Ecosystem Services

Nature's Subsidies to Society and the Economy

Development Alternatives

Ecosystem services

Provisioning

Goods produced or provided by ecosystems

Regulating

Benefits from regulation of ecosystem processes

Cultural

Non-material benefits from ecosystems

Development Alternatives

Caring for the Environment

NOT a Tax on Development

-- it is in fact

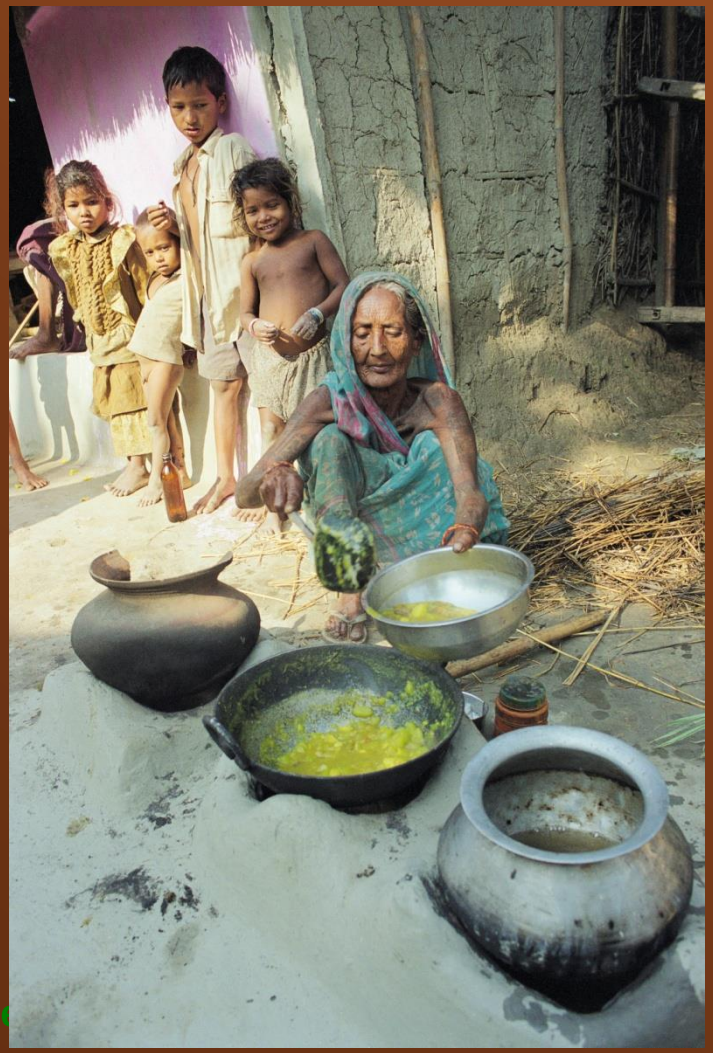
An Excellent Investment to Accelerate it.

Jobs

*

- Tourism
- Commodities
- Extractors
- Industries
- Traders
- Bankers
- Government
- NGOs

Everyone Needs the Services Provided by Ecosystems



Cyano-Bacteria

*

the Creators of the Earth's Atmo-sphere

Ganoderma lucidum – Nature's Immunologist

Development Alternatives

Pollination

*

Wild Plants

and

Crops

Development Alternatives

Biological Pest Control

Traditional Medicines

Development Alternatives

Seed Dispersal

Nature's Chemical Factories

Development Alternatives

Development Alternatives

Nature's Food and Water Factories

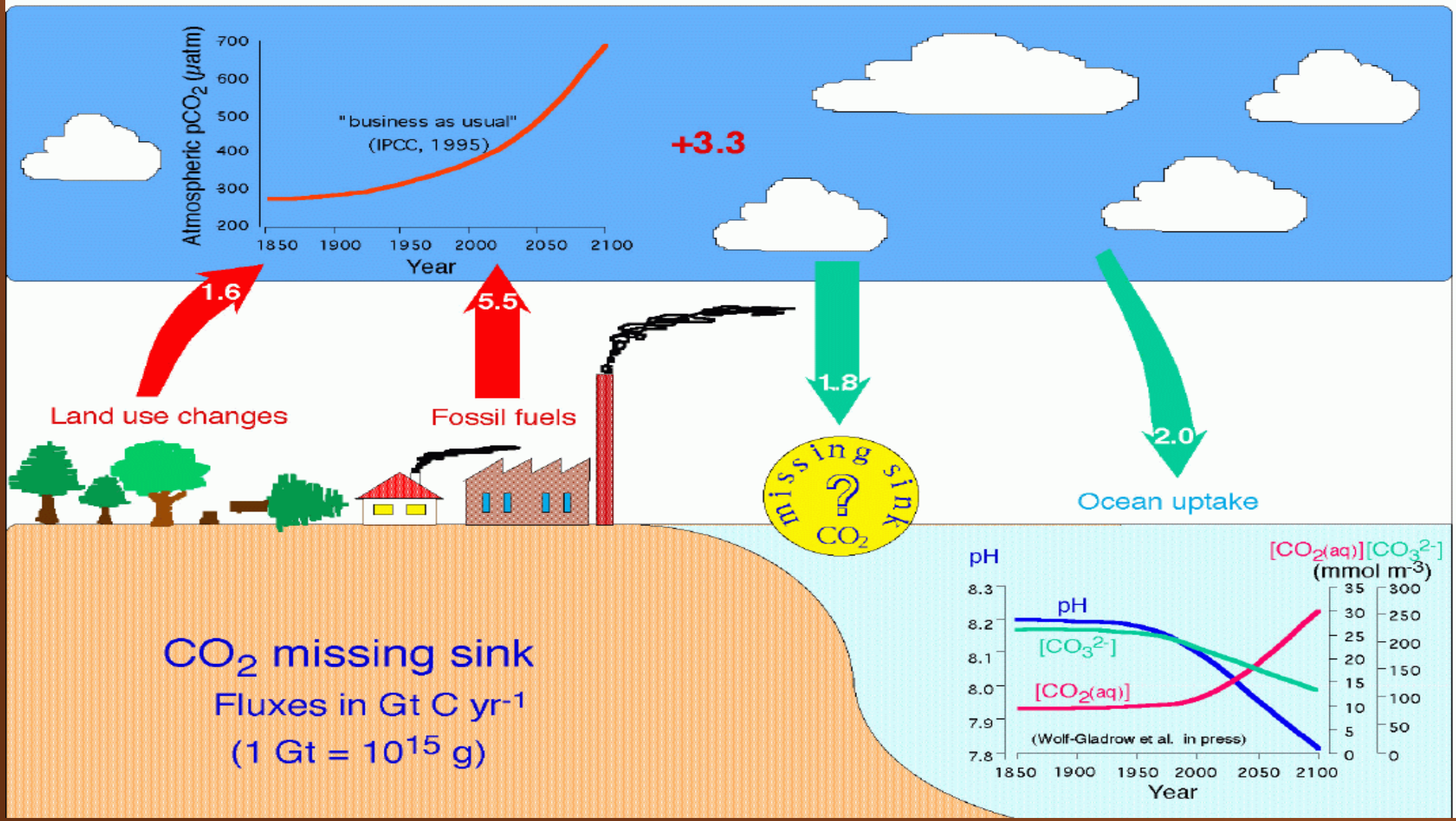
Traditional Rice Varieties for Salty Soils

Development Alternatives

Development Alternatives

Salicornia

Anthropogenic perturbations of the global carbon cycle



Development Alternatives

Biogeochemical Cycles

Development Alternatives

Natural Reservoirs

Glaciers for Year Round River Flows

Development Alternatives

Wetlands – Balancing Water Cycles

Development Alternatives

Welwitschia Mirabilis

Development Alternatives

Science

Development Alternatives

Aesthetic Beauty and Inspiration

And Many, Many Others

Including:

- **Mitigation of Floods and Drought**
- **Storm Protection**
- **Regulation of Climate**
- **Nurturing Biodiversity**
- **Refuge for Migratory Species**
- **Etc, etc**

Ecological Services

How Big?

What Value?

For Whom?

Which Priorities?

The Paradoxes of Economics

- If it is not quantified, even if its value to planetary survival is ∞, it is worth 0
- Depreciation applies to engineering capital, but not to natural capital

Water Supply for New York City circa 1997

Water Treatment Plant

Development Alternatives

Water Treatment Plant?

Development Alternatives

6.5 Billion Dollars

+ 300 Million Every Year

Development Alternatives

Development Alternatives

700 Million Dollars - One Time Investment

o

New York City: Value of Waterworks

Catskills: US $ 0.7 Billion

Engineered: US $ 6.5 Billlion

(Plus US$ 0.3 Billion/year)

Saving: US $ 6 Billion

Date: 1997

Estimated by: City of New York

Development Alternatives

Floods Cost Billions in the North and the South

UK Flood Costs Today:

US $ 2 Billion per Year

Australia: Value of Pollination

Amount: **US $ 1.3 Billion**

Date: **2000**

Estimated by: **Rural Industries Research and Development Corp, Govt of Australia**

35 % of human food comes from plants pollinated by wild pollinators

100,000 species of bats, bees, beetles, birds, and butterflies – plus flies and moths -- provide *free* pollination services

USA: Value of Pollination

Amount: US $ 5.7 to 8.3 Billion

Value of Crops: US $ 24 Billion

Ref: Ecological Society of America

Replacement of Chemical Pesticides Saves Money – and Lives

2000 Estimate of Replacement Value:

US $ 54 Billion per year.

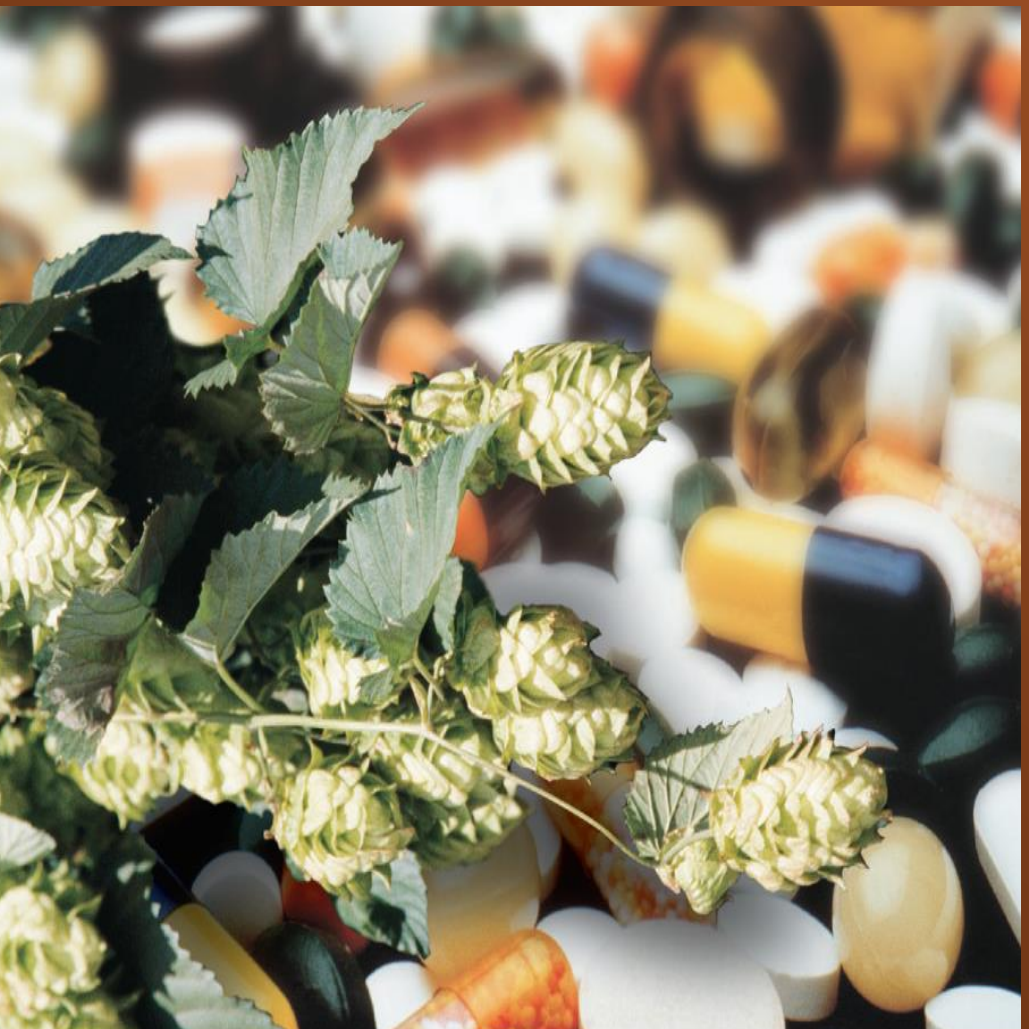
(Not Including Health Costs Saved)

Development Alternatives

Pharmacy

Development Alternatives

40 % of Pharmaceuticals derived from Natural Products. Including 9 out of Top 10



2003 Sales of Pharmaceuticals:

US $ 480 Billion

World: Value of Ecological Services

Best Estimate: US $ 33 Trillion

Range: US $ 16 to 54 Trillion

Date: 1999

Estimated by: 18 International Economists from the US, Netherlands and Argentina

Published by: Nature

World: Value of Ecological Services (Trillion US Dollars) - How

Nutrient Cycling	17.0	
Climate/Atmosphere	3.7	
Culture	3.0	
Water	2.8	
Waste Treatment	2.3	
Raw Materials		1.4
Miscellaneous	2.1	
TOTAL	33.3	

World: Value of Ecological Services (Trillion US Dollars) - Where

Coastal Zones	12.6
Open Ocean	8.4
Wetlands	4.9
Forests	4.7
Lakes/Rivers	1.7
Miscellaneous	1.0
TOTAL	33.3

Global GDP in 1997

Approximately
US $ 20 Trillion

$ 33 Trillion !

Without Any of the Intrinsic Value !!

$ 33 Trillion !

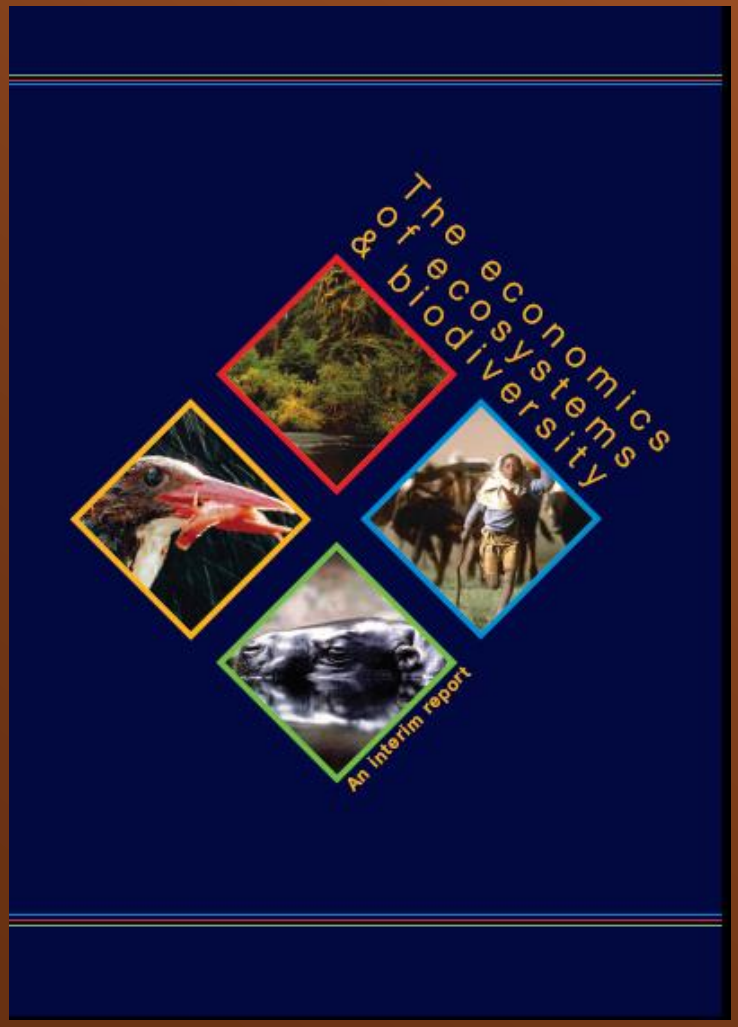
But where is all this value going?

Who is getting the Benefits?

and

Who bears the Costs?

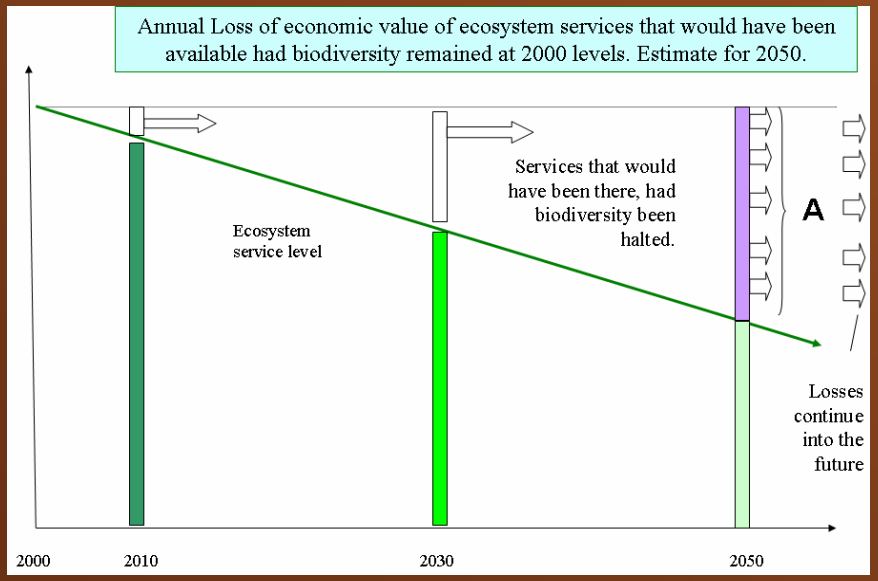
TEEB – Interim Report
Three Key Messages



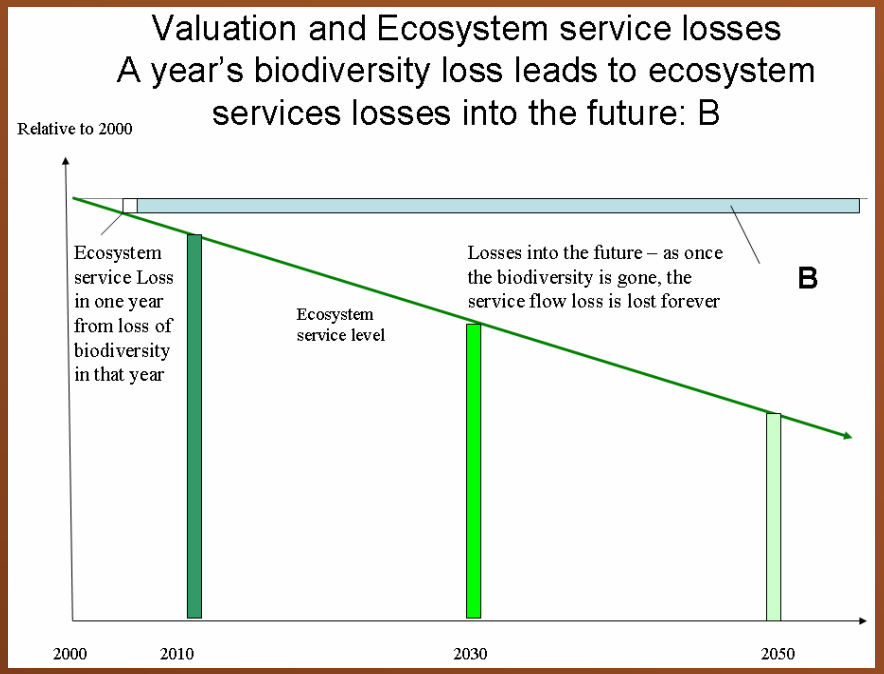
- Economic Size & Welfare Impact of Losses is huge
- Strong link with Poverty & risk of MDG's failure
- Discount rates are *ethical* choices

Losses in 'PV' terms…
('COPI' study, May 2008)

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



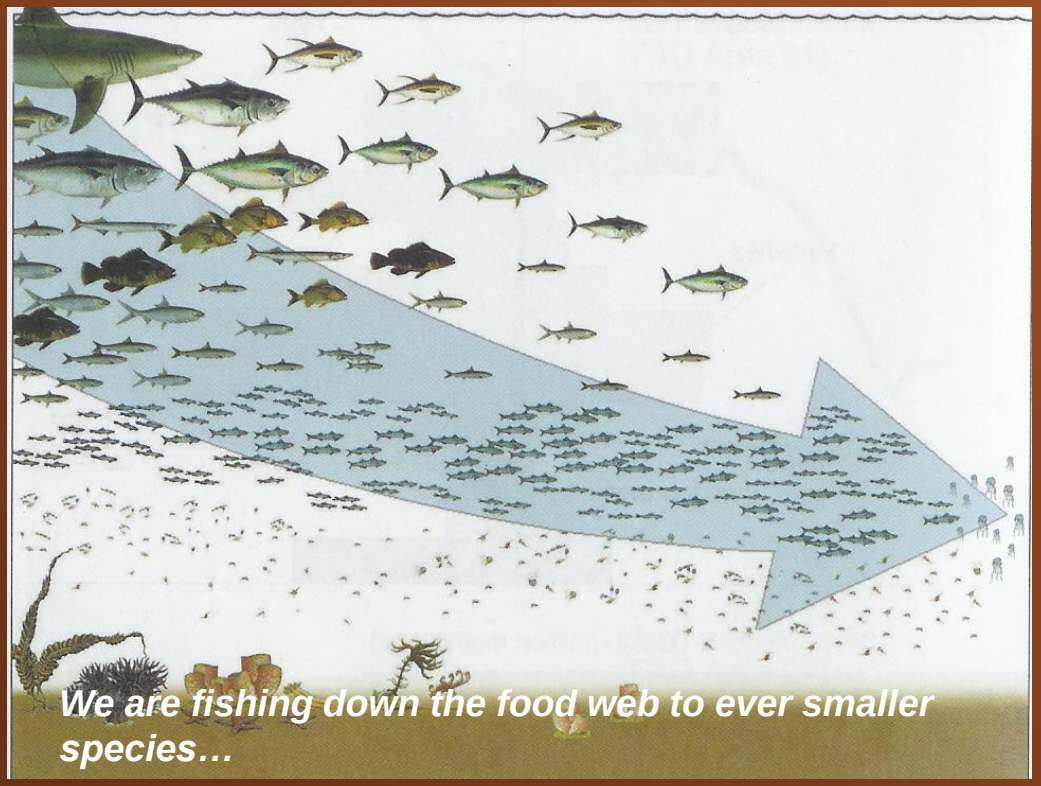
B : Natural Capital Loss every year



Welfare losses equivalent to 7 % of GDP, horizon 2050

Natural Capital Lost : Annually EUR 1.35 x 10^{12} to 3.10 x 10^{12}

Global Loss of Fisheries…
Human Welfare Impact



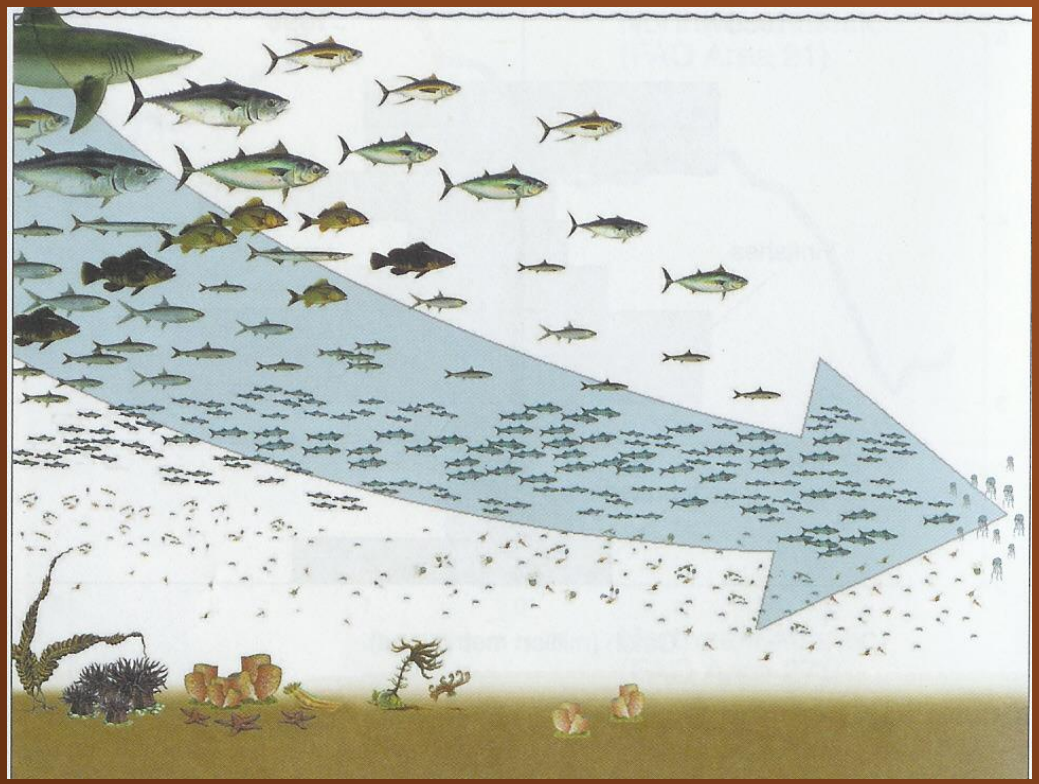
- **Open Access & Perverse Subsidies are key drivers of the loss of fisheries**
- **Half of wild marine fisheries are fully exploited, with a further quarter already over-exploited**
- ***at risk : $ 80-100 billion income from the sector***
- ***at risk : est. 27 million jobs***
- ***but most important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

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

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

Global Loss of Fisheries…

Is there a Solution ?
(see TEEB – D1, out in November)



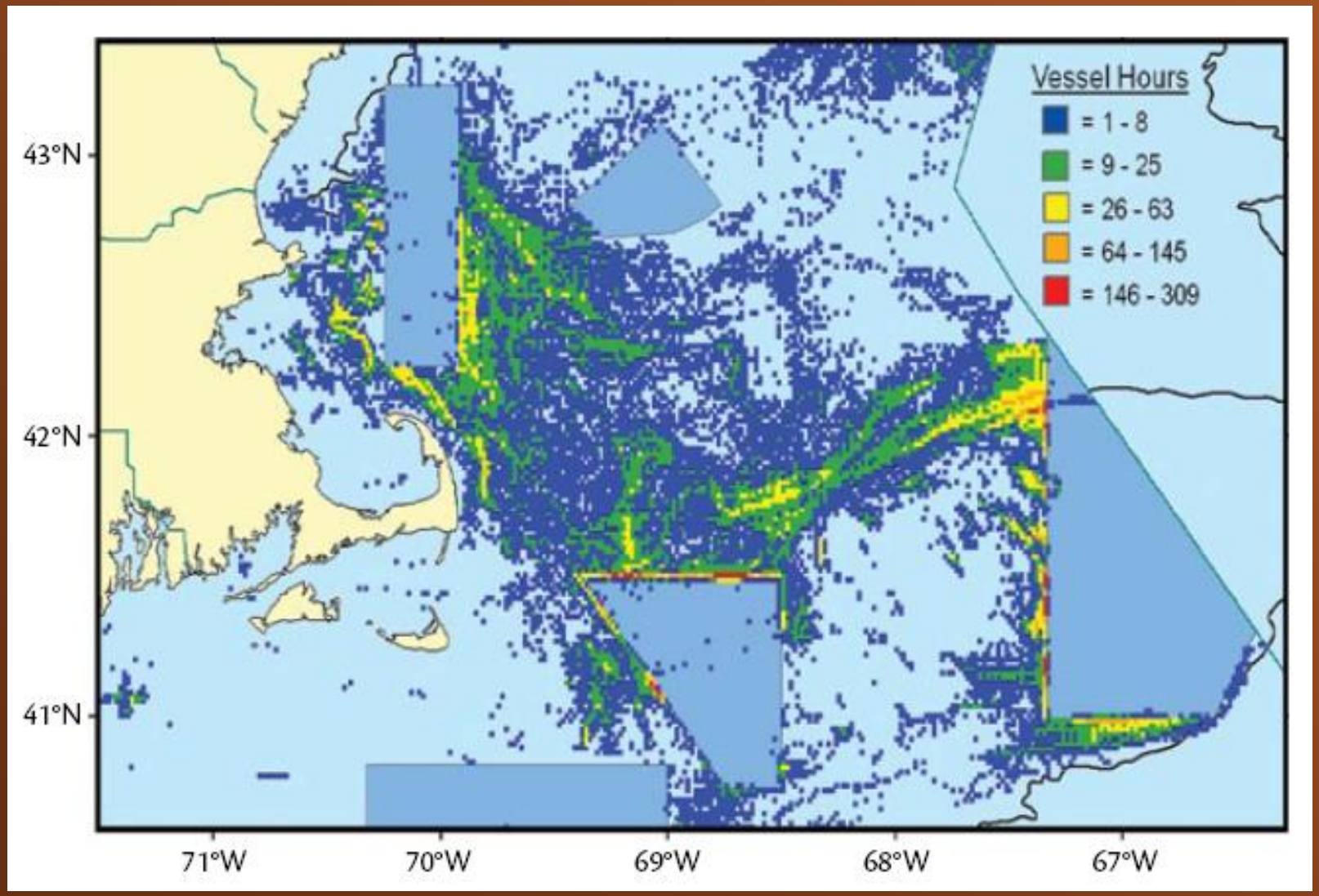
Is there evidence that reserves work ?

We are fishing down the food web to ever smaller species…

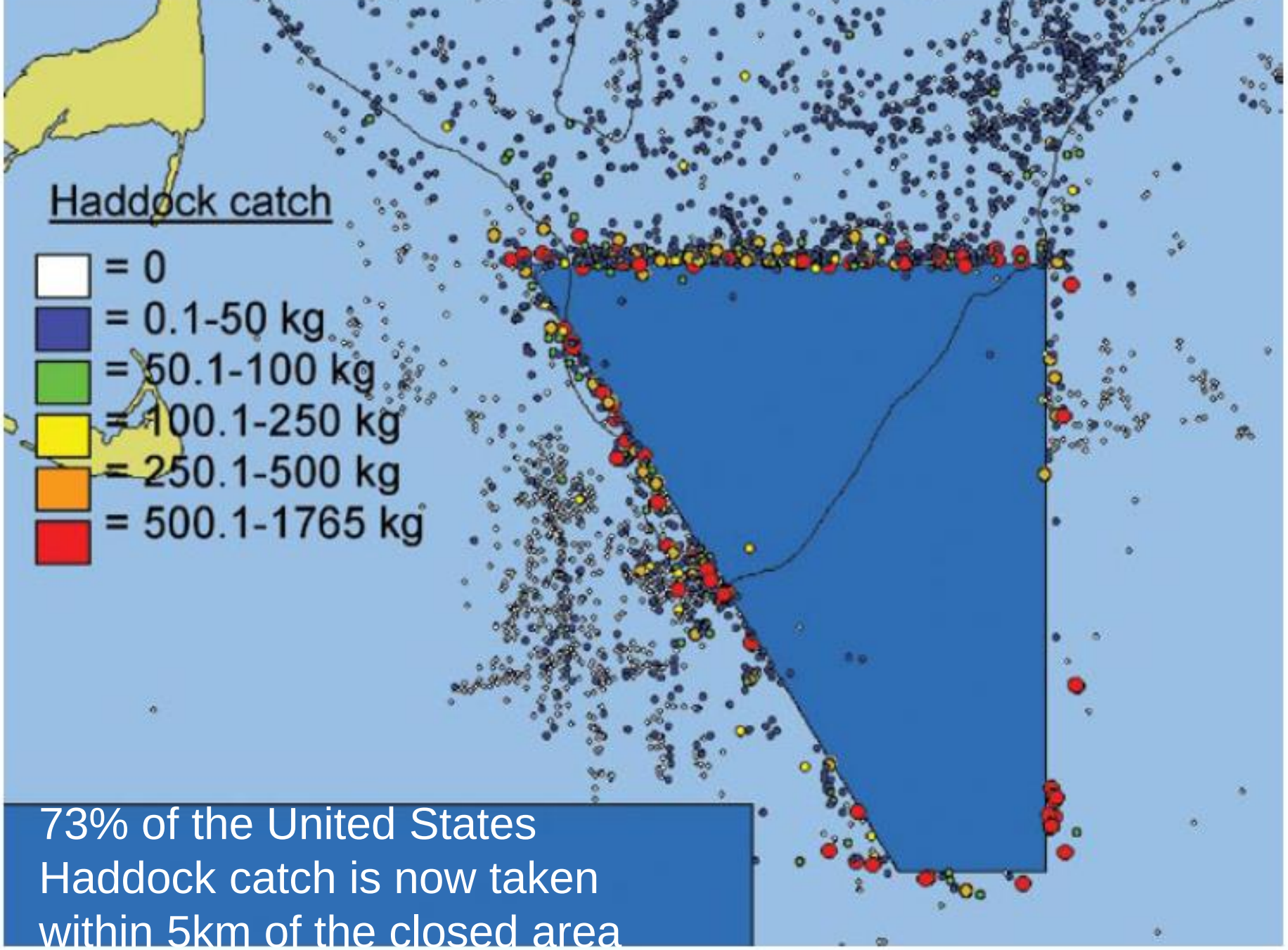
Reserves all over the world show dramatic increases in spawning stocks

(Source : Prof. Callum Roberts, University of York)

Eg : Distribution of fishing effort around Georges Bank closed areas



Source: Fogarty et al. (2007)



73% of the United States Haddock catch is now taken within 5km of the closed area boundaries

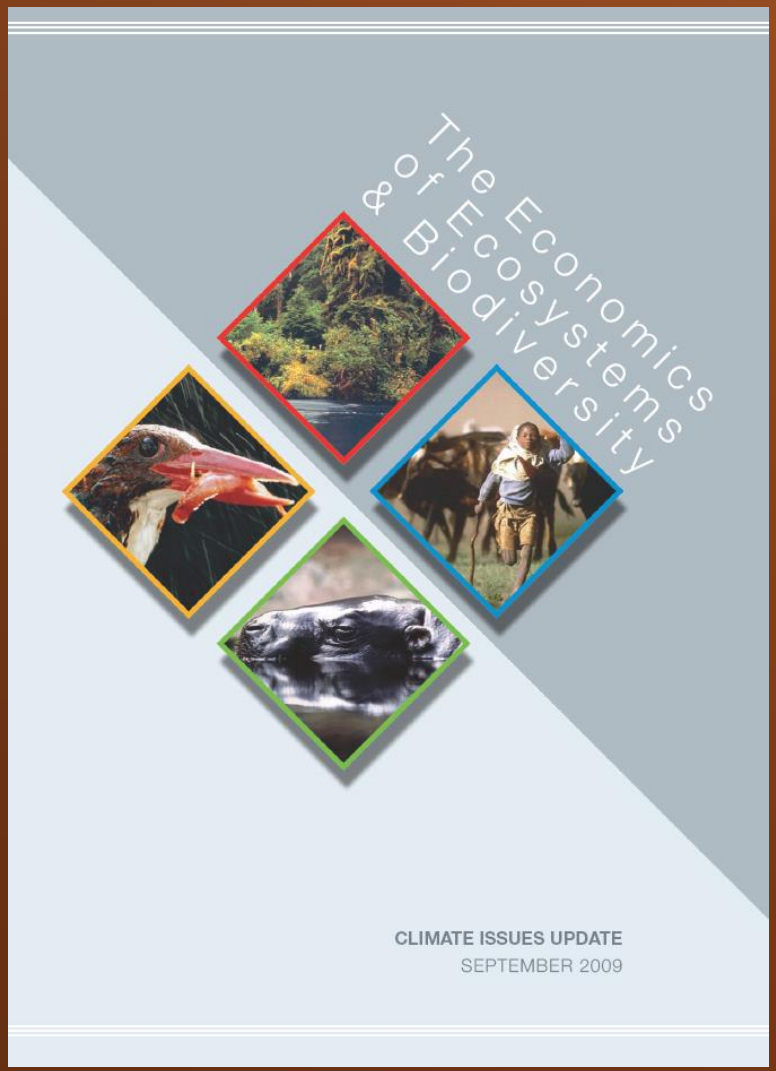
Source: Murphy et al. (2007)

TEEB Phase 2
Nov 2009 – August 2010

- Science & Economics Foundations, Policy Costs, & Costs of Inac
- Policy Evaluation for Policy-Makers
- Decision Support for Business Risks & Opportunities
- Administrators
- Citizen & Consumer Ownership

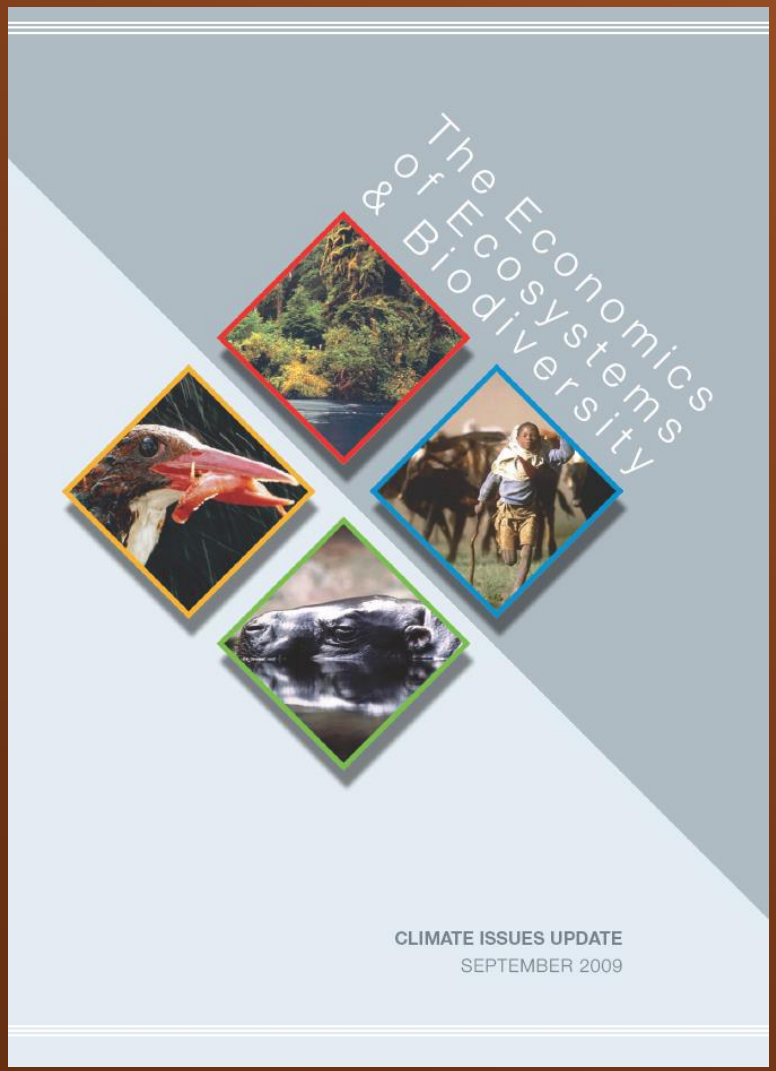
TEEB Outreach
Role of “D0” …

TEEB – D1
(Advance Instalment !)
“Climate Issues Update”



- **Coral reef emergency**
- **Forest carbon for climate mitigation**
- **National accounting for forest carbon**
- **Ecosystem investment for climate adaptation**

TEEB -
Climate Issues Update



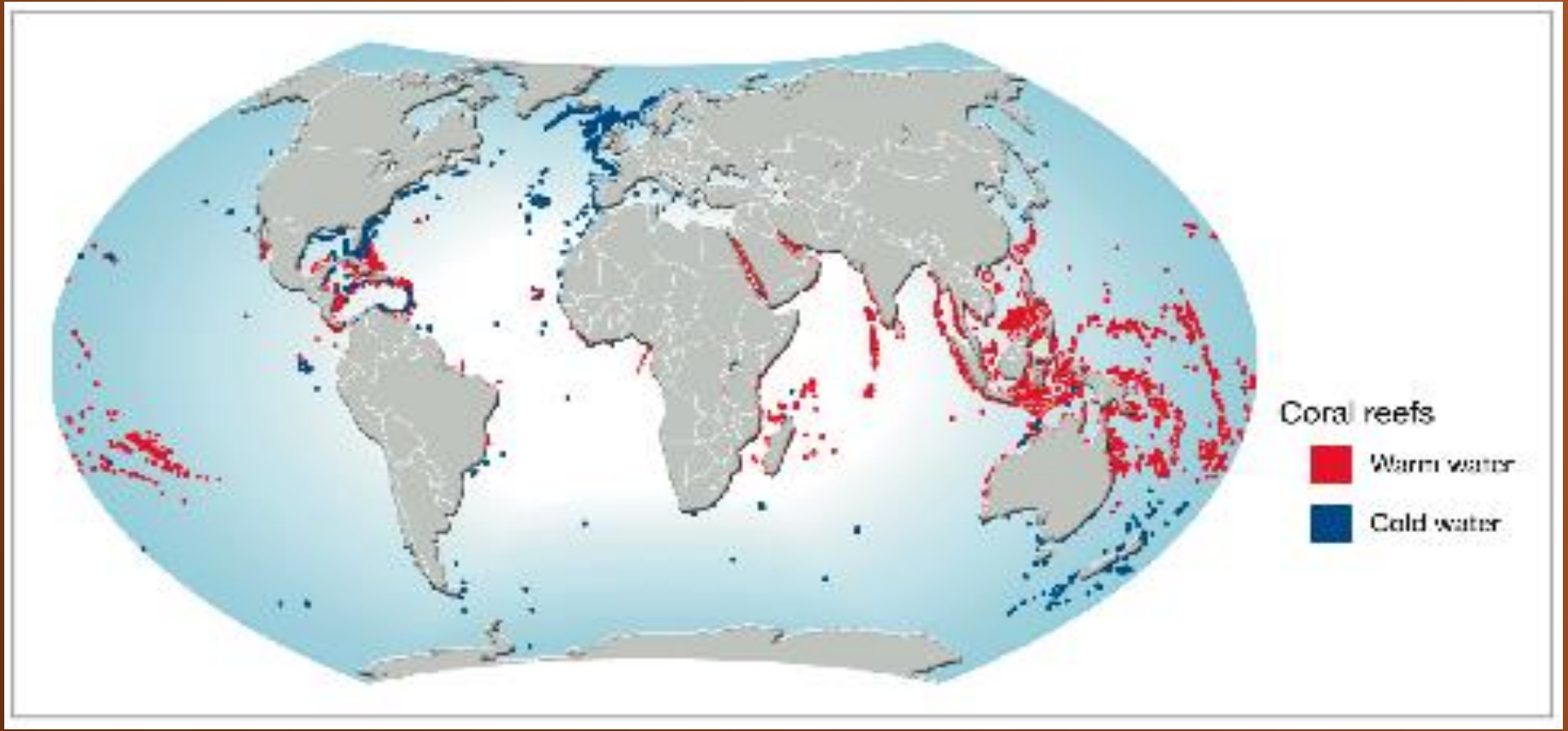
Coral reef emergency

Forest carbon for climate mitigation

National accounting for forest carbon

Ecosystem investment for climate adaptation

Coral Reefs…



Coral Reef Valuations are very high…but is this relevant…?

Table 1: Benefits from ecosystem services in coral reef ecosystems

CORAL REEFS	Value of ecosystem services (in US$ / ha / year – 2007 values)		
Ecosystem Service	**Average**	**Maximum**	**Number of Studies**
Provisioning services			
Food	470	3,818	22
Raw materials	400	1,990	5
Ornamental resources	264	347	3
Regulating services			
Climate regulation	648	648	3
Moderation of extreme events	25,200	34,408	9
Waste treatment / water purification	42	81	2
Biological control	4	7	2
Cultural Services			
Aesthetic information / Amenity	7,425	27,484	4
Opportunities for recreation and tourism	79,099	1,063,946	29
Information for cognitive development	2,154	6,461	4
Total	**115,704**	**1,139,190**	**83**
Supporting Services			
Maintenance of genetic diversity	13,541	57,133	7

Note: these estimates are based on ongoing analyses for TEEB (TEEB Ecological and Economic Foundations, Chapter 7). As the TEEB data base and value-analysis are still under development, this table is for illustrative purposes only.

WHAT WE THINK CORAL REEFS LOOK LIKE….

WHAT THEY ACTUALLY LOOK LIKE….

Coral Reef Valuations & Thresholds…

- Tropical Coral Reefs are at a threshold of irreversibility
- Remember …..“Economics is mere weaponry, its targets are ethical choices”
- Ethical choice coming up : Stabilization Targets …

@ 450 ppm CO_2

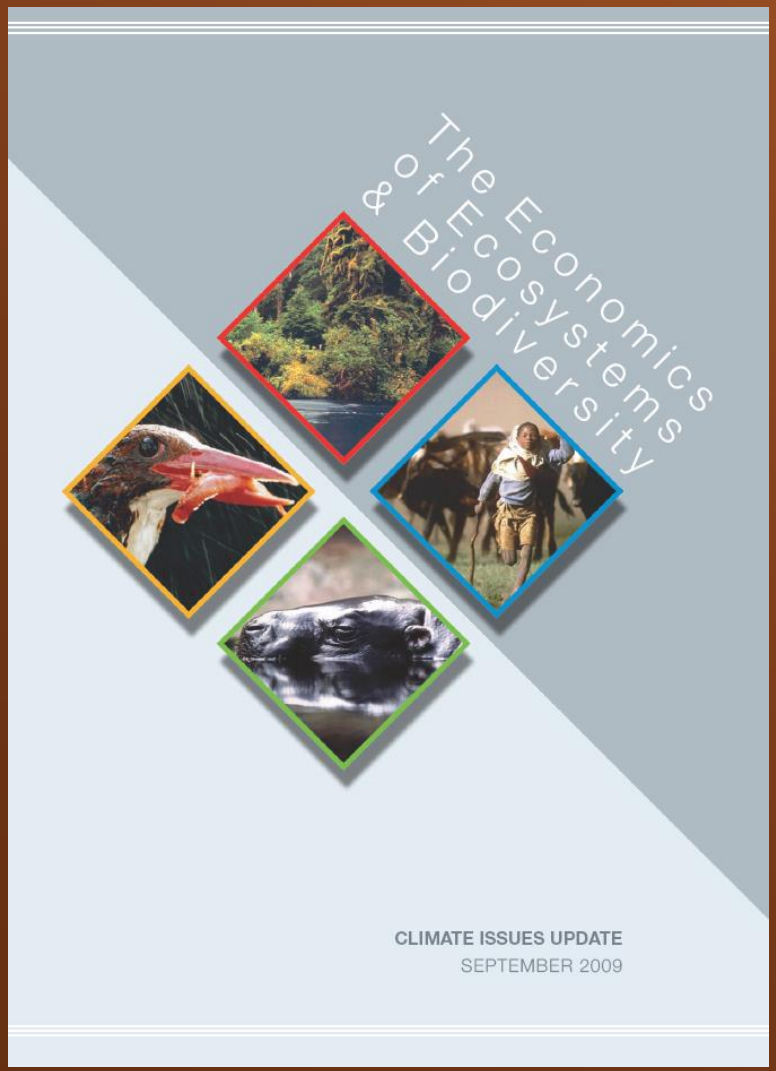
(no Tropical Coral Reefs in 10-40 yrs)

OR

@ 350 ppm CO_2 ?

(Tropical Coral Reef may survive in the long term….)

TEEB -
Climate Issues Update



Coral reef emergency

Forest carbon for climate mitigation

National accounting for forest carbon

Ecosystem investment for climate adaptation

Tropical Forests of the World…. Largest Terrestrial Carbon Sinks

- ❖ store a fourth of all terrestrial carbon (Trumper et al, 2009)
- ❖ capture up to 4.8 Gt CO2 annually (Lewis & White, 2009)