

Ecosystem Services

UNEP-IUCN Roundtable

World Conservation Congress

Bangkok

18 November 2004



Development Alternatives

Ecosystem Services

***Nature's Subsidies
to Society
and the Economy***



Caring for the Environment

***NOT a Tax on
Development***

-- in fact it is

***An Excellent Investment
to Accelerate it.***





Ecosystem services

Provisioning

Goods produced or provided by ecosystems



Regulating

Benefits from regulation of ecosystem processes



Cultural

Non-material benefits from ecosystems





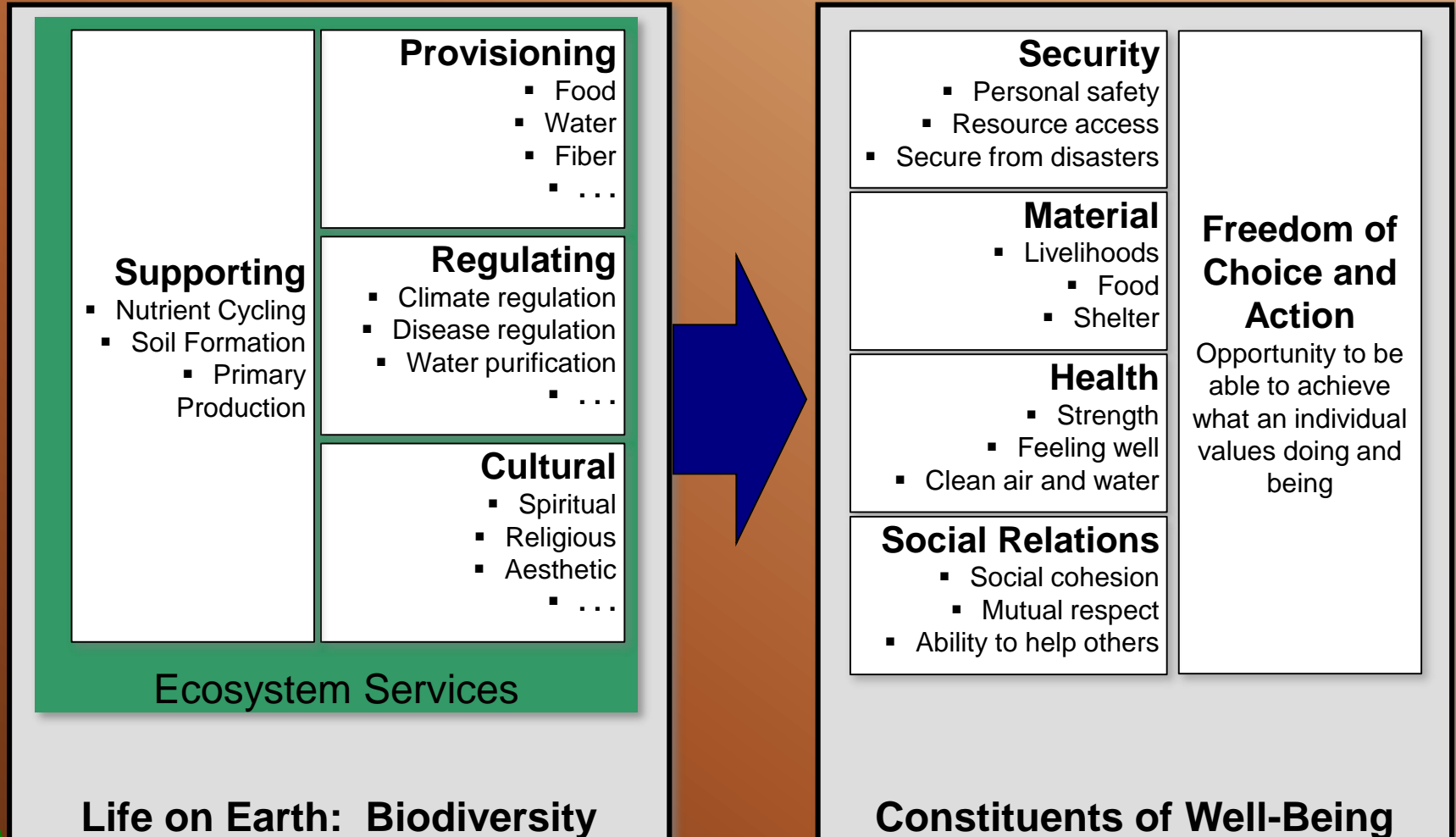
The balance sheet

| | Enhanced | Degraded | Mixed |
|---------------------|---|--|--|
| Provisioning | Crops Livestock Aquaculture Carbon sequestration | Capture fisheries Wild foods Wood fuel Genetic resources Biochemicals Fresh Water Air quality regulation Regional & local climate regulation Erosion regulation Water purification Pest regulation Pollination Natural Hazard regulation Spiritual & religious Aesthetic values | Timber Fiber Water regulation Disease regulation Recreation & ecotourism |
| Regulating | | | |
| Cultural | | | |

**Bottom Line: 60% of Ecosystem
Services are Degraded**



Linking Ecosystem Services to Human Well-Being



Caring for the Environment

***NOT a Tax on
Development***

-- it is in fact

***An Excellent Investment
to Accelerate it.***





**Earthworms: More Soil
Fertility than all Chemicals**



Development Alternatives

Nature's Subsidies

Can Be Very Large

— *but*

Not Always Noticed





**Algae – Give More Oxygen
than All Forests**



Development Alternatives

Some Ecosystem Services

- **Widely Known by the Public**
 - *Ex: Regulation of Water by Forests*
- **Well Understood by Scientists**
 - *Ex: Sourcing of Raw Materials from Nature*
- **Wisely Handled by Decision Makers**
 - *Ex: Stratospheric Ozone Shield*





Forests: Regulation of Water and Oxygen



Development Alternatives



**Raw Materials
from Nature**

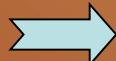


Development Alternatives

Basic Life Supports Critical for Survival

- Oxygen in the Atmosphere
- Fresh Water on/in the Ground
- Climate Control for the Planet

Value  ∞

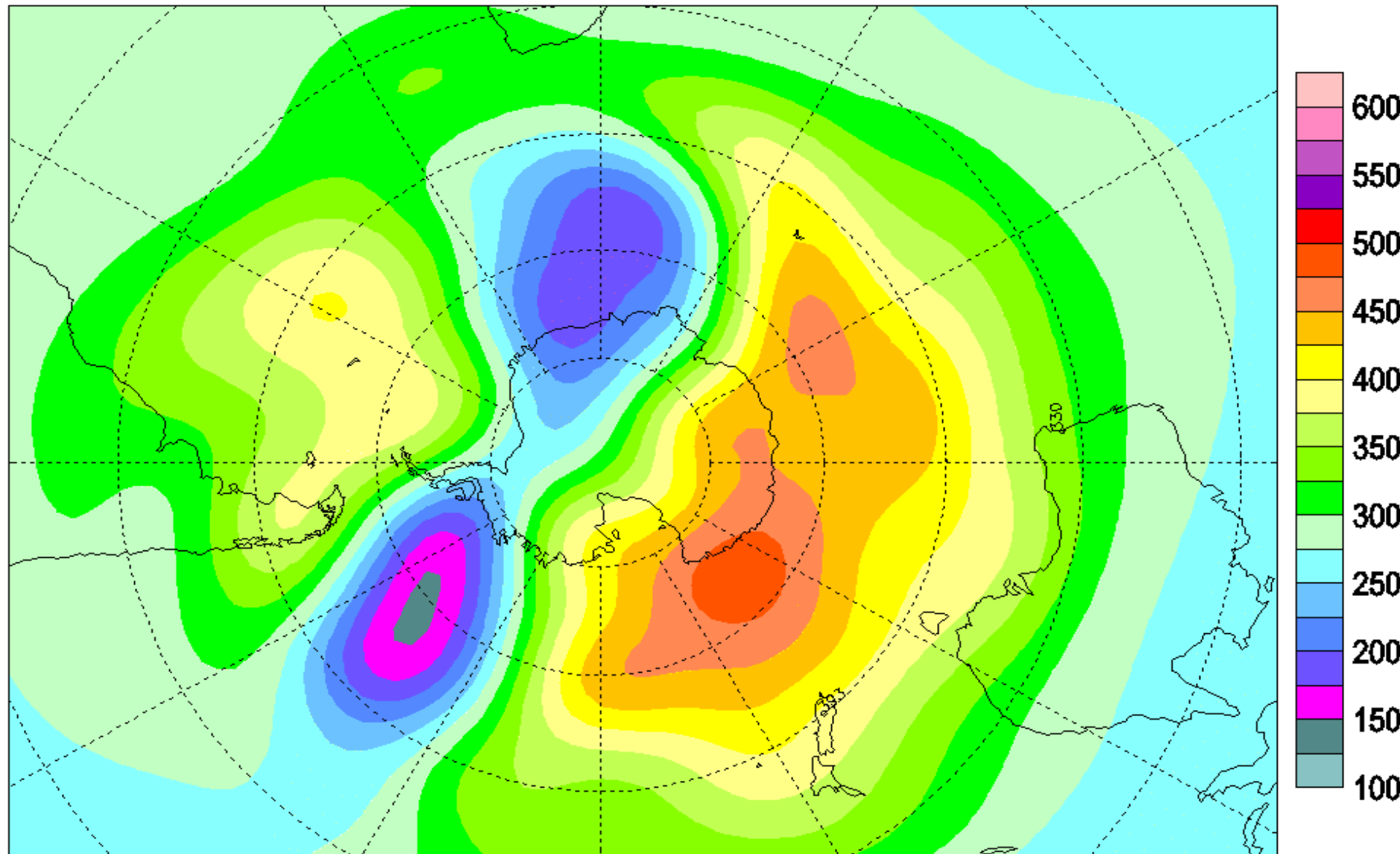
Price  0



Other Ecosystem Services

- Undervalued
- Ignored
- Not Recognised At All





Ecosystem Services

Are Also of Great Economic Value

At Virtually No Cost, They Provide :

- **Basic Needs and Livelihoods**
- **Food and Medicine**
- **Raw Materials and Energy**
- **Removal of Wastes**
- **Environmental Balance**



Human Security



Ecosystem Services for the Poor – “Ecosystem People”



Basic Needs

- **Water**
- **Food**
- **Fuel**
- **Fodder**
- **Fiber**
- **Medicines**
- **Sanitation**
- **Materials**





Water



Mushrooms

*

full of
Protein
and
Minerals

Food





Development Alternatives

Cooking Fuel



Fodder



Development Alternatives



Development Alternatives

Fiber



Development Alternatives

Medicines



Development Alternatives

Construction Material



Development Alternatives

Waste Treatment



Development Alternatives

Water Stressed Life



Desert Clover



Development Alternatives



Life Saving Dew



Development Alternatives



Livelihoods

- Agriculture
- Mini Industries
- Crafts
- Services
 - Energy
 - Water
 - Construction
 - Traditional Medicine



Development Alternatives

Growing Food



Development Alternatives

Collecting Coconuts



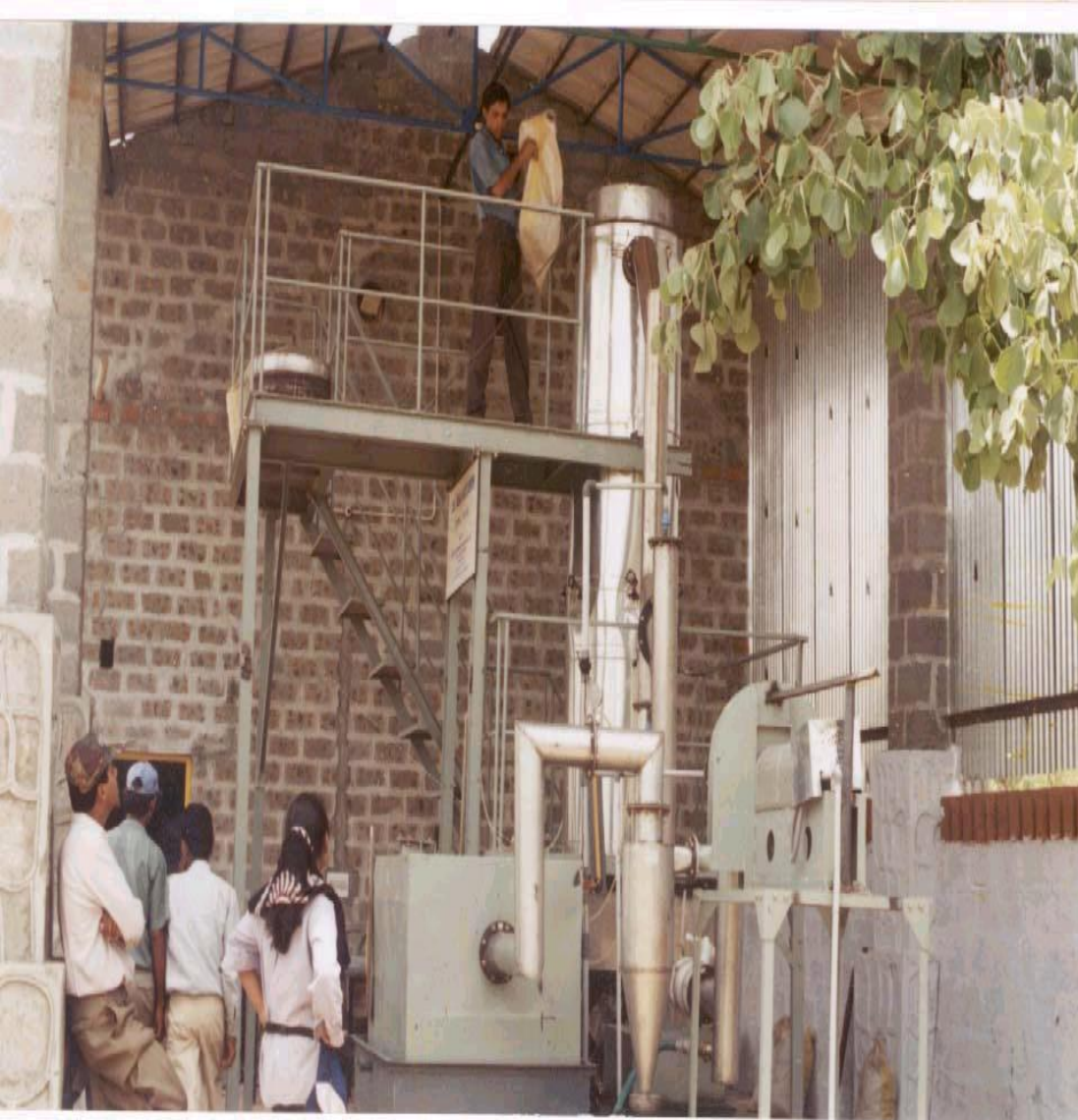
Development Alternatives

Catching Fish



Development Alternatives

Beating Coir



Power Station Fueled by Local Biomass



Development Alternatives

Ipomea

**The
Shame-
less
One**



Exotics and Weeds



Development Alternatives



**for
70%
of
Asia
&
Pacific**

**And what about the Rich – the
“Biosphere People”?**



**The
Other
30%**



Developme



Shiitake Mushrooms



Development Alternatives



Development Alternatives

Fish at the Market



Development Alternatives

Pharmacy



Development Alternatives

Pharmaceuticals

Traditional Medicines





Mahogany



Hickory



Cherry



Yew



Iroko



Oak



Walnut



Larch

Variety



Development Alternatives





Development Alternatives

Recreation and Sports



Ecotourism



Development Alternatives



Jewels of Nature



Development Alternatives



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



Development Alternatives

**Ganoderma lucidum –
Nature's Immunologist**



Pollination

*

**Wild
Plants
and
Crops**



Development Alternatives

Biological Pest Control



Development Alternatives

Seed Dispersal



Nature's Chemical Factories



Development Alternatives



Nature's Food and Water Factories



Development Alternatives



Traditional Rice Varieties for Salty Soils



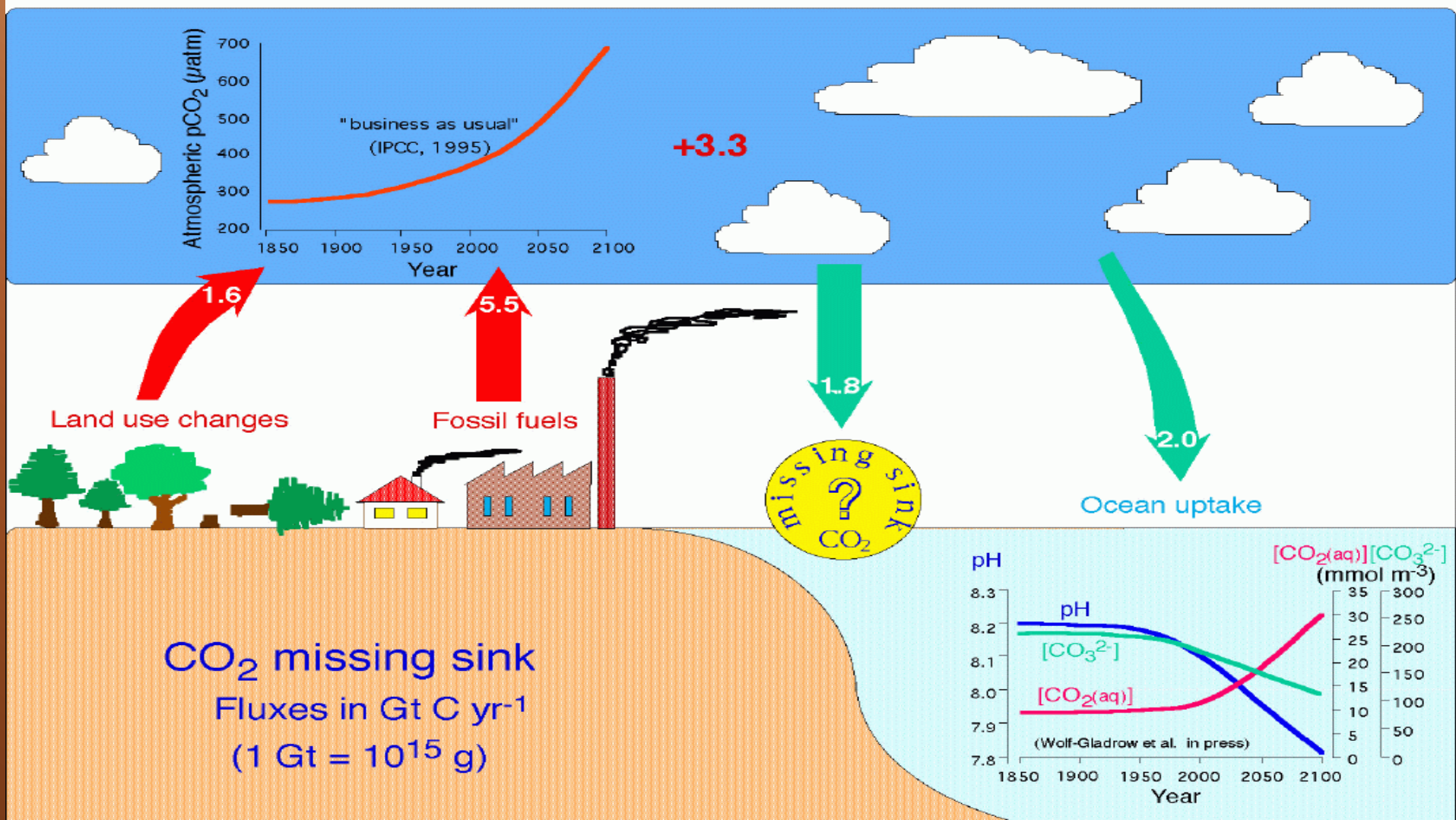
Development Alternatives



Development Alternatives

Salicornia

Anthropogenic perturbations of the global carbon cycle



Biogeochemical Cycles





Development Alternatives

Natural Reservoirs



Glaciers for Year Round River Flows



Development Alternatives



Wetlands – Balancing Water Cycles



Development Alternatives



Welwitschia Mirabilis





Aesthetic Beauty and Inspiration



Development Alternatives

And Many, Many Others

Including:

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





People in Harmony with Nature



Development Alternatives

But Ecosystems are Fragile!

**Their Processes
are easy to
Disrupt
and even to
Destroy**





**How do We
Disrupt the
Services
Provided by
the
Ecosystem
?**



**Bad Land Use Leading to
Erosion and Siltation**



Development Alternatives



Development Alternatives

Indiscriminate Logging



Removal of Protective Vegetation



Development Alternatives



Development Alternatives

Deforestation



Creating Deserts



Overuse of Toxic Chemicals



Development Alternatives



**Runoff of Pesticides, Fertilizer,
Sewage and Wastes**



Development Alternatives



Alien Species



Development Alternatives



Overfishing



Development Alternatives



Endangered Species



Development Alternatives



**Urban
Sprawl**

**Roads
and
Highways**



- **Air Pollution**
- **Acid Rain**
- **Toxic Wastes**



Development Alternatives

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 Treatment Plant?



Development Alternatives



Water Treatment Plant?



Development Alternatives

New York City: Value of Waterworks

Catskills: US \$ 0.7 Billion

Engineered: US \$ 6.5 Billion

(Plus US\$ 0.3 Billion/year)

Date: 1997

Estimated by: City of New York





6.5 Billion Dollars

+ 300 Million Every Year



Development Alternatives



Development Alternatives

**700 Million Dollars -
One Time Investment**

New York City: Value of Waterworks

Catskills: US \$ 0.7 Billion

Engineered: US \$ 6.5 Billion
(Plus US\$ 0.3 Billion/year)

Saving: US \$ 6 Billion

Date: 1997

Estimated by: City of New York



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)**



**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 Dollars, US) - 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 Dollars, US) - 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

Approximately
US \$ 20 Trillion



Third World

Virtually *No*

- Data
- Research
- Awareness
 - ❖ Academic or Official



How Much do Ecosystem Services Contribute to National Economies?



Who gets the Benefits?

And

Who bears the Costs?





**The
70%
?**

**Or
the
30%
?**



Developme

Policy Interventions Needed

- **National Accounting System**
 - **Green Accounts (include Nature's Subsidy)**
 - **Balance Sheet (separate Assets & Income)**



Policy Interventions Needed

- **National Accounting System**
 - **Green Accounts (include Nature's Subsidy)**
 - **Balance Sheet (separate Assets & Income)**
- **Institutions of Governance**
 - **Local, Decentralised Decision-Making**
 - **Community Ownership of Resources**
 - **Strong Regional Participative Planning**



Research Needed

- **Research**
 - **How Much are Eco Services Worth?**
 - **Who Benefits and Who Pays for them?**
 - **How is Indigenous Knowledge included?**



Research Needed

- **Research**
 - **How Much are Eco Services Worth?**
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- **Development**
 - **Sustainable Technologies**
 - **Zero Emission Initiatives**



And Action!



Wide Spectrum of Action

Conserve Biospheric:

- Species
- Habitats
- Processes

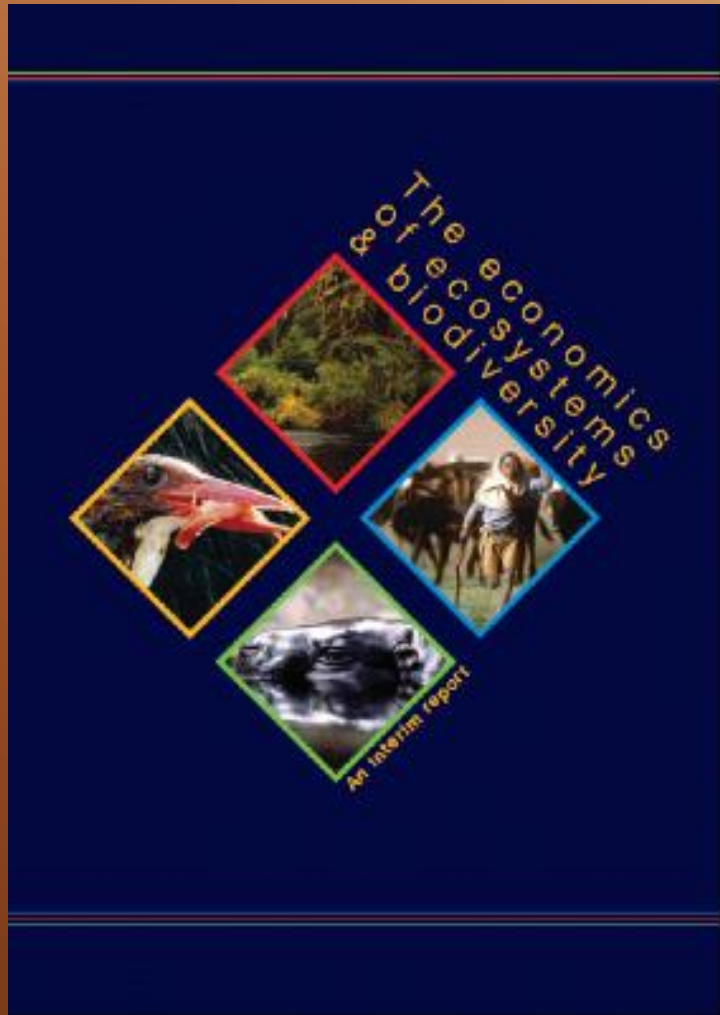
Produce and Consume

- Eco-efficiently



TEEB – Interim Report

Three Key Messages



Economic Size & Welfare Impact of Losses is huge



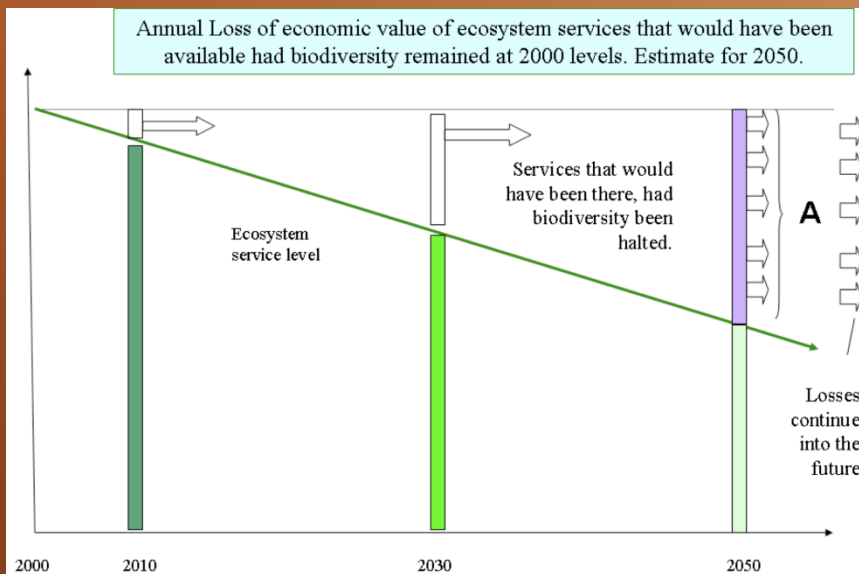
Strong link with Poverty & risk of MDG's failure



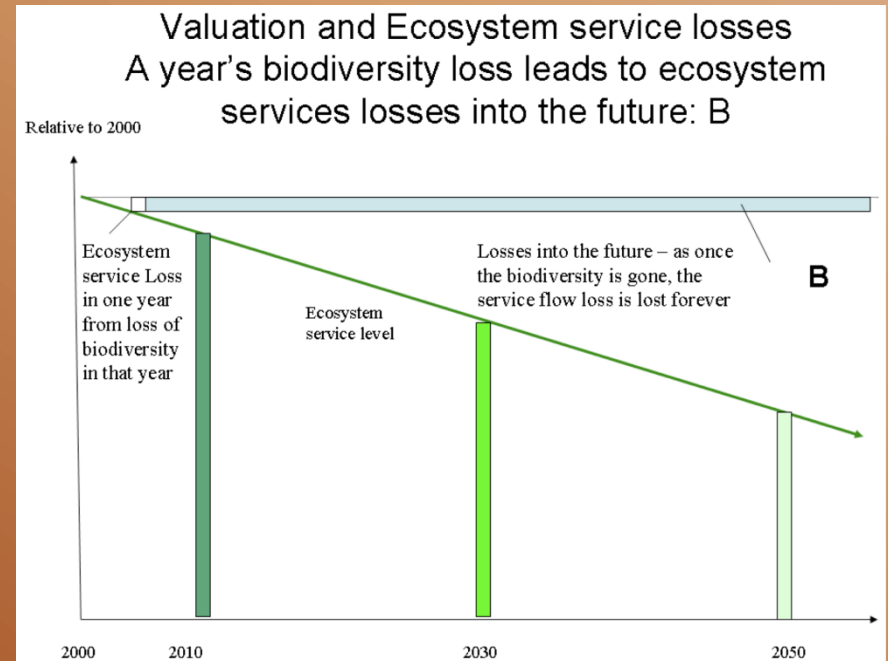
Discount rates are *ethical* choices

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

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



B : Natural Capital impact



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

**Welfare losses equivalent
to 7 % of GDP, horizon 2050**

(@ 4%
Discount Rate)

(@ 1%
Discount Rate)

TEEB : 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.





The Five Kingdoms of Nature

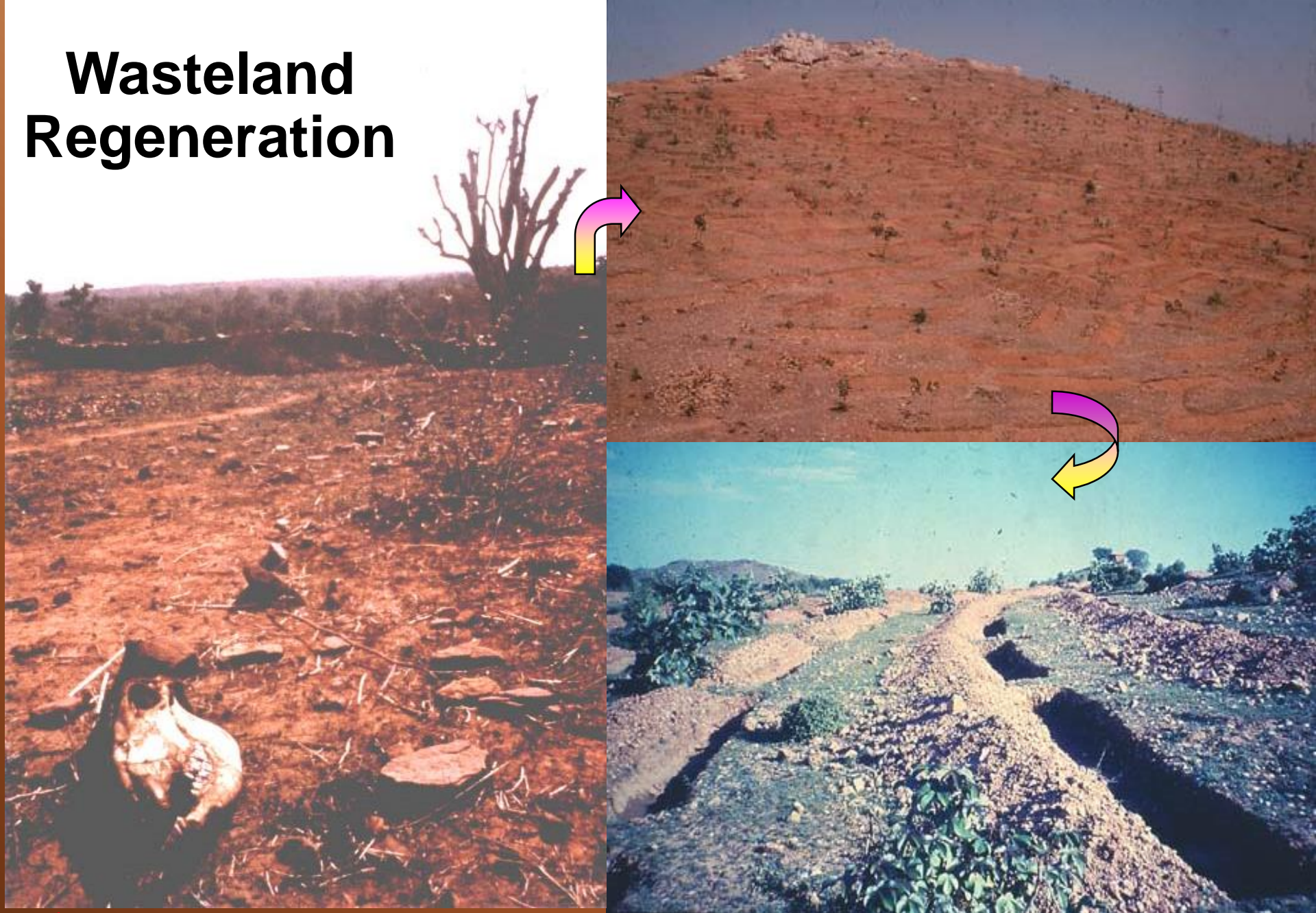
- **Animals**
- **Plants**
- **Fungi**
- **Algae**
- **Bacteria**

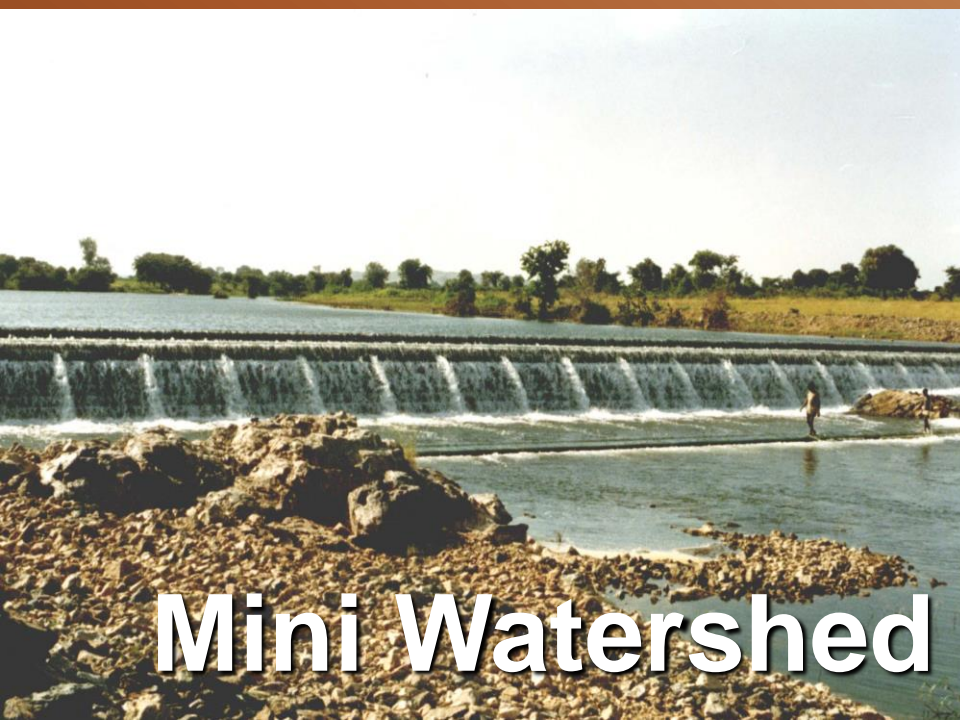


Organic Fertilizer



Wasteland Regeneration



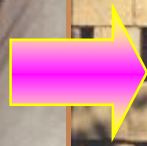


Mini Watershed Development



Cookstoves





Development Alternatives

Earth Construction

Development Alternatives





Development Alternatives

Local Industries



**Reduce, Recycle
and Reuse**



Development Alternatives



**Energy Efficient
Industries**



Development Alternatives

Are We Smart Enough to Co-opt Ecosystems

**To the Service
of
Human Security
?**

