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Valuing biodiversity and ecosystems
services for public decision making
Some insights from the French CAS report

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biodiversity and ecosystem services valuation

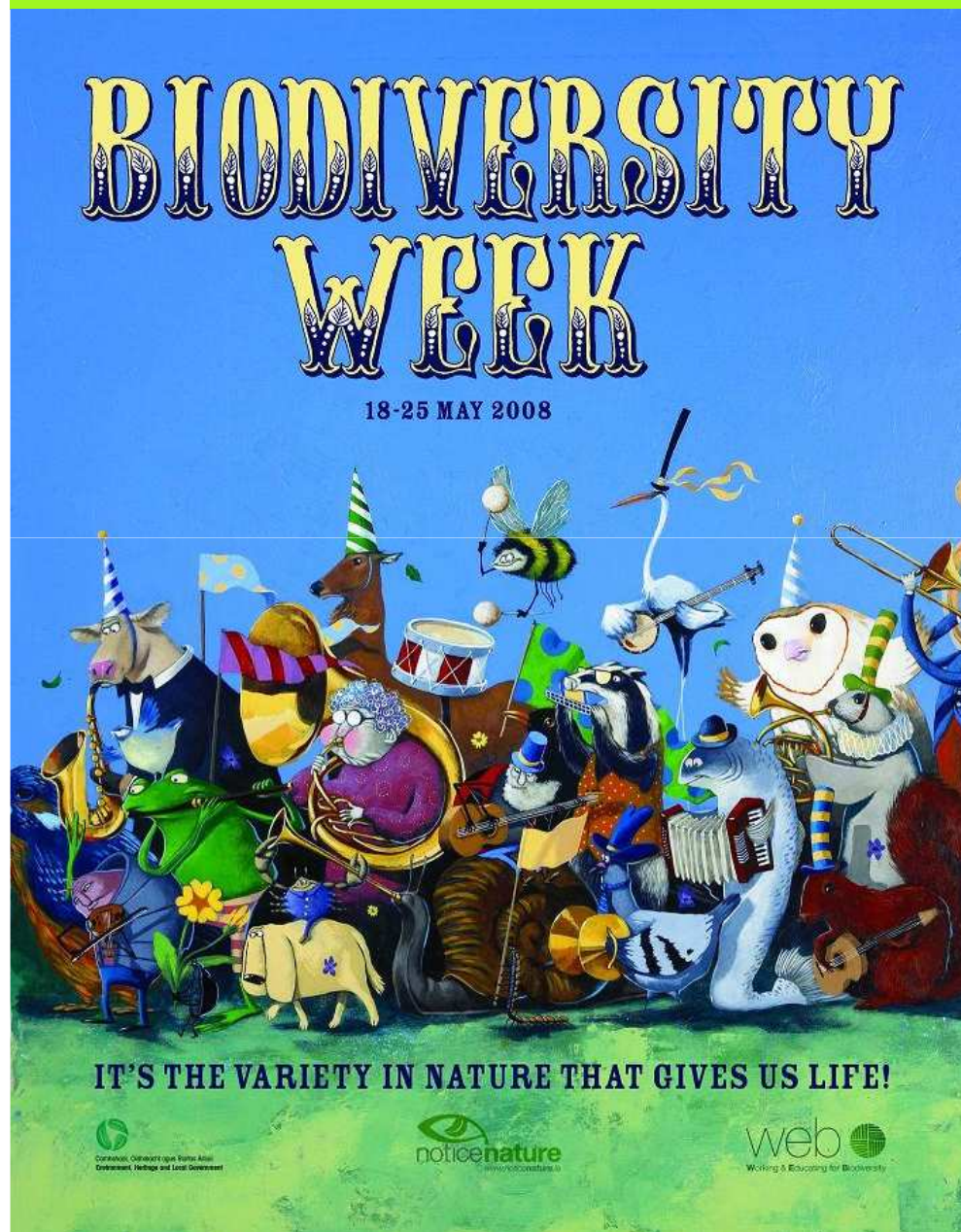


Menu :

1. Valuing economically
2. Why valuing biodiversity ?
3. Concepts and methods
4. Dealing with time and uncertainty
5. Limits
6. Towards « reference values »
7. Further comments

“Almost all economists are intellectually committed to the idea that the things people want can be valued in dollars and cents. If this is true, and things such as clean air, stable sea levels, tropical forests, and species diversity can be valued this way, then environmental issues submit – or so it is argued – quite readily to the discipline of economic analysis... Most environmentalist not only disagree with this idea, they find it morally deplorable.” (The Economist, January 31st, 2002).

Saving biodiversity is very much in *Vogue*...



 **EXPOSITION GREENWASHING**
Le Blanchiment écologique ou l'envers de la pub

DU 8 AU 11 AVRIL 2008
AU POINT DE BASCULE - 108, RUE BRETEUIL - 13006 MARSEILLE
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PARTENAIRES



The CAS report on the economic approach of biodiversity and ecosystem services

- The task force:
 - Created after the so-called “Environment Grenelle”
 - Chair B. Chevassus-au-Louis
 - 30 members : economists, ecologists, administratives, civil society...
- The group was given a mission that identified 4 major questions:
 - Draw up an assessment of scientific knowledge on the theme of ascribing monetary values to the ecosystems services and the value of biodiversity.
 - Analyse the socio-economic issues of biological diversity in France, including the Overseas Departments and Territories.
 - Propose specifications for further research needs.
 - Estimate first reference values for taking biodiversity into account that could be used in the socio-economic studies related to infrastructure projects.
- This report fulfills two main objectives:
 - to present and critically analyse the methods that can be used to estimate the economic values of biodiversity and ecosystem services,
 - to apply these methods to the ecosystems present in France in order to provide reference values that can be used in the socio-economic evaluation of public investments, in particular.

On the meaning of economic valuation

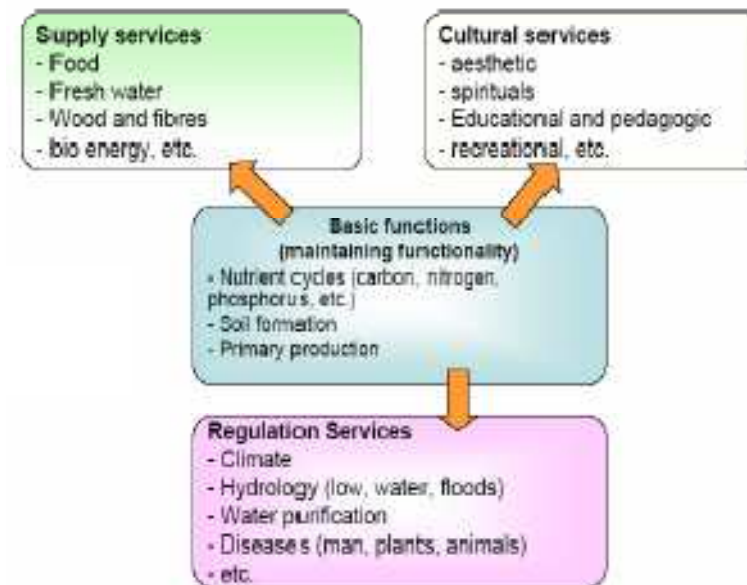
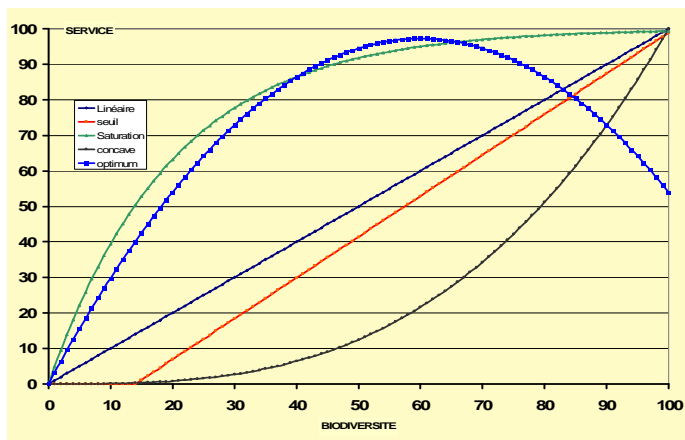
- The economic concept of value:
 - ✓ **Anthropocentric** (*anthropogenic?*)
 - ✓ **Instrumental** or *consequentialist* (\neq *deontological*) :
 - Utilitarianism = arithmetic of pleasures and pains
 - Based on the sum of individual utilities, not their distribution
 - ✓ **Subjective** :
 - the agents are considered as the best judges of their preferences
 - How to deal with 'non familiarity" (like "Merit goods")
 - ✓ **Marginalism**: valuation rests on comparison, not real measurement
- The incommensurability debate
 - Can all utility sources really be compared?
 - Is nature **substitutable** ?
 - Concept of « **critical natural capital** »
 - behind a minimum level, « natural capital » is no longer *substitutable*, but *complementary* of the other factors

Is biodiversity an economic good ?

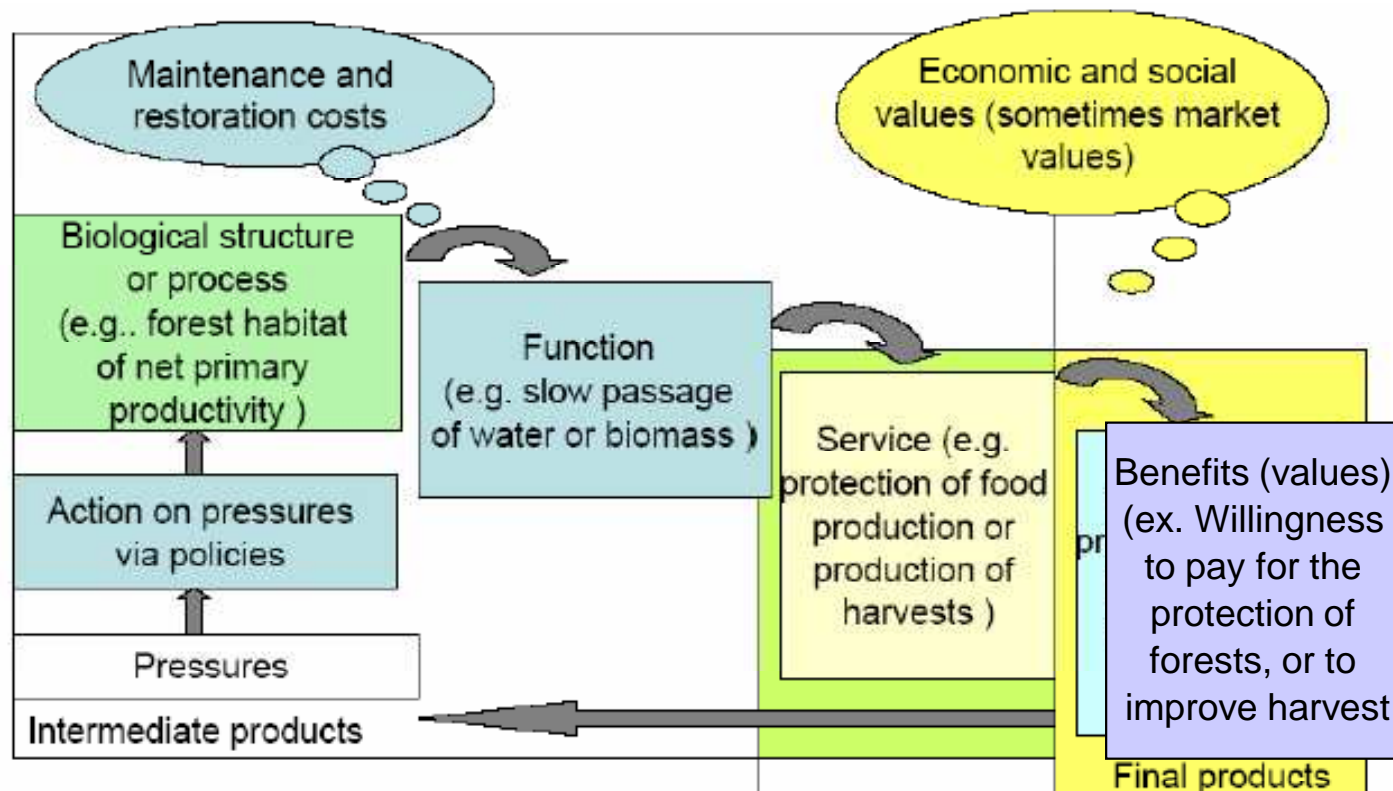
- The value of any object depends upon its usefulness and its scarcity
 - Is biodiversity useful?
 - Is all the biodiversity useful?
 - Is biodiversity scarce?
 - there is a positive willingness to pay to prevent its dégradation
- Biodiversité as an economic good?
 - Eventually a multi-layers public good:
 - Non-rivalry for certain uses?
 - Exclusion : is it possible to exclude ? Is it desirable ?
(which appropriation?)
 - A characteristic of ecosystems that influence their social value
- Valuation and the market
 - Values are not prices
 - Valuation as a first step (towards market)?
 - Valuation as an alternative (to the market for regulation)?

Why biodiversity is so important for our societies

- The first difficulty, to perceive socioeconomic stakes related to biodiversity, is to **identify the whole extension of its presence in the daily life** of human being: biodiversity is everywhere, from food production to digestion, from skin préservation to chemical industries, etc.
- **Ecosystem services result from the interactions between organisms** that shape the environment and ecosystem functioning. Air and water purification, carbone storage, soils fertility are services that result of organisms interactions
- The *Millenium Ecosystem Assessment* proposed a classification of ecosystem services in 4 main groups

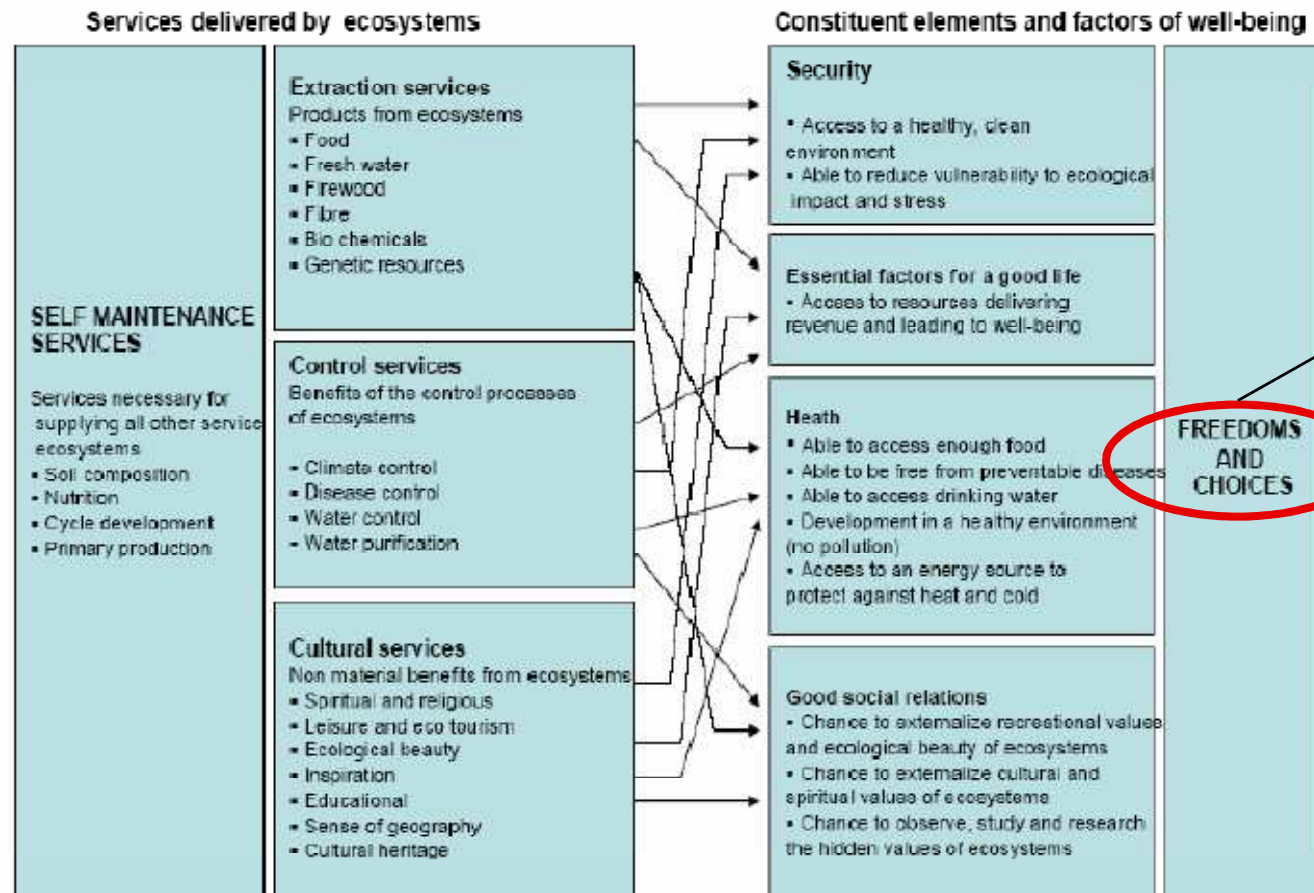


Link between biodiversity, ecosystem functioning, ecosystem services and their social value



Source: European commission, 2008

Ecosystems services and their links with human welfare



Freedom of choice and action implies the existence of alternatives at several levels:

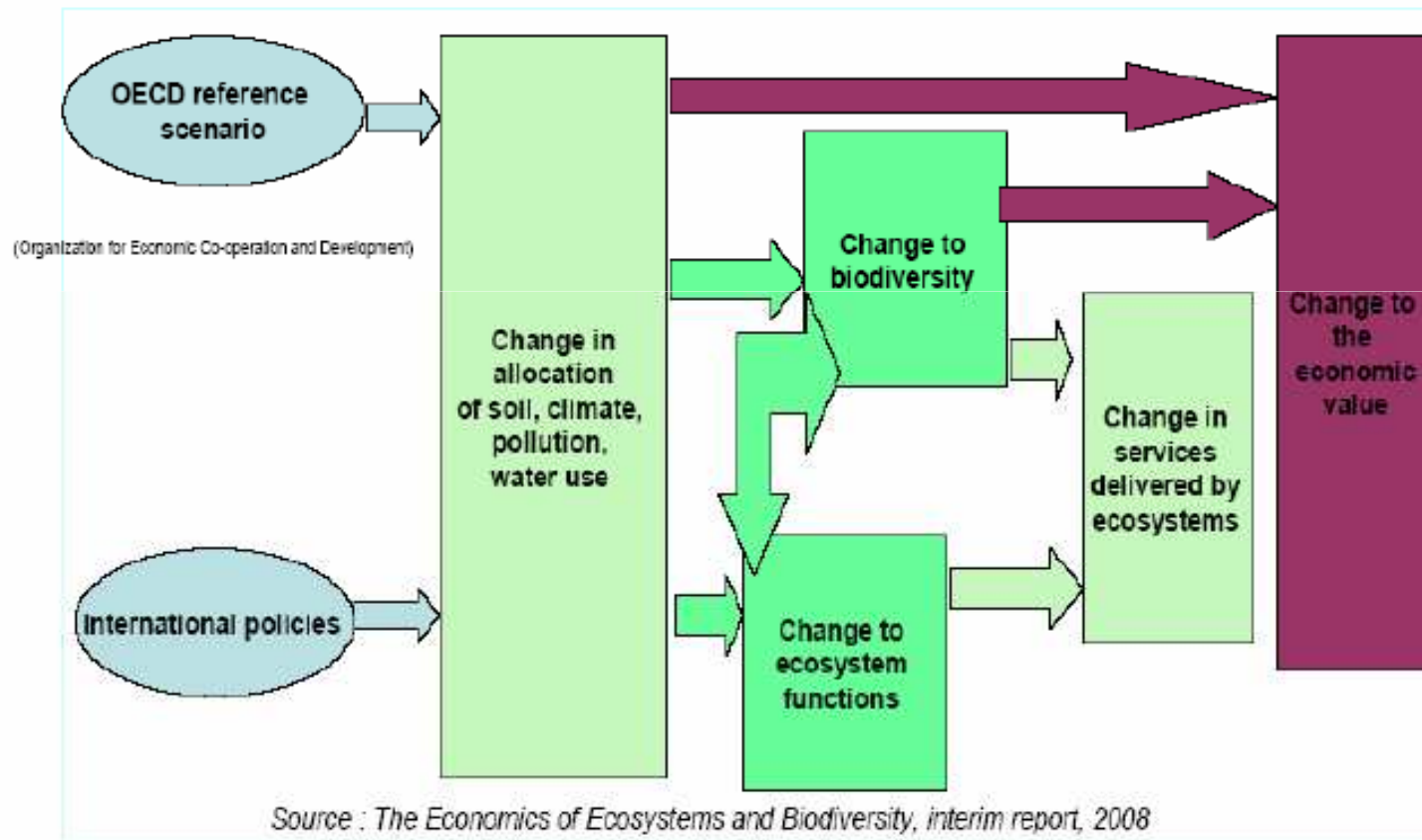
- technical,
- political,
- economic,
- cultural...

It should be integrated in the analysis of economic values

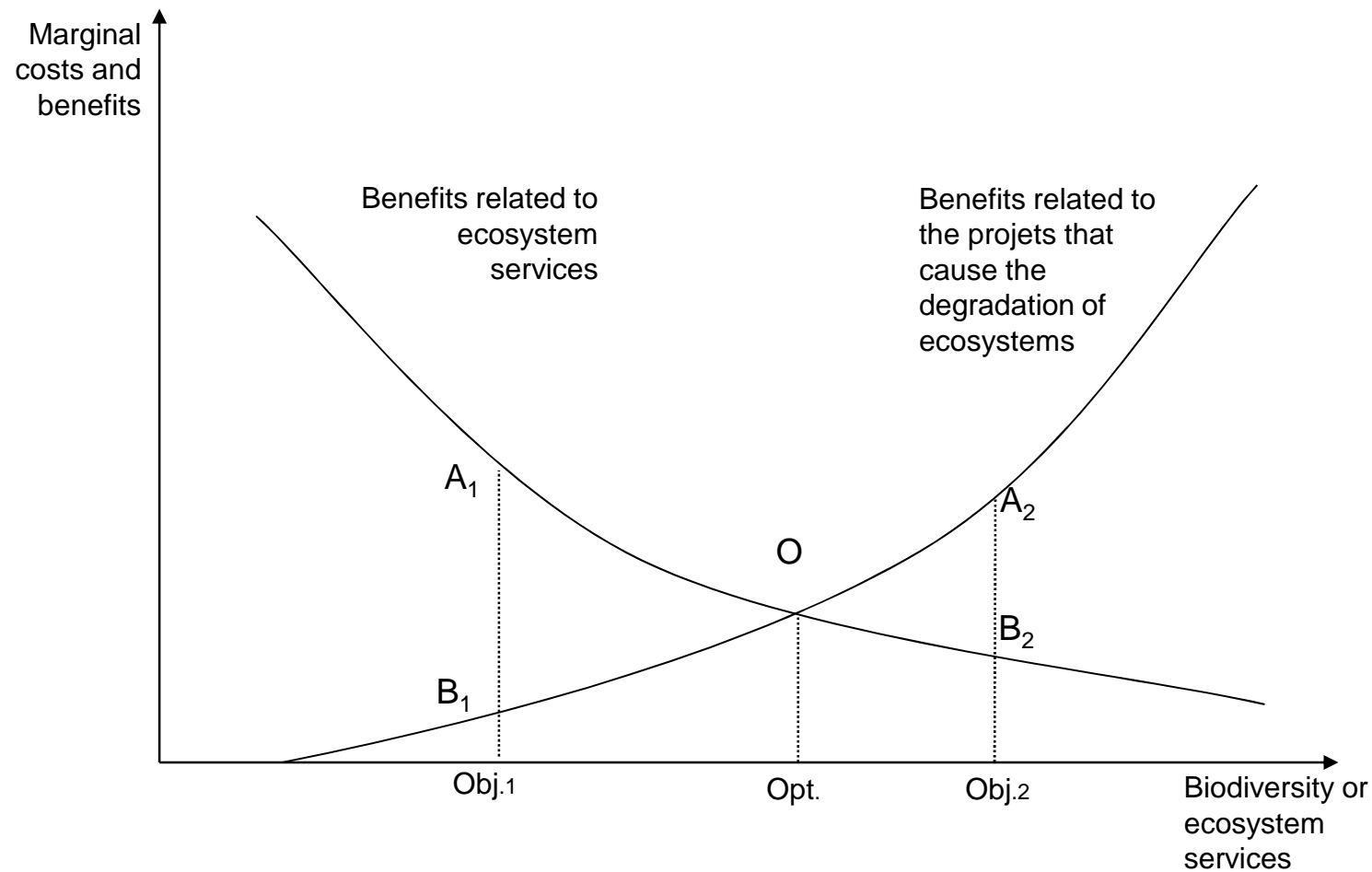
Source: Millennium Ecosystem Assessment, 2005

The cost of inaction

Building economic and political scénario to compare the evolution of ecosystem services and the cost of biodiversity losses



Thinking economically : confronting ecosystem services benefits and conservation costs



Economic analysis and collective choices

Economic analysis is aimed at enlightening collective choices.

It can be useful for various level of public decision making?

1. Rationalizing conservation strategies ?

- Cost-efficiency analysis recommends to realize all the conservation actions that have the lowest «unit cost »
- It implies to define (ecologically) equivalence classes!

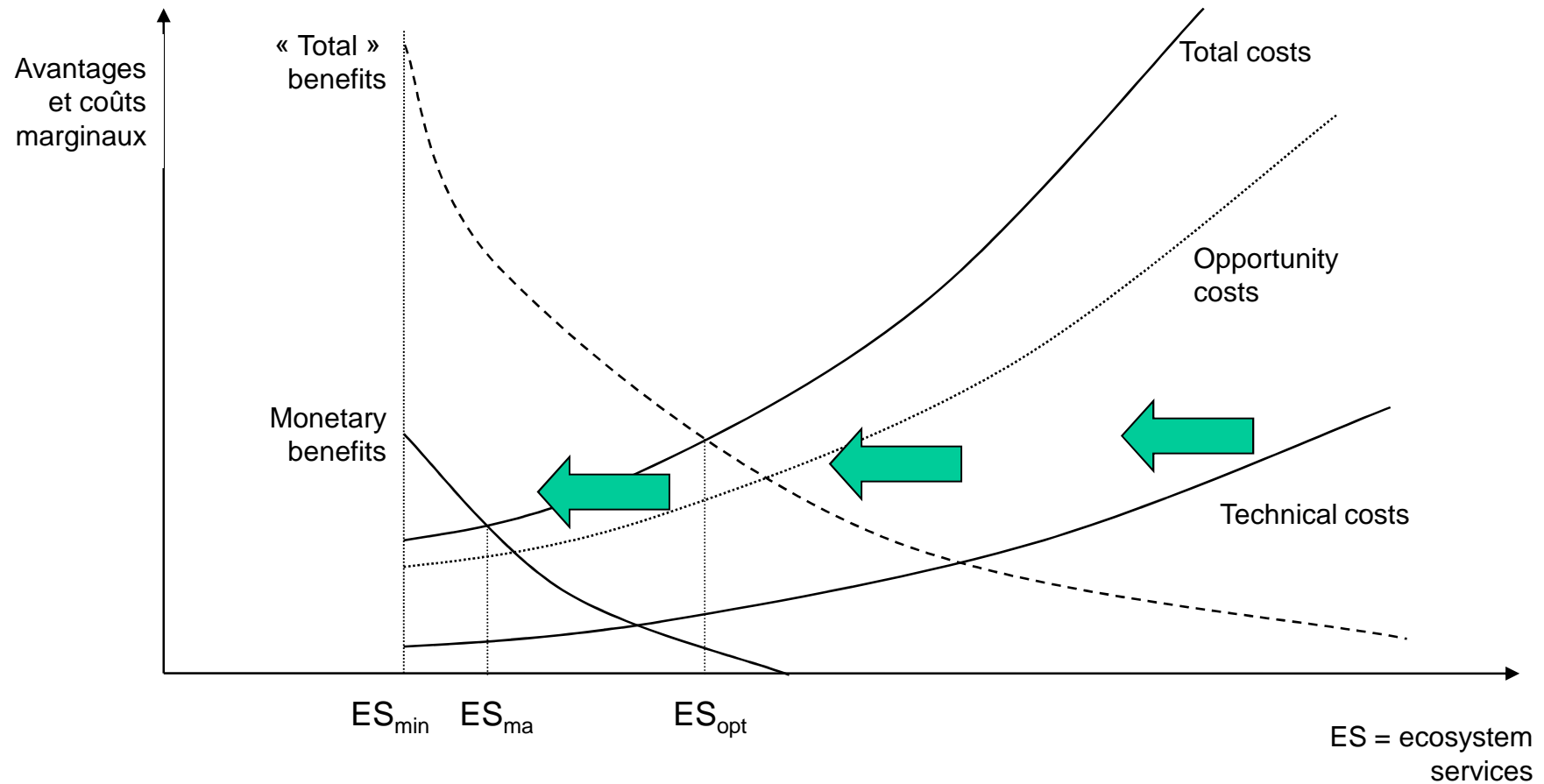
2. Rationalizing the conservation effort?

- Cost-benefit analysis aims at maximising « welfare »
- The benefit of the conservation actions must be confronted with the other sources of human welfare

3. Taking into account the welfare losses related to biodiversity and ecosystem degradation in public decision making (highways, HSL, urban sprawl, agricultural or forestry policies...)

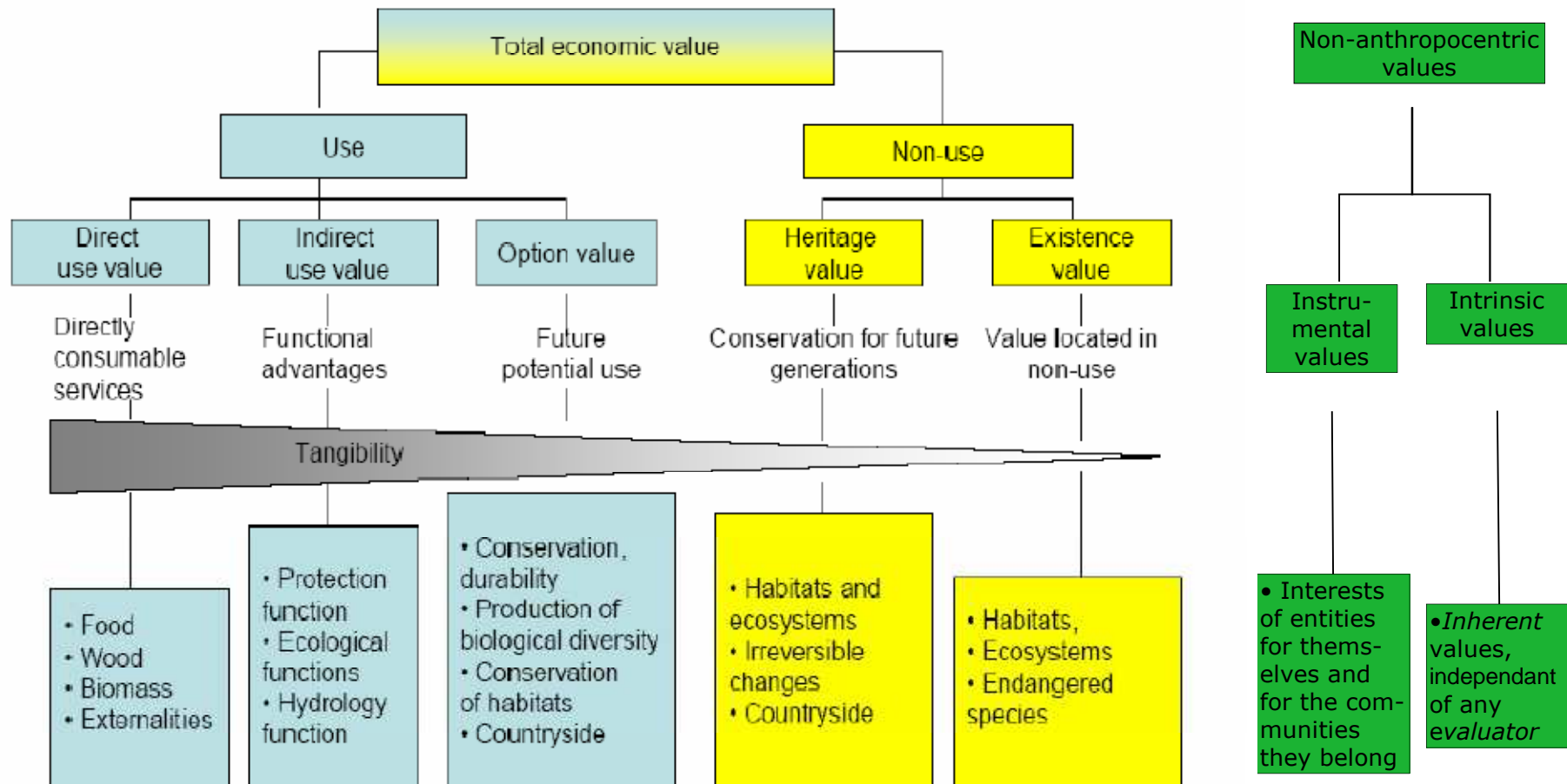
- The consequences of the ecosystems destruction or degradation must be measured in a way that allows comparability of values with the other dimensions of the project (price-equivalent)
- This produces an information that can be compared, i.e., to the restauration or replacement costs of the impacted ecosystems

Do we really care about biodiversity?



Source : D. Pearce (2007)

Les composantes de la valeur économique totale : synthèse ?



Source : Strategic analyse centre, February 2008

Total economic value of natural assets : open questions

- Since their introduction by J.V. Krutilla (1967), the interpretation of existence values evolved :
 - From willingness to pay for consevation, without any use perspective
 - Towards the expression of altruism and responsibility ("*stewardship*")
- Non-use values and intrinsic values
 - from anthropocentrism to anthropogenic values ?
- Economic values or the purchase of moral satisfaction (Kahnemann & Knecht, 1992) ?
- Are economic agents altruistic consumers or citizens with ethical commitments (Sen, 1987) ?
- Do agents have prior preferences for any asset, or do they discover them in the valuation process (Plott, 1996)



Many valuation methods...

1. Cost based methodes:
 - ✓ Monetising bio-physical damages
 - ✓ Impact of production functions
 - ✓ Restauration costs (?)
 - ✓ Replacement costs (?)
2. Methods based on revealed preferences:
 - ✓ Prevention or protection costs
 - ✓ Travel costs method
 - ✓ Hedonistic prices
3. Methods based on stated preferences:
 - ✓ Contingent valuation method (direct WTP)
 - ✓ Joint analysis (indirect)
4. Benefit transferts
 - ✓ From one study or from a meta-analysis
 - ✓ Transferring a cost function rather than a value
 - ✓ Available data bases (*EVRI*, *Envalue*, *ESD*...)


A screenshot of a spreadsheet application displaying a table with multiple columns and rows of data. The data appears to be organized into sections, possibly representing different computer models or configurations.

Model	Processor	Memory	Storage	Price
Model 1	Intel Core i5	8 GB	1 TB	1200
Model 2	Intel Core i7	16 GB	2 TB	2500
Model 3	Intel Core i9	32 GB	4 TB	5000
Model 4	AMD Ryzen 9	24 GB	3 TB	3500
Model 5	AMD Ryzen 7	16 GB	2 TB	2000
Model 6	AMD Ryzen 5	8 GB	1 TB	1000
Model 7	Intel Core i3	4 GB	500 GB	500
Model 8	Intel Core i1	2 GB	250 GB	250
Model 9	Intel Core i0	1 GB	125 GB	125
Model 10	Intel Core i-1	512 MB	62.5 GB	62.5



All these approaches meet strong limits

- Informational limits and “systemic errors”:
 - Cost-based methods must be framed by social values (if restoring an ecosystem costs 10 times the WTP of the concerned population, restoration is inefficient)
 - Revealed preferences methods capture only some aspects of the total value and only indicate some specific use values (recreative, aesthetic...)
 - Stated preferences methods often encompass systemic errors (hypothetic bias, strategic, embeddedness...)
- What happens in the absence of valuation?
 - Decisions follow the preferences of the Prince ? The interests of the strongest lobbies ? The dominant ideology or the custom of the day ?
 - Decisions are made by elite, technocrats and experts (better educated and informed) that know, better than population, where are the major interests?
- The CAS group was confronted to the dilemma of choosing between:
 - More robust methods (there are observable costs or behaviours) measuring limited values (use values) or controversial
 - Wider scope approaches (the whole TEV can potentially be identified) ; but poorly reliable (since based on the statements of possibly poorly or misinformed agents)
 - Benefit transfers constitute a perspective of practical interest, but remains poorly reliable as long as the basic studies have not been designed in the perspective of being transferred

Biodiversity: which object can be valued ?

- Which object ?
 - The diversity of life forms
 - Genes
 - Species
 - Habitats, landscapes
 - Ecosystems functions
- Valuing ecosystem services
 - More easily understandable by consumers/users
 - Easier elaboration of equivalence classes
 - The *Millenium Ecosystem Assessment* (2005) created a certain consensus (provisory)



Dealing with time and uncertainty

- Time appears in economic analysis through the question of discounting (the current public discount rate is clearly lower than in the past : 4%)
- The very long run justifies is better taken into account with decreasing discounting rates (« hyperbolic » or “*Gamma*” discounting)
- Discounting is related to values, utilities: it is then compulsory to make hypothesis on the evolution of relative prices (including shadow prices) in the long run :
 - Decreasing trend for manufactured products (technical changes)
 - Increasing trend for ecosystems and biodiversity that reflects increasing scarcity and growing demand (income elasticity for environment demand > 1)
- For irreplaceable assets, the “Hotelling rule” may apply (shadow price increasing with the discounting rate) ; that may lead to infinite values for time indefinite services
- The uncertainties on the dynamic of ecosystem services and their social demand give a great importance to option values...
... but make their quantification very difficult if not unrealistic

Is the CAS report consistent with standard environmental economics

- The CAS report:
 - Recognize the interest to summarize biodiversity stakes in a value index like in any standard social cost-benefit analysis (it was not the case in preceeding prescriptions, namely in the « Boiteux report»)
 - These indicators are build from valuations studies that are, for some of them, based on individual preferences
- But, several choices appears more specific:
 - The concept of « reference values » is poorly scientifically grounded... it is rather some cooking recipe to contribute to the public decision procedure
 - Limiting valuation to use values and quantiable services follows a practical and realistic viewpoint but is certainly not conform to the logic of economic optimisation
 - The “reference values” are mainly build from valuation based on avoided costs (or proxy) in order not to depend on poorly grounded and reliable preferences



"They say they are a pair of bureaucrats who are just as important to the planet as any other life form."

The report is focused on « ordinary biodiversity »

- « General » or « ordinary » biodiversity is the sole for which:
 - « Reference values » may have a practical meaning
 - Valuations from services are reasonably robust
 - Non-use values are generally limited
 - Discounting choices are reasonably simple and consensual
- The so-called remarkable biodiversity (actually « remarked ») :
 - Can locally stand for considerable and possibly essential stakes
 - But should benefit of appropriate forms of protection and that will imply ad hoc treatments in the socioeconomic assessment and, then, should not suffer from a qualitative assessment
- There was, in fact, a wide consensus in the group to emphasize the paramount importance of the long run stakes related to « ordinary biodiversity »

Towards « reference values » for public economic analysis

Reminder : the objective was to propose *reference values* allowing to:

- take biodiversity into account for the socioeconomic assessment of infrastructure projects and public policies
- draw « routinized » cost-benefit analysis to enlighten public decisions

These are clearly minimal values:

Biodiversity

> Ordinary biodiversity

> Valuation through services

> Quantifiable services

> Limited to use values

> limited to monetizable uses

The report gives:

- Average « standardised » annual values
- « Capitalised » total values \approx annual values \times 40
- Tries to estimate maximal plausible values (reflecting long run potential)

Vers des valeurs de référence: the forest case

Services	Proposed value	Comments
Extraction services - wood - other forest products (excluding game)	€ 75 (€ 75 to € 160) € 10 to € 15	According to method of appraisal (stumpage or post-extraction)
Regulation services - carbon sequestration - carbon storage - other atmospheric gases	€ 115 € 414 (€ 207 to € 414) Not rated	€ 360 in 2030 € 650 to € 1,300 in 2030 Lack of reliable quantitative assessments
Regulation services (continued) - water (annual quantity) - water (flow regulation) - water (quality) - protection (erosion, floods) - biodiversity - other regulation services (health, etc.)	€ 0 Not assessed € 90 Not assessed Not assessed directly Not assessed	Assuming no major effect of forests on annual hydrological balance Lack of relevant studies Lack of relevant studies Assessed through other services Lack of relevant studies
Cultural services - hiking (excluding hunting and subsidiary produce) - hunting - other cultural services	€ 200 (€ 0 to € 1,000) € 55 - 69 Not assessed	According to use rate Negative externalities to deduct Lack of relevant studies
TOTAL* (min.-max.)**	approx. € 970 € 500 to over € 2,000	

* Taking the indicated value or the average of the indicated range.

** By simply adding minimum and maximum values.

Implementing reference values

- 1) First estimates appears to confirm that **nonmarket ecosystem services** (namely regulation services) can stand for larger weight than the market prices of lands :
 - this statement may result in changes in the hierarchies of public decisions in several fields (agriculture, forestry, conservation...)
 - they are nevertheless not matching the prices of land for urban uses as far as only “ordinary biodiversity” is concerned
- 2) Reference values are only... references that will have to be :
 - **spatially differentiated** (according to observable local parameters)
 - modified or adapted according to the anticipated **dynamics** (when the considered ecosystem is included in a class which is becoming scarcer or endangered...)
- 3) **Transparent and legitimate procedures** will be of the highest importance for specifying these values and controlling their use
 - to prevent never ending contestation and debate
 - to create a better “foreseeability” for project and property developers

Why valuing biodiversity?

- Science never says to us what we have to do
- Valuing biodiversity and ecosystem services is a way to get and organise information in order to improve decision making
- Valuing biodiversity is a political choice grounded on the belief that we are living in a world of increasing scarcities (more numerous and hopefully richer people) that will imply an increasing number of choices
- Valuing biodiversity does not imply that biodiversity should become a market good, and values don't aim at becoming the prices of ecosystem destruction allowances
- A better management of « ordinary biodiversity » is a top priority, and « reference values » may contribute to achieve this objective in a more efficient, and possibly fairer way, in all cases more conscious and, hopefully within a democratic deliberative process
- Valuing biodiversity and ecosystem services is eventually too serious to be entrusted to the (sole) economists... but it would be unreasonable to practice economic valuation without them

Why valuing biodiversity?

« If our purpose is to conserve these (ecosystem) services, valuation is to a large extent non pertinent. (...) in the matter of nature protection, valuation is neither necessary, nor sufficient. We conserve many things that we don't evaluate and little of those we value » (Geoffrey M. Heal)





Thank you for your attention