



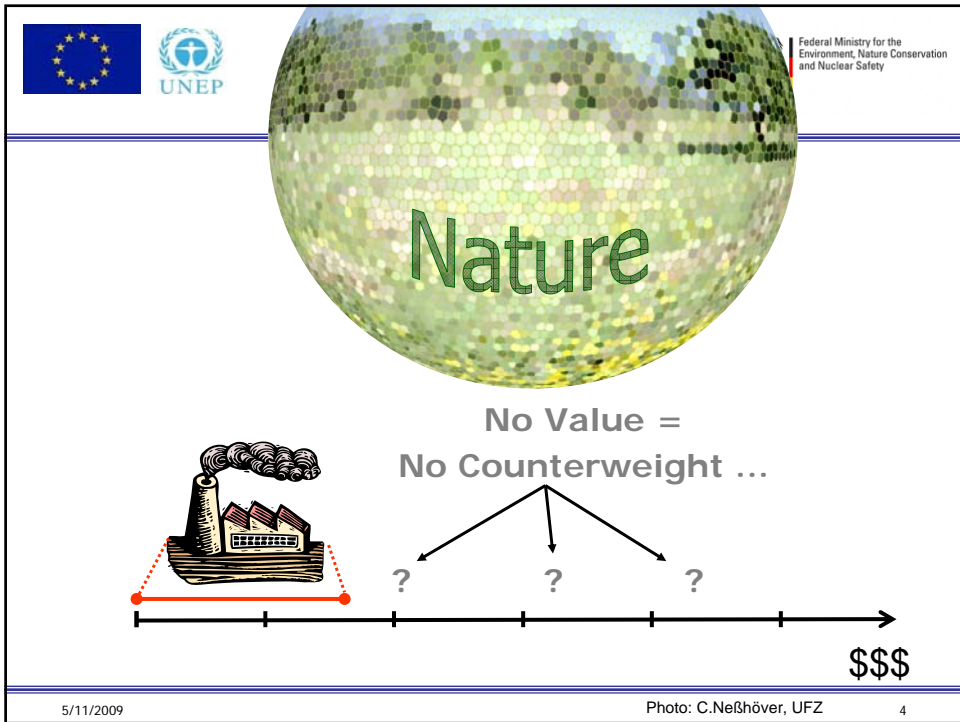
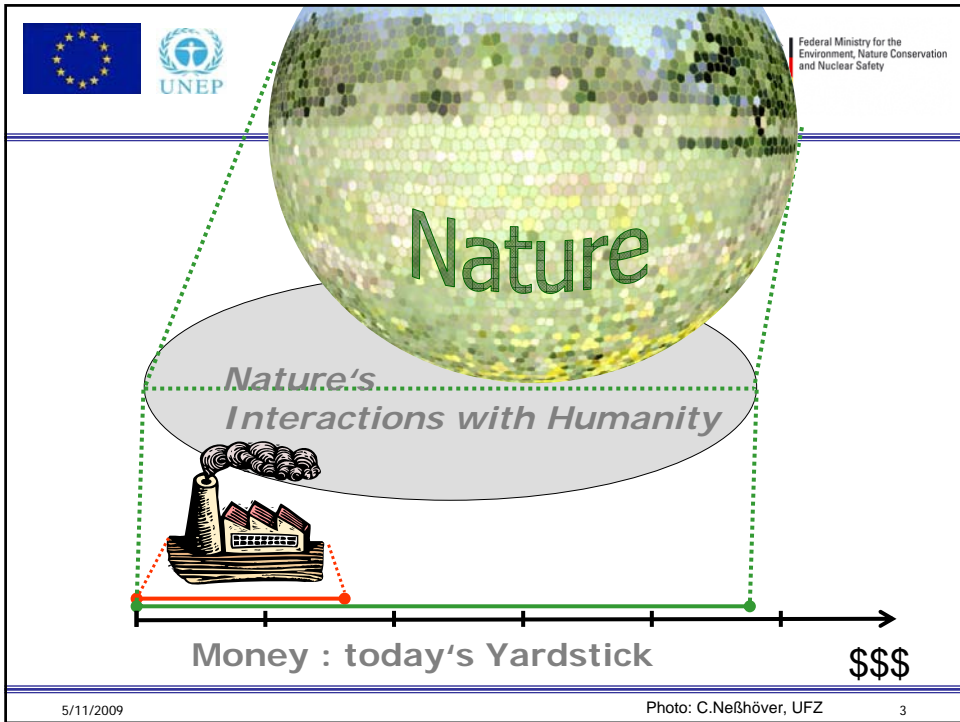
The Economics of Ecosystems and Biodiversity "TEEB"

The Royal Society
Foundation Meeting on Valuation of Biodiversity
5th May, London

Pavan Sukhdev
(Study Leader, TEEB)



WHY ?





WHAT ?



Five Important Dimensions of "Biodiversity"...



- 1. Species Richness** (to quantify species diversity, its recreational, medicinal, etc. values, including contribution to ecosystem resilience and robustness)
- 2. Species Rarity** (to quantify species close to extinction, their ethical and recreational values, global citizens significant "WTP" for these. Note that Species Rarity is closely and inversely related to another biodiversity attribute, Population Viability, hence a reflection of physical dispersion, mean range size & separation)
- 3. Biomass Density** (because of its role in delivering very important services, especially Carbon storage, water provisioning and regulation, and others)
- 4. Primary Productivity** (to measure the natural rate of production of biomass, & its food production potential through the human appropriation of net primary productivity - to feed 9 billion of us in 2050)
- 5. Genetic diversity** (to quantify bio-prospecting values and insurance values for future foods, etc)



Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

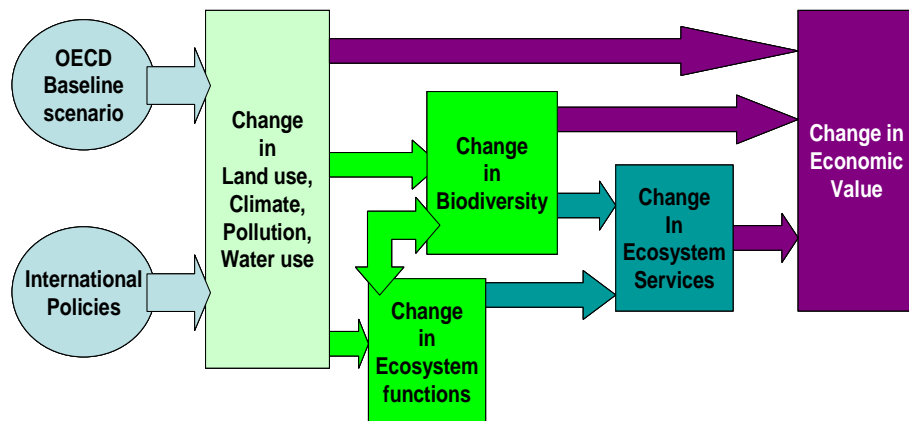
HOW ?



Biodiversity, Ecosystems, and their Services



Federal Ministry for the Environment, Nature Conservation and Nuclear Safety





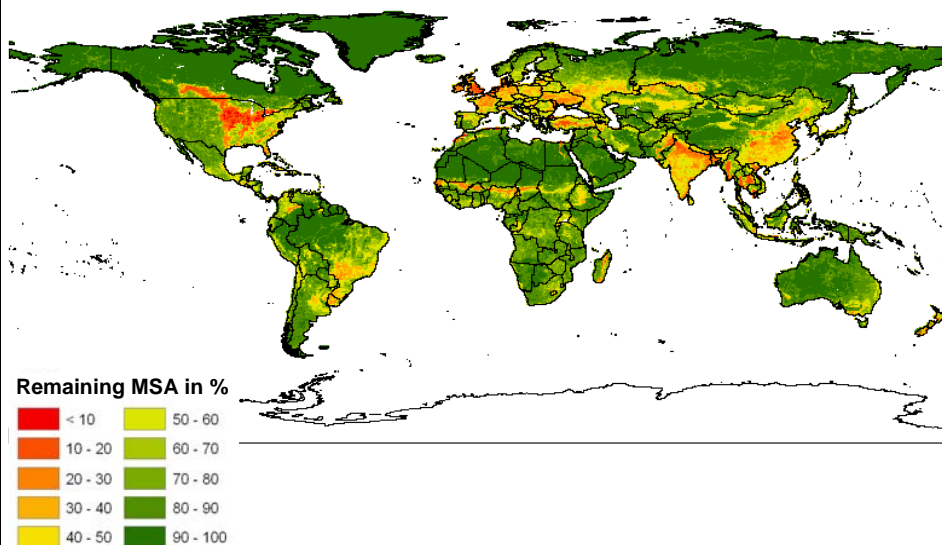
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

TEEB – Phase 1

5/11/2009

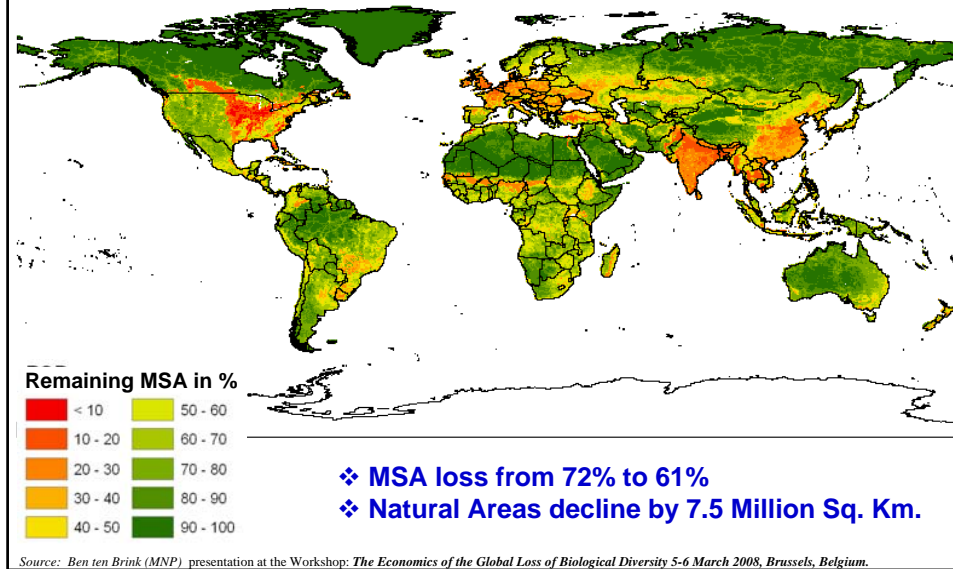
9

Level of Biodiversity in the World in 2000 (OECD baseline, Globio-3 model, “MSA” indicator)

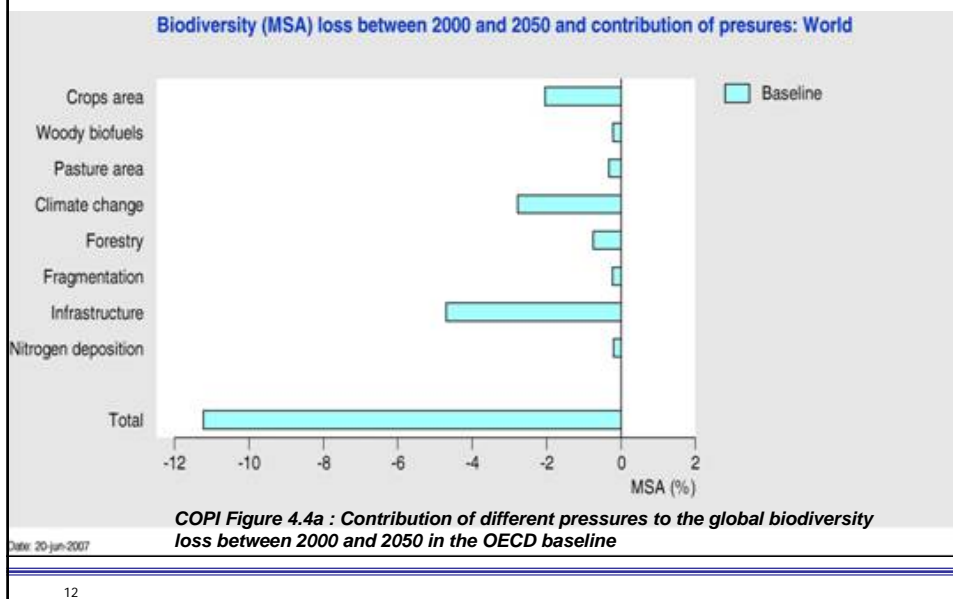


Source: Ben ten Brink (MNP) presentation at the Workshop: *The Economics of the Global Loss of Biological Diversity* 5-6 March 2008, Brussels, Belgium.

Level of Biodiversity in the World in 2050 “Business as Usual” Scenario of the future



Main drivers of Biodiversity Loss 2000 - 2050 (Globio-3)



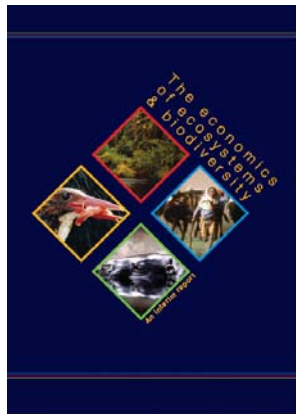


**TEEB – Interim Report
COP-9, Bonn, May 2008**



Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Key Messages from the Interim Report....



Economic Size & Welfare Impact of Losses



Strong Links with Poverty / MDG's / "GDP of the Poor"



Discount Rates are an *ethical* choice

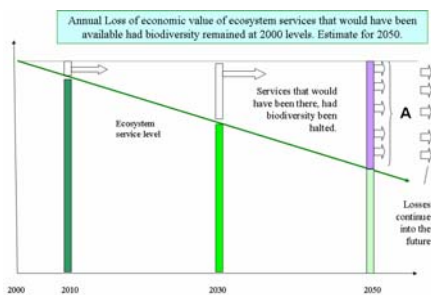


Losses in 'Present Value' terms...
(COPI study, May 2008, TEEB)



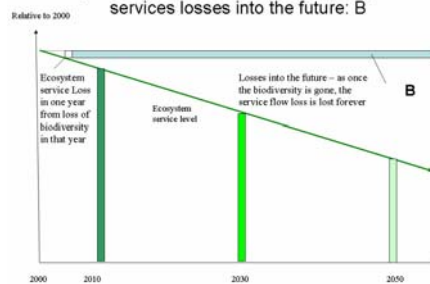
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

A : 50-year impact of inaction or 'business as usual'



Welfare losses equivalent to 7 % of GDP, horizon 2050

B : Natural Capital Loss every year
Valuation and Ecosystem service losses
A year's biodiversity loss leads to ecosystem services losses into the future: B



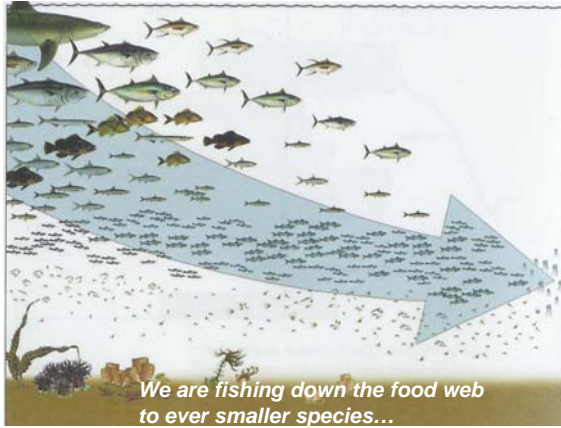
Natural Capital Lost : Annually
EUR 1.35 x 10¹² to 3.10 x 10¹²
(@ 4% Discount Rate) (@ 1% Discount Rate)



Global Loss of Fisheries... ...Human Welfare Impact



Federal Ministry for the Environment, Nature Conservation and Nuclear Safety



- Perverse Subsidies are a key driver of the loss of fisheries**
- Half of wild marine fisheries are fully exploited, with a further quarter already over-exploited**
- at risk : \$ 80-100 billion income from the sector**
- at risk : est. 27 million jobs**
- but most important of all.....**

at risk : Health ... over a billion rely on fish as their main or sole source of animal protein, especially in developing countries.

5/11/2009

Source: Ben ten Brink (MNP) presentation at the Workshop: *The Economics of the Global Loss of Biological Diversity 5-6 March 2008, Brussels, Belgium. Original source: Pauly*

15



Ecosystem Losses & Links to MDG's



Federal Ministry for the Environment, Nature Conservation and Nuclear Safety



MDG 1: Eradicate extreme poverty and hunger

MDG 8: Develop a Global Partnership for Development

MDG 5: Improve maternal health

MDG 4: Reduce child mortality

16



Examples : Rewarding Unrecognized Benefits



- **Costa Rican PES** : Payments for Environmental Services are virtually a national strategy for forest and biodiversity conservation and sustainable development
- **Panama Canal** : Insurance firms and shipping companies are financing a 25-year project to reforest the water catchment of the canal to restore freshwater flow to its locks... the fear of loss due to closures of the Canal had been making shipping insurance premiums mount
- **Guyana** : A Private Equity firm recently bought the rights to environmental services from a 370,000 hectare rainforest reserve in Guyana anticipating that its services (water storage, biodiversity maintenance, rainfall regulation, etc) will gain value. *Revenues will be shared 80% with the local community.*

17



TEEB – Phase 2

5/11/2009

18



Ecosystem Services Valued / Not Valued in "Phase I"



Included (8 services)	<p><i>Provisioning services</i></p> <ul style="list-style-type: none"> • Food, fiber, fuel <p><i>Regulating services</i></p> <ul style="list-style-type: none"> • Air quality maintenance • Soil quality maintenance • Climate regulation (i.e. carbon storage) • Water regulation (i.e. flood prevention, timing and magnitude of runoff, aquifer recharge etc.) • Water purification and waste management <p><i>Cultural services</i></p> <ul style="list-style-type: none"> • Cultural diversity, spiritual and religious values, educational values, inspiration, aesthetic values, social relations, sense of place and identity, cultural heritage values • Recreation and ecotourism
Not included (10 services)	<p><i>Provisioning services</i></p> <ul style="list-style-type: none"> • Biochemicals, natural medicines, pharmaceuticals • Ornamental resources • Fresh water <p><i>Regulating services</i></p> <ul style="list-style-type: none"> • Temperature regulation, precipitation • Erosion control • Technology development from nature (bionics) • Regulation of human diseases • Biological control and pollination • Natural hazards control / mitigation (i.e. storm and avalanche protection, fire resistance etc.) <p><i>Cultural services</i></p> <ul style="list-style-type: none"> • Living comfort due to environmental amenities

5/11/2009

19



Ecology & Economics – Focus Areas



Valuation Framework ... more work on

- Ecosystem dynamics
- Thresholds
- Resilience
- Urban biodiversity
- Agricultural biodiversity
- Discount rates as ethical choices

Valuation Methodology more work on

- more ecological services / regulating services of forests (e.g. flood prevention, soil erosion prevention)
- some option values, (e.g. bio-prospecting)
- WTP survey instrument design
- thresholds, ecosystems close to thresholds, and how to factor this into valuation
- benefits of oceanic and coral reef biodiversity
- pollution / health benefits (of urban biodiversity)
- pollination / other benefits (of rural biodiversity)

5/11/2009

20



Coral Reef Biodiversity : Bio-prospecting values ?



Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

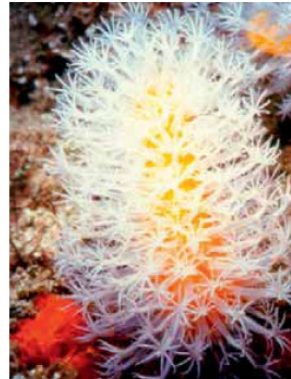
Alzheimer's Disease

*The substance this worm, *Paranemertes peregrina*, uses to paralyze its prey can also serve as a treatment of Alzheimer's disease* © Harbor Branch Oceanographic Institution at Florida Atlantic University



Cancer

This coral produces an anti-cancer drug currently under preclinical investigation © Harbor Branch Oceanographic Institution at Florida Atlantic University



Source : Manfred Waiser / Christian Neumann, June 2008, "The Value of our Oceans", WWF Germany

5/11/2009

21



1-Word Summary of TEEB Phase 2



Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

"Mainstreaming"

22



TEEB – Final Report
Sep 2009, June 2010



Federal Ministry for the Environment, Nature Conservation and Nuclear Safety



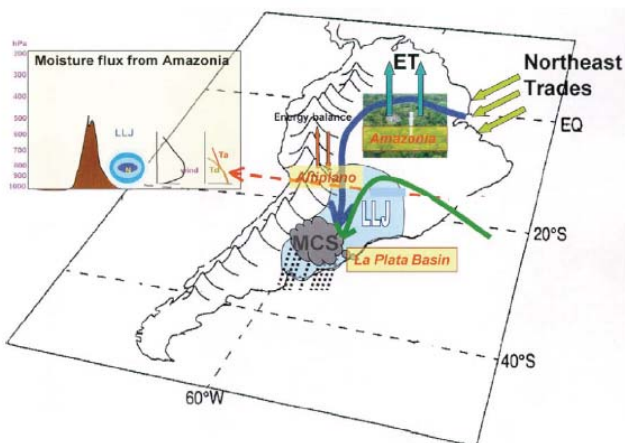
- ➡ Science & Economics Foundations, Policy Costs, & Costs of Inaction
- ➡ Policy Evaluations for Policy-Makers
- ➡ Decision Support for Administrators
- ➡ Business Risks, Opportunities, Impact Metrics
- ➡ Consumer Ownership



Another D1 Challenge : Economic Feasibility of Large-Scale Water PES ?



Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

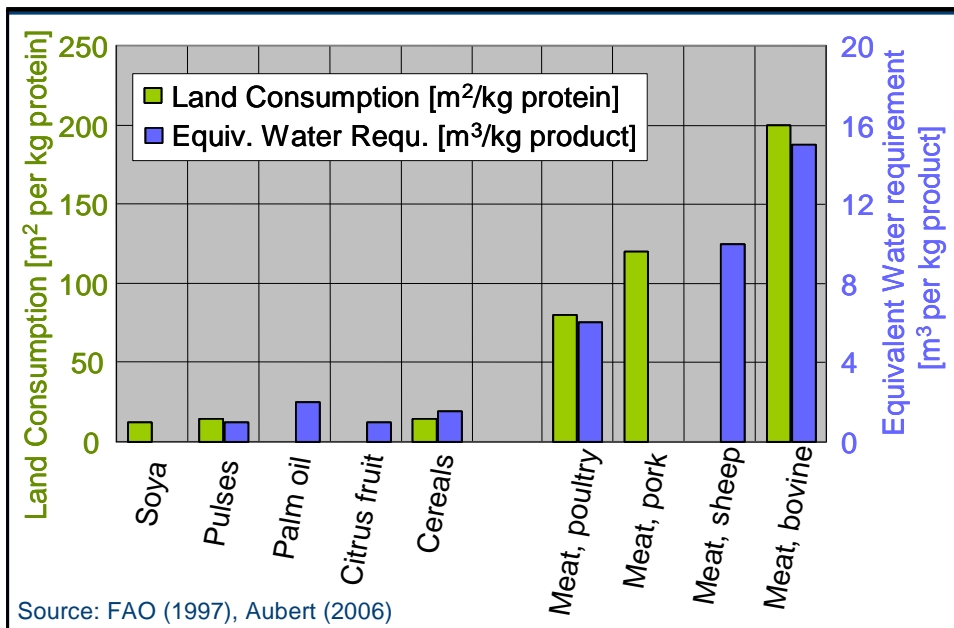


**Amazon Rainforest
“Water Pump”**

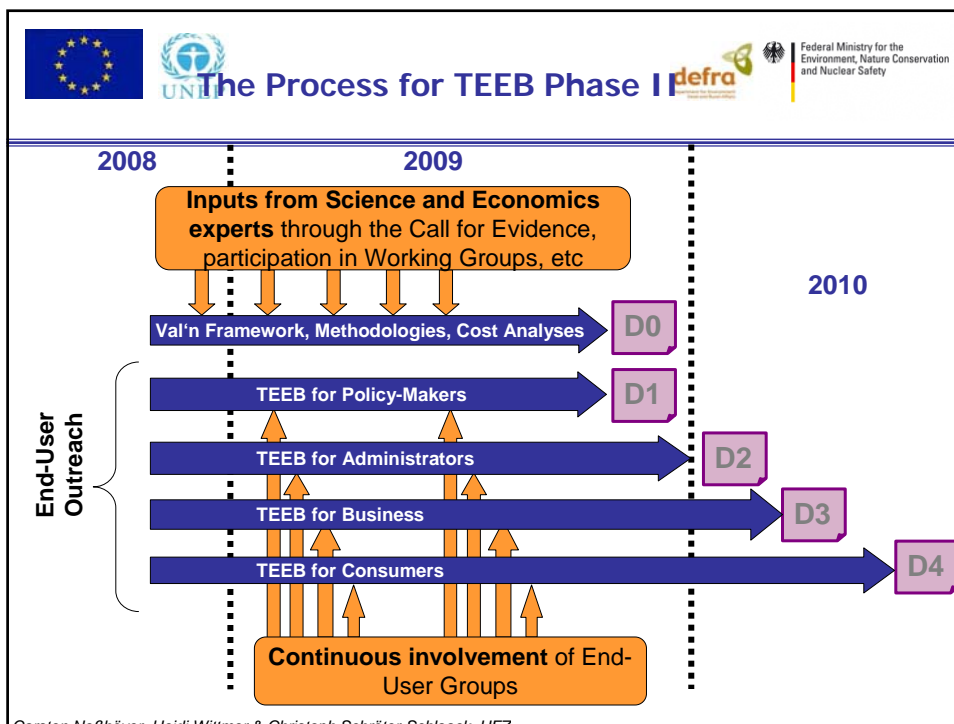
Evapo-transpiration puts 20 billion tonnes of water into the atmosphere daily, some of which falls as rain in the Rio Plata Basin...

Marengo et al. 2004, Journal of Climate

(Global Canopy Programme & Canopy Capital Ltd, 2008)



Consumer Theme : Ecological Footprints - Land and Water use by various foods





Thank You !