly und Watson 2005, MA

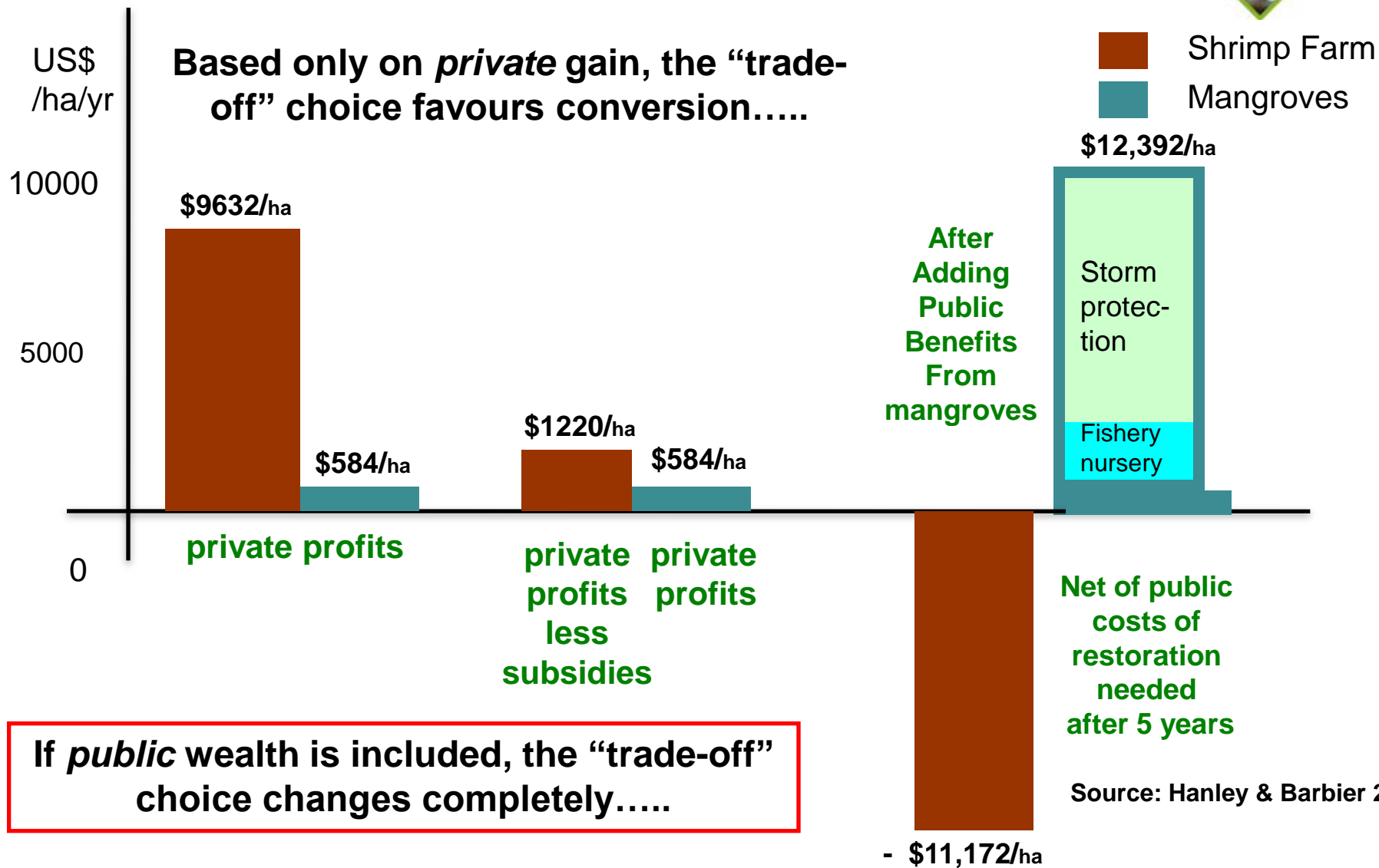
- Half of all fishstocks fully exploited
one fourth overexploited
- *At risk: approx. 27 Million jobs*
- ***More than 1 billion people depend on fish for main source of protein***
- *At risk: \$ 80-100 Billion income*
- *Currently already losing \$ 50 billion/year*
- Subsidies main reason for damages



Different Levels of Analysis



The Economics of Ecosystems & Biodiversity





Market-based conservation schemes: highly demanding requirements

„It is often argued that environmental services markets will be effective and equitable:

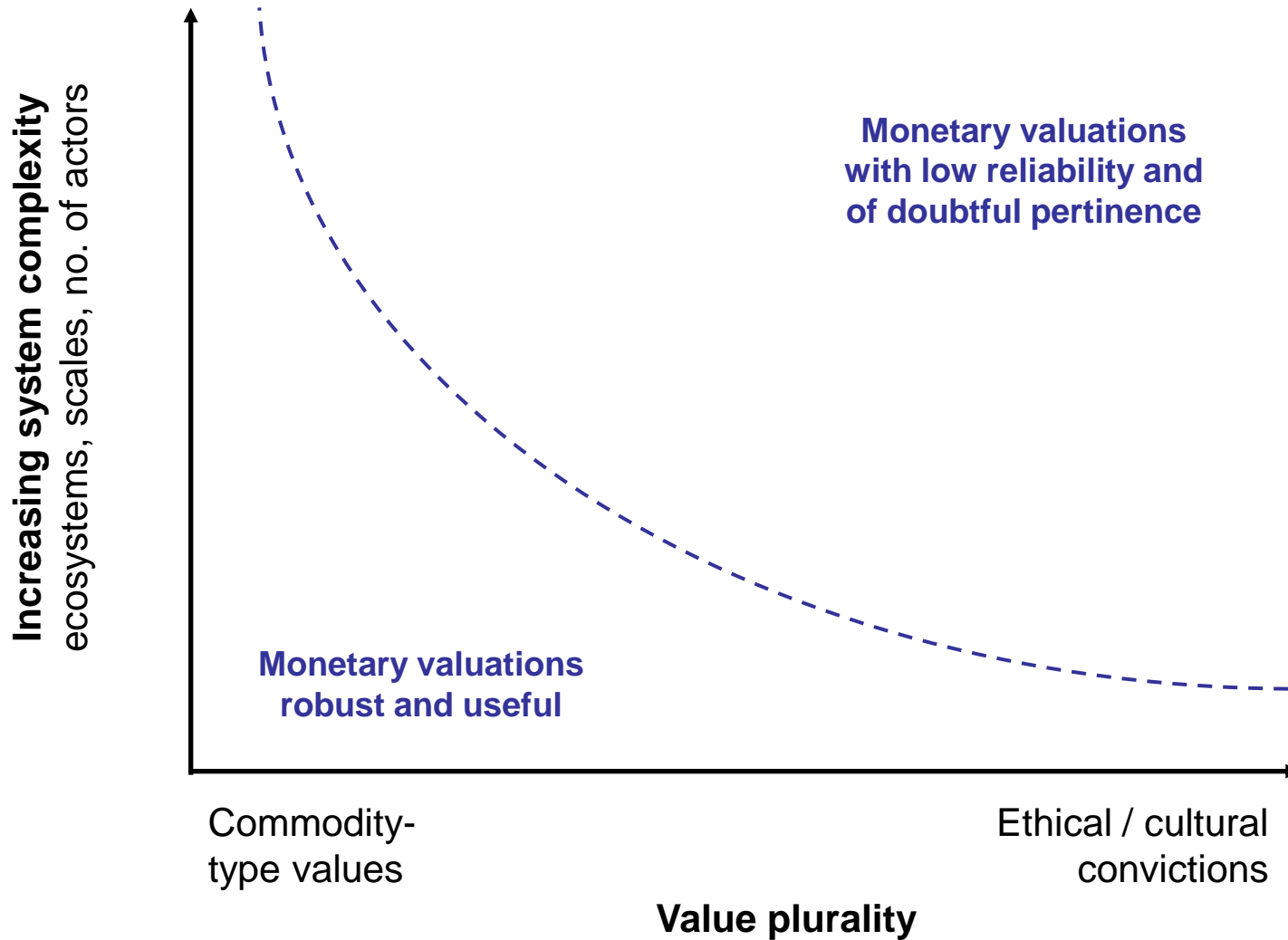
1. If all ecosystem values are properly accounted for
2. If rights are equitably distributed amongst “owners”
3. If the market is properly regulated & regulations are effectively enforced
4. If there is a level playing field, so that biodiversity producers and consumers can participate equitably

However, in reality most of these conditions simply do not exist“





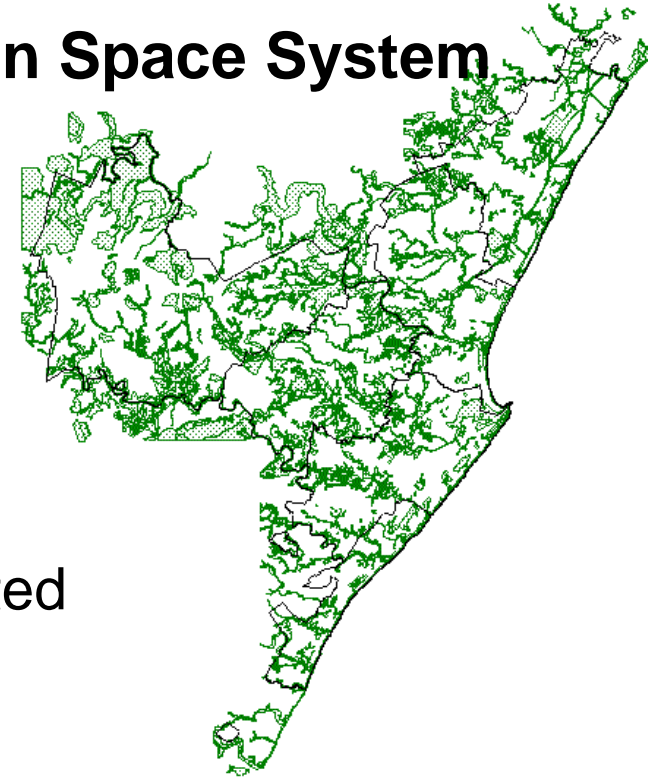
Usefulness of economic valuation





Example : Durban Metropolitan Open Space System

- South Africa's major port, 3million population, 30-40% unemployment
- 4 of South Africa's 7 biomes, 2000 indigenous plant taxa, 97km coastline
- ES valued at US\$400 million annually (replacement value excluding tourism related income)
- Most of remaining open space in private/communal hands and zoned for development
- Principal pressures: landcover change, climate change, invasives
- Port development plan US \$1.2 billion annually





Ecosystem Services a powerful tool in communication

- Help to characterize and communicate values
- Allow to demonstrate value in terms of
 - qualitative description
 - biophysical or socioeconomic quantification
 - monetary valuation
 - who benefits and who loses
- Facilitate giving the full picture and communicating limitations or floor values
- Economic values can help to identify solutions that conserve the environment and help to eradicate poverty