

Valuation of biodiversity and associated ecosystem services

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28

AN EXPLORATION OF TOOLS AND
METHODOLOGIES FOR VALUATION OF
BIODIVERSITY AND BIODIVERSITY
RESOURCES AND FUNCTIONS



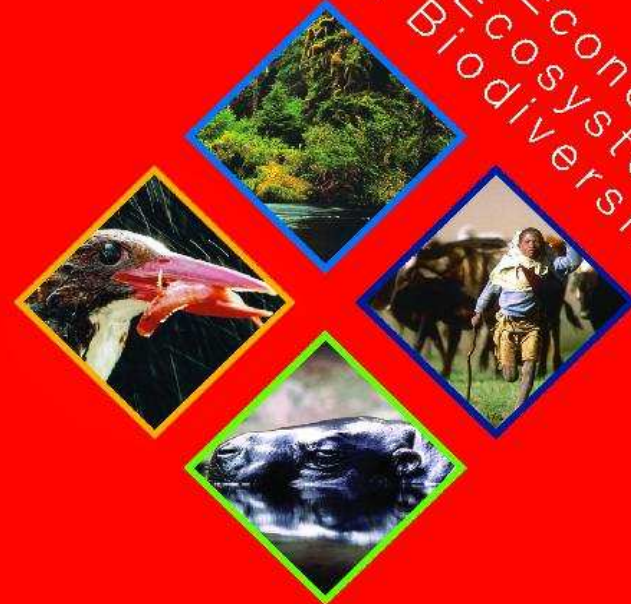
Options for the Application of TOOLS FOR VALUATION OF BIODIVERSITY and Biodiversity Resources and Functions

Biodiversity and its resources and functions generate substantial ecosystem services many of which are not traded on markets and whose value is therefore not reflected in market prices. Consequently, private and public decision-making and the allocation of funds will be distorted if the repercussions of activities on biodiversity resources and functions, and the associated ecosystem services, are not adequately taken into account. This distortion is an important underlying cause of biodiversity decline. Undertaking valuation of biodiversity resources and functions and the associated non-marketed ecosystem services has the potential of improving private and public decision-making, thereby contributing to the target of the Convention to significantly reduce by 2010 the current rate of biodiversity loss.

TOTAL ECONOMIC VALUE (TEV) Most public and private resource management and investment decisions are strongly influenced by considerations of the monetary costs and benefits of alternative policy choices. Undertaking valuation should seek to address the relevant components of the Total Economic Value of non-marketed ecosystem services, bearing in mind that the concept of Total Economic Value includes both the direct and indirect use value as well as non-use value of ecosystem services and hence goes beyond the immediate benefits of commercial exploitations of biodiversity resources. Decisions can be improved if they are informed by the economic value of alternative management options and involve mechanisms that bring to bear non-economic considerations as well.

The options of valuation tools provided in the accompanying table should not be taken as a closed set of tools, considering the evolutionary character of this field.

The Economics
of Ecosystems
& Biodiversity



TEEB FOR LOCAL AND REGIONAL
POLICY MAKERS

Aichi target 2 of the Strategic Plan

“By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.”

Different types of biodiversity values...

“...the intrinsic value, ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components;” (decision X/3, paragraph 9 (b) (ii))

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*“...the intrinsic value, ecological, genetic, social, **economic**, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components;” (decision X/3, paragraph 9 (b) (ii))*

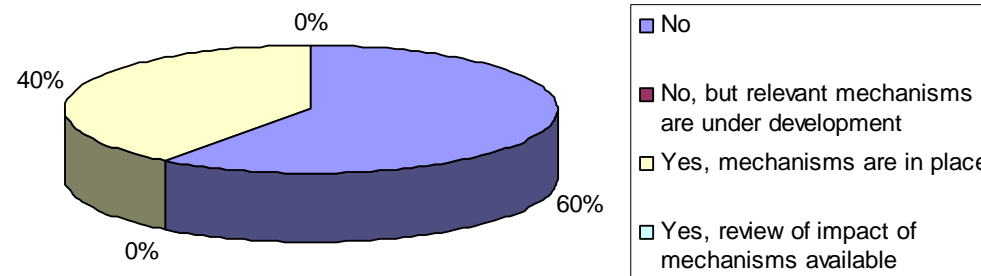
→ now: focus on economic values

Achievements in the region

3rd National Reports

Pacific region (5 out of 15 countries)

84. Has your country developed the mechanisms or approaches to ensure adequate incorporation of both market and non-market values of biological diversity into relevant plans, policies and programmes and other relevant areas? (decisions III/18 and IV/10)	
No	3
No, but relevant mechanisms are under development	0
Yes, mechanisms are in place	2
Yes, review of impact of mechanisms available	0



Environment IS a development problem: E-GDP of the poor

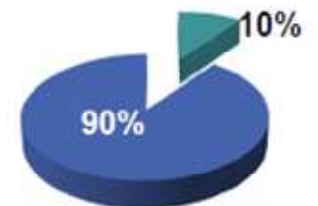
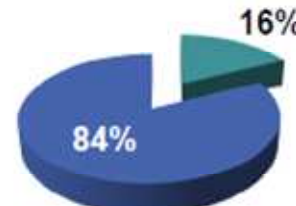
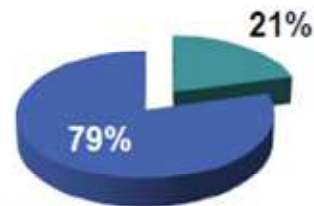
Ecosystem services dependency

Indonesia
99 million

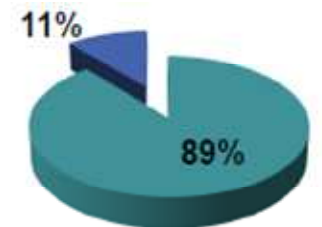
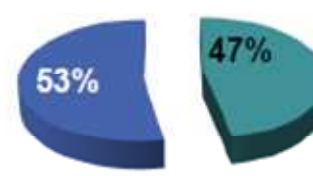
India
352 million


Brazil
20 million

Ecosystem services as percent of classical GDP



Ecosystem services as percent of "GDP of the Poor"



 **Ecosystem services**

What are economic values?

Some important observations...

Economic value \neq commercial value

individuals may assign value for different reasons or motives, and not only for the immediate benefits of commercial exploitations of resources

Where there are tradeoffs/exchanges to be made, valuation can provide information based on “willingness-to-pay” and/or “willingness to accept”

Valuation \neq monetization (nor ‘commodification’)

other ‘payment vehicles’ possible

(combination with) qualitative or semi-qualitative methods

What is this?



A water purification plant

*A flood control
mechanism*

A paradise for flyfishing

Food

Beauty

A place of worship

Leisure

A pollinator

A cure

A way of life

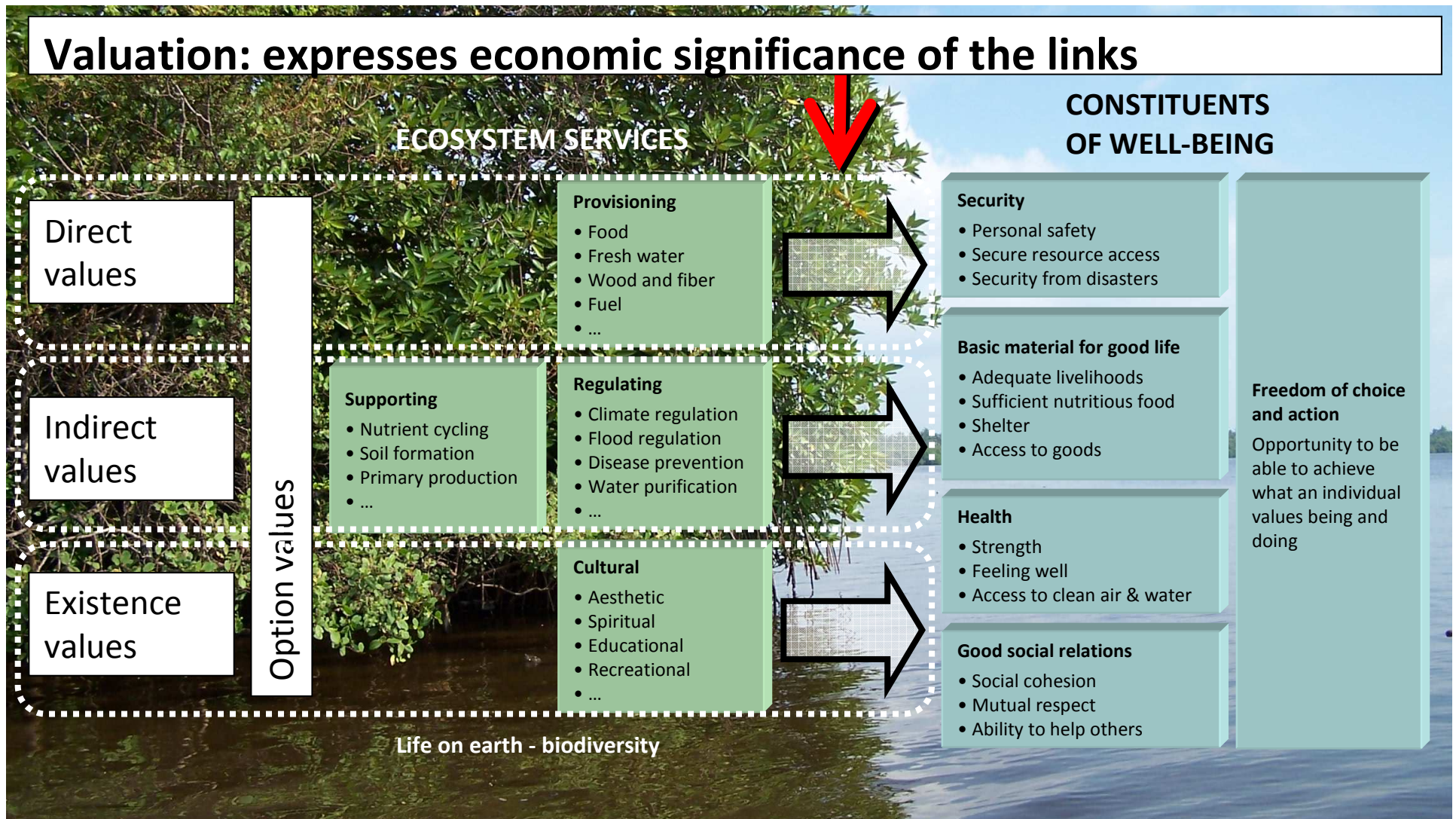
One ecosystem

*→ many different services
and benefits*

*→ require different approaches/tools
to valuation*



Valuing ecosystems



Why undertaking (economic) valuation?

The basic narrative

Some valuable ecosystem services are traded and valued in markets...

e.g., many (but not all) provisioning services

...but many others are not:

Public goods: nobody can be excluded from their use

Externalities: Boundaries of analysis.

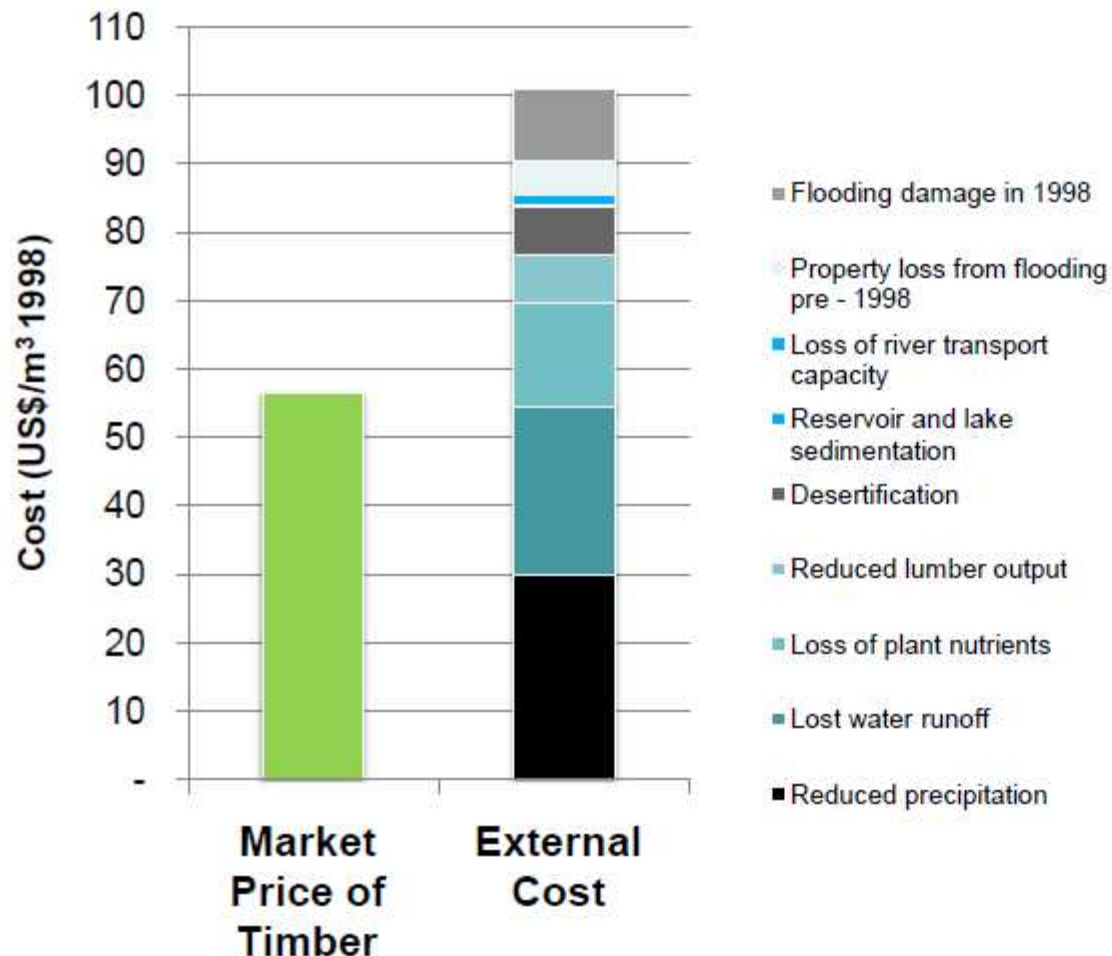
Weak price signals/ incentives for individual conservation/sustainable use efforts

*‘Measure better in order to manage better’
‘(Economic) valuation shall elicit “hidden”
biodiversity values for better decision-making.’*

The Economics of Ecosystems & Biodiversity



Business impacts at sector & country-level



- US\$12.2 billion estimated ecological cost of deforestation in China (1950-88)
- 60% of this cost is attributed to logging
- 64% of logging was for construction and materials sectors
- External costs = 178% of the market price of timber (1998)

Source: TEEB for Business, 2010 (Annex 2.1).

Limits to (economic) valuation...

Economic valuation puts biodiversity values 'on an equal footing' with other economic benefits and costs, BUT:

Some values cannot be measured...

(e.g., intrinsic, religious values)

...but need to be **recognized** nevertheless.

Others can be measured but are difficult to monetize...

...their values need to be **demonstrated** (by other tools).

Still others can be measured and monetized...

...their value can be **captured** by applying economic valuation tools.

Valuing biodiversity, ecosystems, or ecosystem services?

Valuing ecosystem services is easier than valuing biodiversity

Role of biodiversity in ecosystem functions, and role of ecosystem functions in providing ecosystem services

Valuing individual ecosystem services is easier than valuing whole ecosystems

- Stock vs flow
- Achieving comprehensiveness while avoiding double-counting
- Net present value and the role of discount rates

Situation specific: You must know what you want to do with the information in order to decide whether to use valuation:

- Absolute Total Economic Valuation (TEV) for awareness raising and accounting
- Relative TEV for policy and decision making.

Applications

Awareness raising

Stand alone valuation exercise, for instance of one or a few ecosystem services which are key in the specific national context (Aichi Target 1)

Project analysis

Project appraisal: integration into economic decision-making tools

- Cost-benefit analysis (CBA)

- Cost-effectiveness analysis

Correcting prices (e.g. entry fees for national parks) (Aichi Target 3)

Programme/policy level

Integration into/interaction with other assessment tools (SEA)

Development of (sector) strategies and planning processes, land use planning

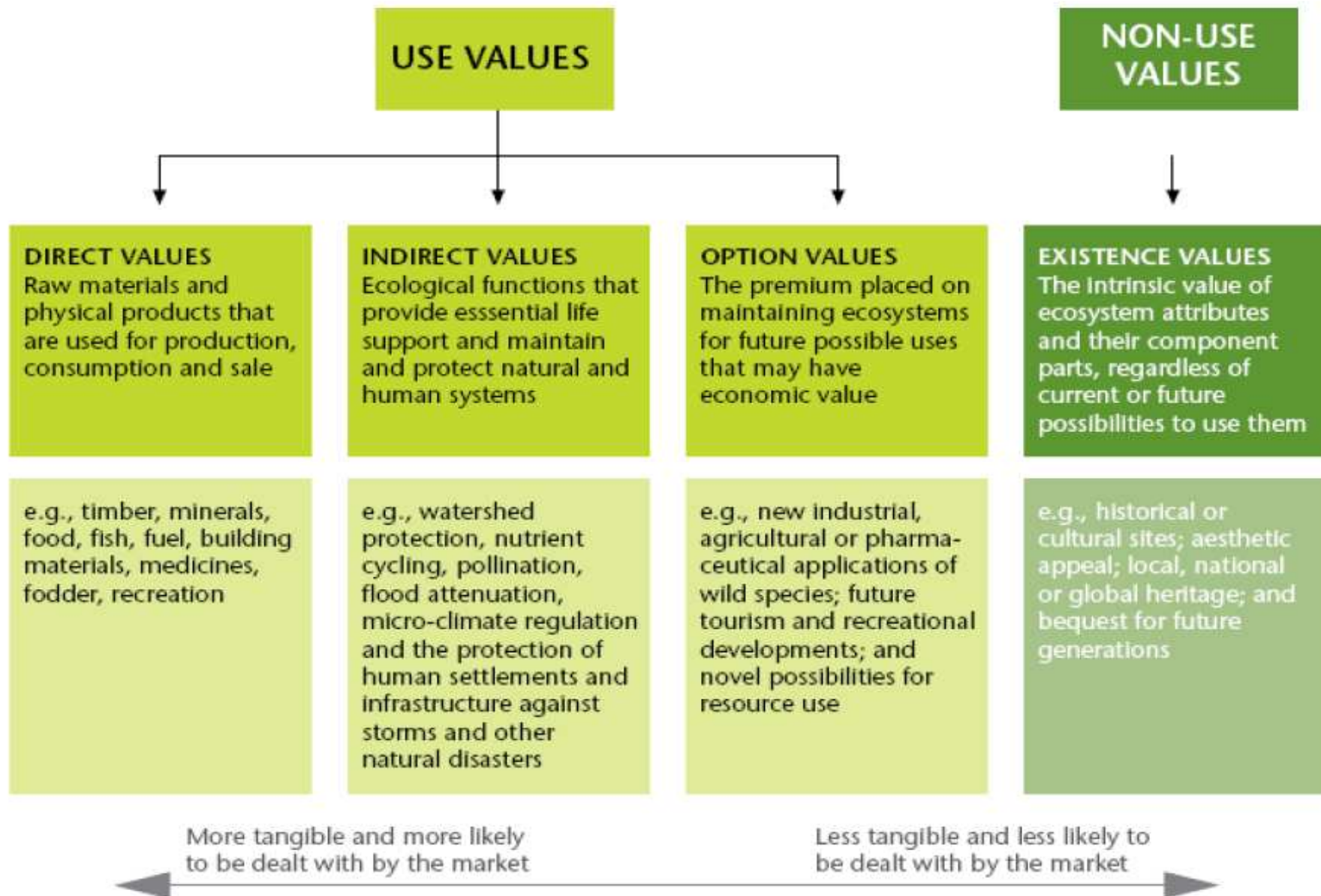
Integration into national accounting (SEEA) (Aichi Target 2)

What are your country's national objectives and priorities?

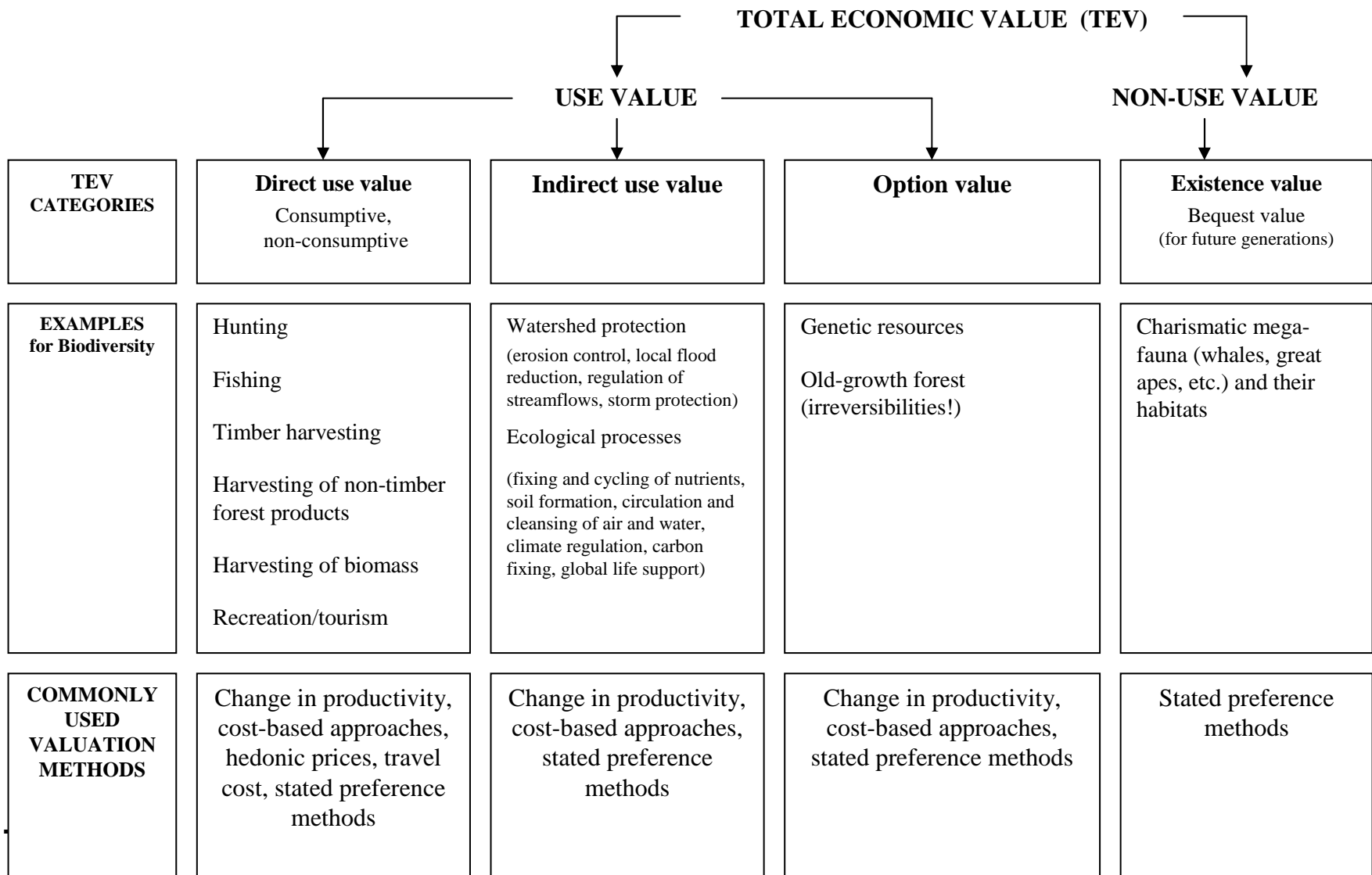
Valuation and national accounting

- UN SEEA (system of integrated economic and environmental accounts)
- Latest version 2003, currently under review
- Strengthening ecosystem components one goal of the review
- Environmental accounts are satellite accounts and mainly bio-physical
- Some sectoral accounts are operational and being already implemented by countries (e.g., water)
- Strengthen ecosystem (service) components in existing sectoral accounts.
- Global Partnership on Wealth Accounting and the Valuation of Ecosystem Services (WAVES)

Total economic value (TEV)



Total Economic Value (TEV)



Tools

1. **Revealed-preference methods**

individuals reveal their willingness-to-pay in actual behavior (e.g., in “surrogate” markets)

2. **Stated-preference methods**

individuals state their willingness-to-pay in hypothetical behavior, by responding to questionnaires

3. **Benefit (functions) transfer**

transfer results of one or several studies to a comparable site

Tools

General assessment

- Valuation tools can generally provide useful and reliable information when applied carefully and according to best practice.
- Choice of tools is situation-dependent
 - Cost vs accuracy
 - Total vs relative; Accounting vs policy; Awareness vs Development
- Analyses require technical expertise
- Economic values and valuation provide some of the information needed to make better decisions
 - Needs to be put into context and to be part of a broader deliberative and participatory process in order to be useful.

Apply a cost-benefit criterion to the valuation itself-

Example: Mangrove forests in Southern Thailand

- Study covers some (direct and indirect) use value of mangrove forests
- Direct use values: fish/seafood, honey, timber (boat repairs)
- Indirect use values: fish breeding ground (for offshore fisheries); coastal protection; [carbon storage – not considered in trade-off analysis]
- Change-in-productivity approach; replacement cost
- Policy question: mangrove conservation or conversion to shrimp farms?
- Source: Sathratai and Barbier 2001 and updates, TEEB

Example: Mangrove forests in Southern Thailand

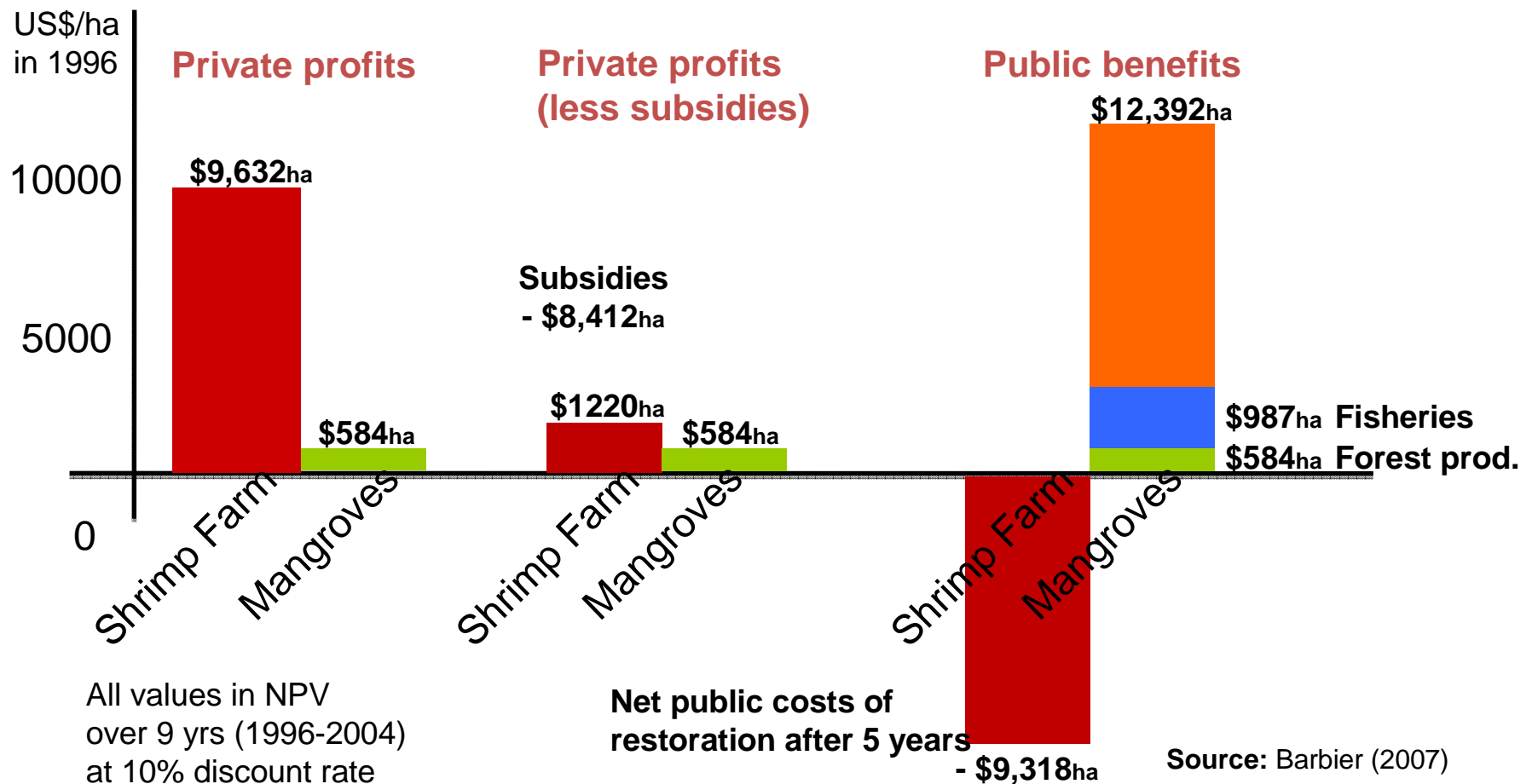
NET PRESENT VALUE OF MANGROVE FOREST BENEFITS*	
BENEFIT	Value (US\$) per ha
DIRECT USE VALUE:	
Net income from timber and non-timber products	87.84
INDIRECT USE VALUE:	
Offshore fishery linkages	20.82–68.90
Coastline protection	3,678.96
TOTAL DIRECT AND INDIRECT USE VALUE	3,787.62–3,835.70
DIRECT USE VALUE ONLY:	
Net present value (10% discount rate)	822.59
Net present value (12% discount rate)	734.83
Net present value (15% discount rate)	632.27
DIRECT AND INDIRECT USE VALUES:	
Net present value (10% discount rate)	35,470.72–35,920.98
Net present value (12% discount rate)	31,686.34–32,088.57
Net present value (15% discount rate)	27,264.13–27,610.22

* All net present value calculations are based on a 20-year time line.

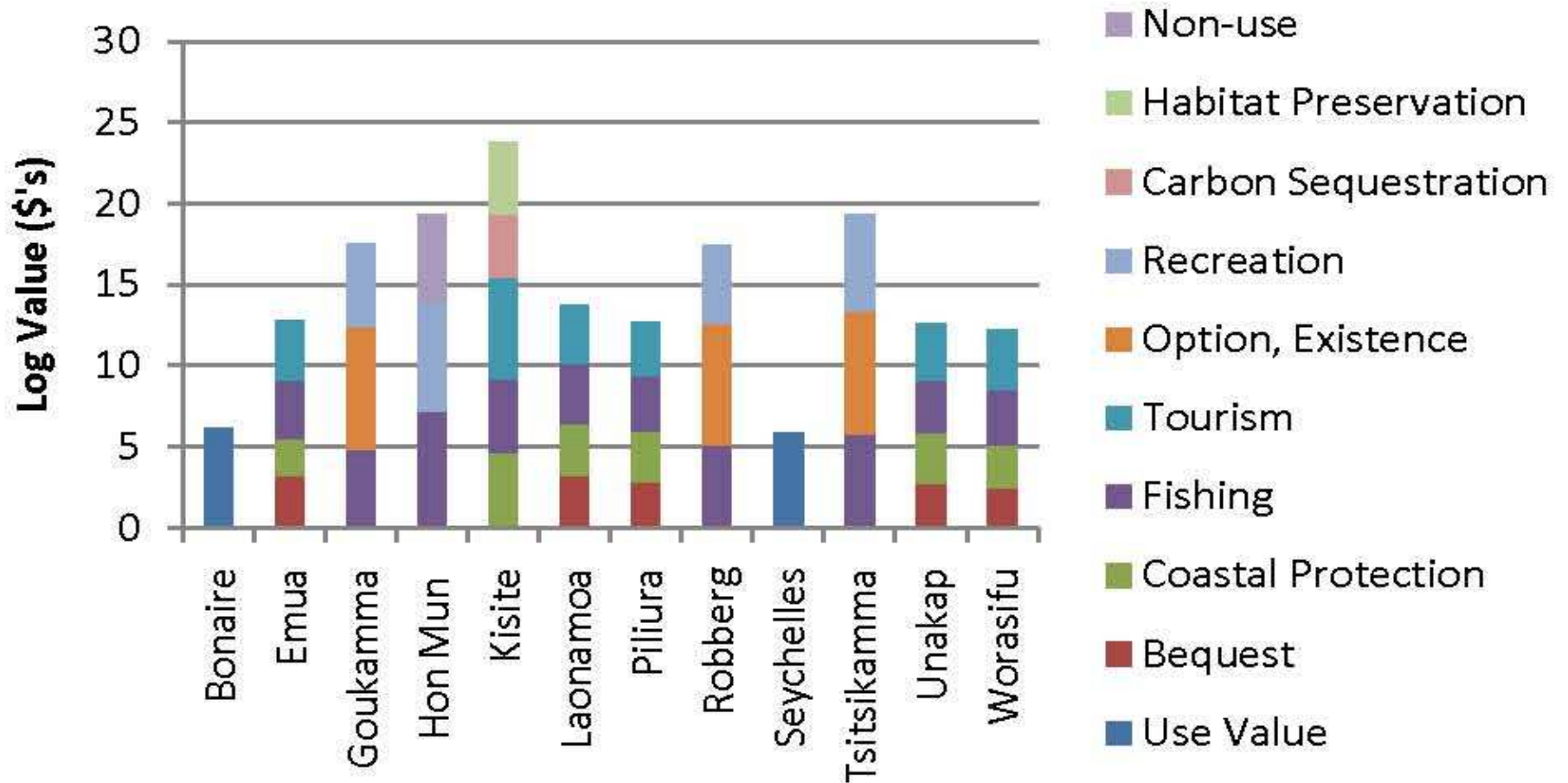
Source: CBD TS 28, p.46, Sathratai and Barbier 2001.

Example: Mangrove forests in Southern Thailand

Shrimp farms vs mangroves



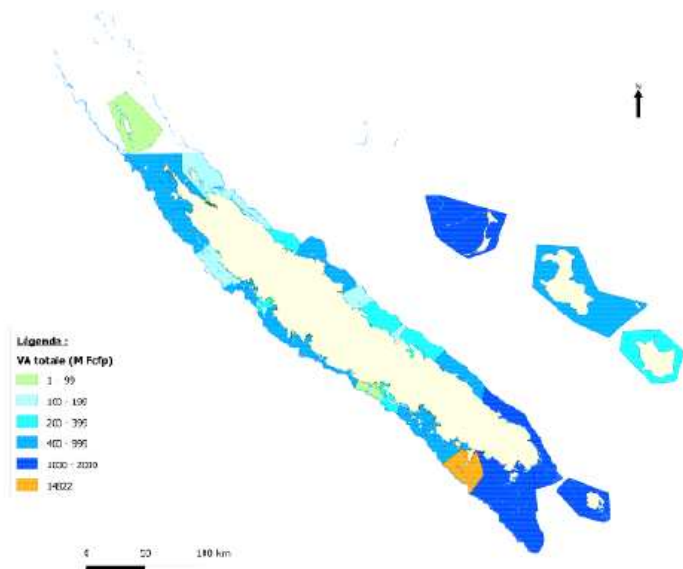
Marine Protected Area Total Economic Values



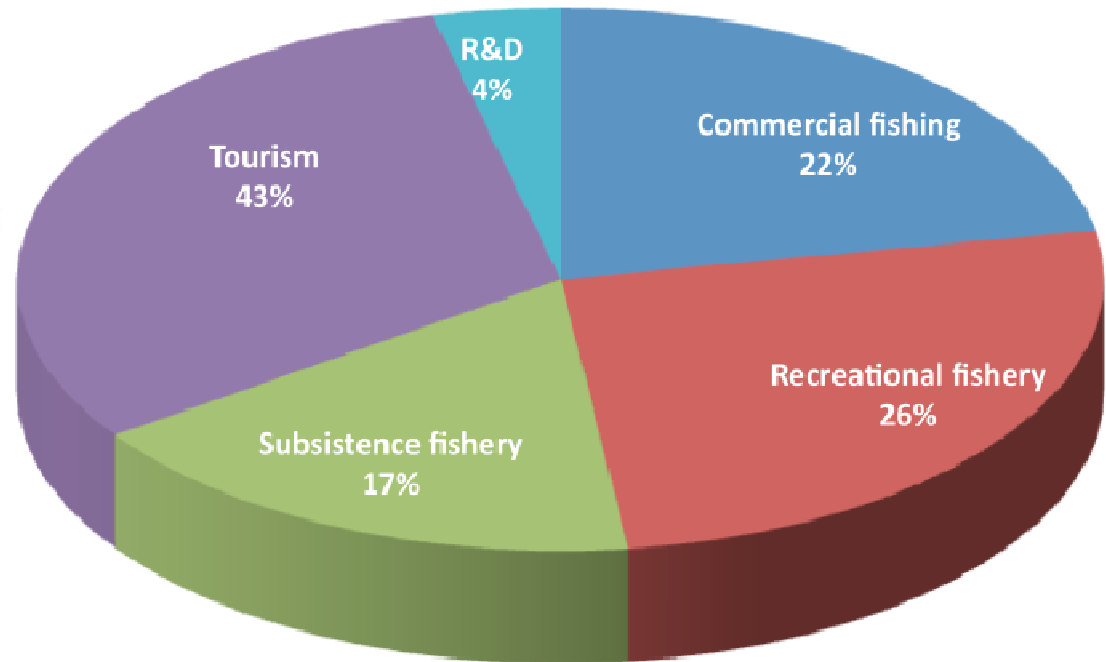
Using valuation for awareness raising: Coral reef ecosystem service benefits in Fiji

Component of TEV	Economic value per year	PV (20-year period, $i=10\%$)
Fisheries	1,359,257	12,863,808
Bequest value		
using WtCT	62,521	594,795
using WTP	23,539	223,942
Research/education	7,625	64,787
Coastal protection		
Coral reefs	851,352	8,099,387
Mangroves	170,797	1,624,888
Waste assimilation	621,890	5,916,385
Total	3,034,460 – 3,073,442	28,793,197 – 29,164,050

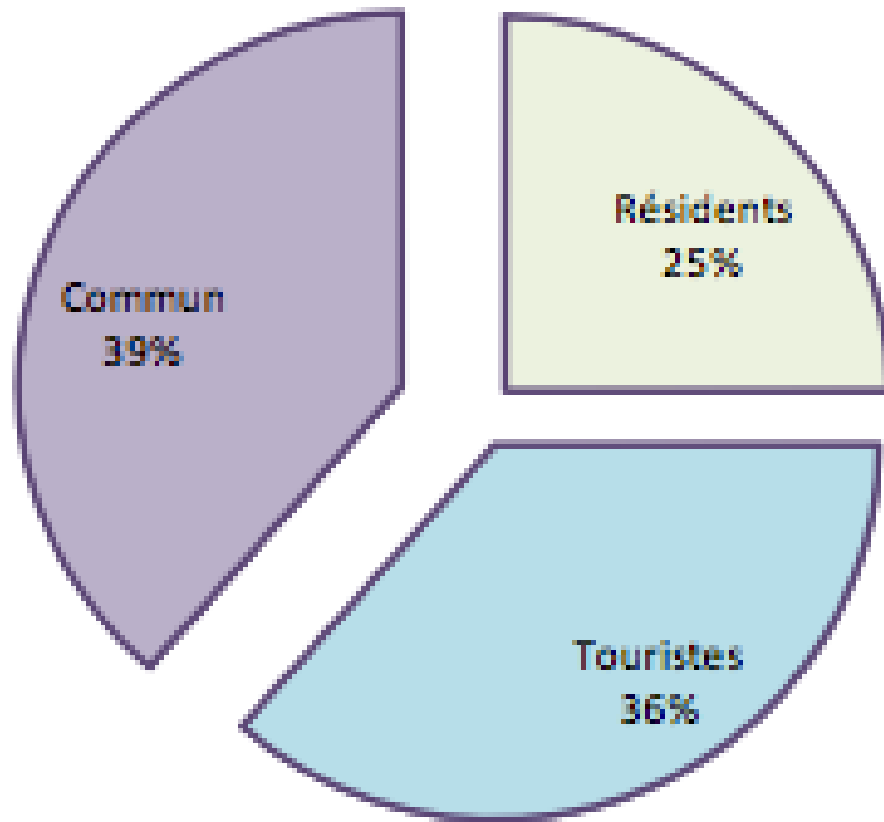
Using valuation to identify the distribution of benefits (New Caledonia: 190-320 M€/y)



Financial value of coral reef ecosystem services - Use values
2008 : 9,000- 12,000 MFcfp (78-103 M€, 100-137 M usd)

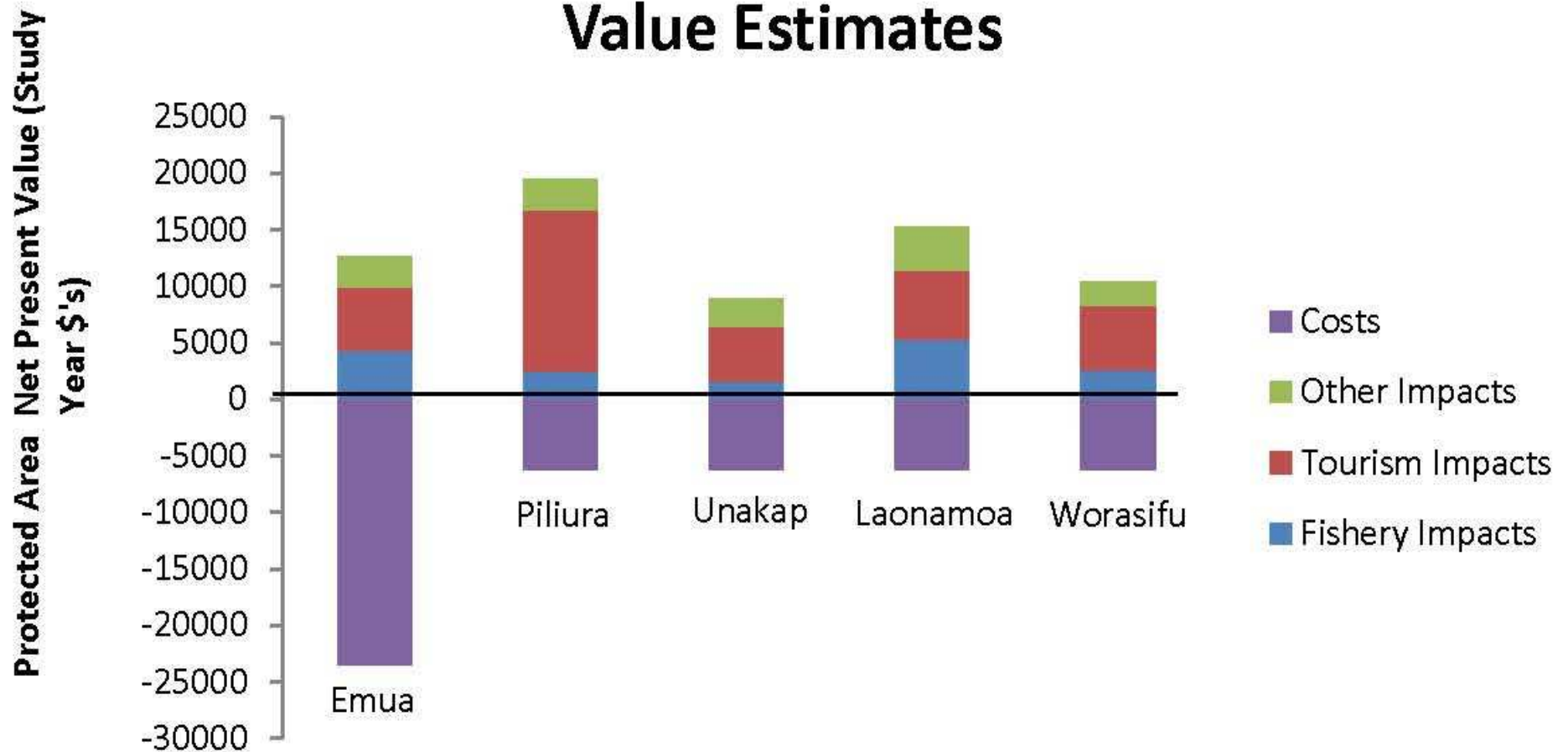


Distribution of benefits amongst stakeholders of coral reef ecosystem services in Martinique



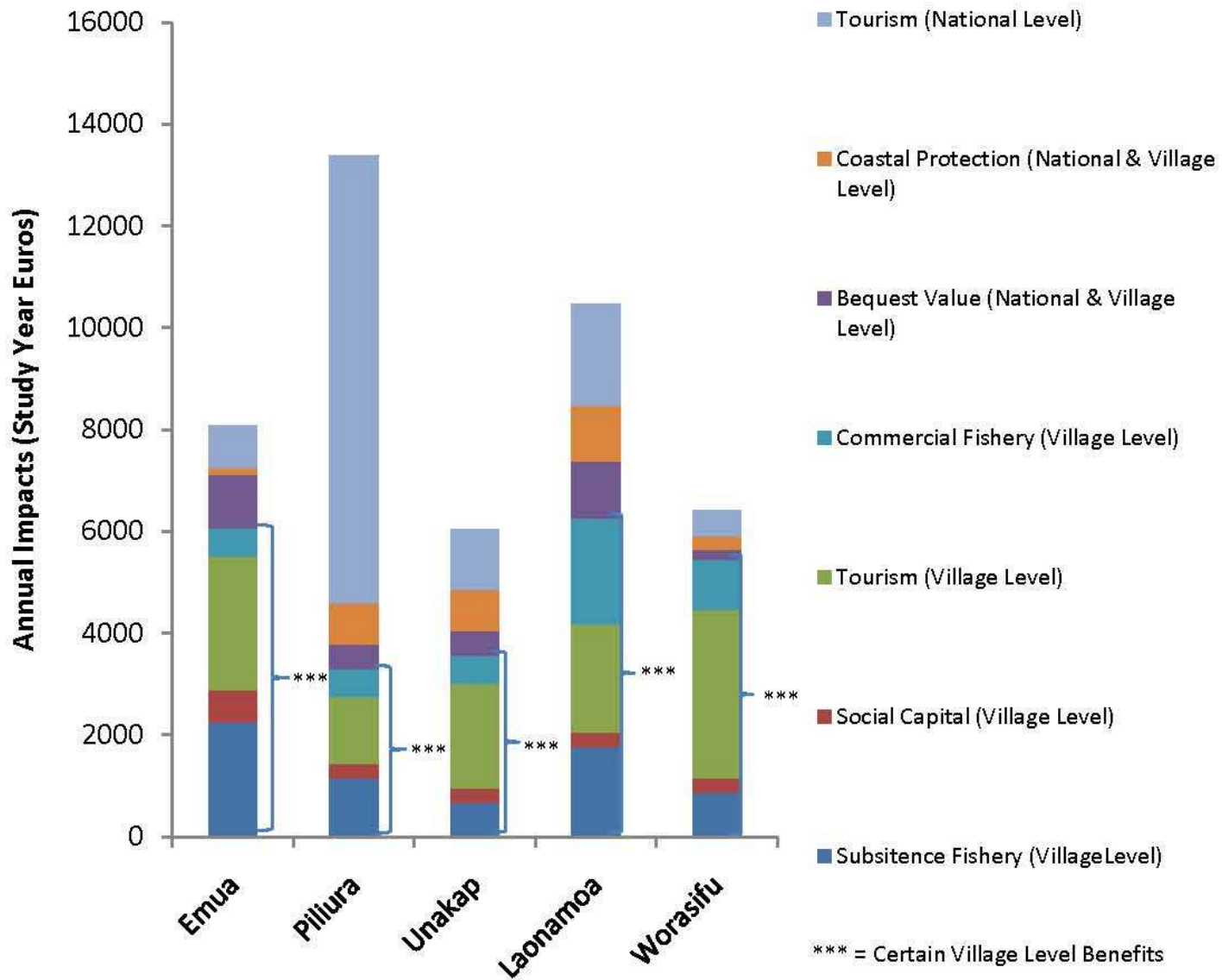
Failler et al 2010

Vanuatu Marine Protected Area Net Present Value Estimates



- Main benefits: subsistence fishery (30%) and rural tourism (70%)
- Main beneficiaries : village communities (65%)

Marine Protected Area Economic Valuation of Impacts, Vanuatu



Valuation: a flexible stepwise approach

Picking the low-hanging fruit in valuation...

- Aim to capture the most important ecosystem services/elements of TEV in a specific context – do not seek comprehensiveness at all cost
- Use simpler tools whenever appropriate
- Consider using qualitative/semi-quantitative representations; do not monetize at all cost

Valuation: a flexible approach

A simple step-wise approach...

1. Define the **decision-making problem** at hand
 - This may involve the definition of (stylized) scenarios for the different options
2. Identify the **most important ecosystem services** (or components of TEV) in the specific context
 - In many situations, these will be a few key direct and indirect use values
 - Stakeholder involvement will be critical
 - Aim for option and existence value only when there is a clear indication that these values are of particular significance in the specific context (because those are particularly difficult to evaluate and typically have a limited development dimension)

Valuation: a flexible approach

3. Considering using the following (comparatively simple) tools:
 - Existing market data: for many direct use values (e.g.: local market prices for many NTFR; tourism revenues;...)
 - Cost-based approaches: e.g. replacement cost associated with the loss of indirect use values
 - Travel cost approach for tourism/site-seeing
 - Benefits transfer: for rapid assessments, and with due caution
 - Change-in-productivity method: for important indirect use values when good scientific data is available

4. Use indicators for human well-being which are meaningful and practicable in the present context
 - In some cases, using highly aggregated monetary figures will actually obfuscate the contribution of ecosystem services to local well-being
 - Spatially explicit information will often be helpful

Towards implementing Aichi target 2

- ✓ Define the national target in accordance with national priorities
 - Agree on role and extent of economic valuation (see 'flexible approach')
- ✓ Options for implementing activities
 - Integration into national guidelines for application of appraisal tools (CBA, CEA, EIA, SEA);
 - Showcase/focus on critical values (e.g. on key ecosystems) (see also goal 1) at national or sub-national level;
 - Prepare 'national TEEB' and feed results into revisions of PRSPs etc.;
 - Establish or strengthen cooperation with statistics offices; explore opportunities to strengthen ecosystem components in sectoral green accounts (water, forests, land);
 - Build local capacity;

**Flexible, well-informed, locally-appropriate,
locally-driven.**

Exercise

- ✓ Identify an important biodiversity and ecosystem service based industry in your country (e.g., agriculture, forestry, mining/extractives)
- ✓ Identify the 3-5 most important ecosystem services that are affected by this industry.
- ✓ Identify those ecosystem services values that are well reflected in markets and those that are not.
- ✓ Identify appropriate measures and indicators of the status of these ecosystem services.
- ✓ Discuss how the value of the stock and flow of these ecosystem services might be assessed.
- ✓ Discuss how tradeoffs between these various ecosystem services might be addressed.

Questions for country discussion

- ✓ What are the most important areas of applying (economic) valuation in your country (e.g., awareness-raising, application within CBA/CEA, SEA, land use planning, green accounting)?
- ✓ What are the most important ecosystem services in your countries where you believe valuation would be useful?
- ✓ Have valuation studies already been undertaken in your countries? Is there a need to update or broaden them?
- ✓ Is valuation been used systematically to inform policy-making? If not, in which areas does it need strengthening, and what are the gaps?