

Ecosystem based approach in mitigation of climate change



The linkage between climate and biodiversity

Biodiversity means the patterns of species, the genetic materials, and habitats in quality and quantity

Climate is the weather average over a long period of time (30 years) in a given region

The linkage between climate and biodiversity

- Climate is a decisive ecological factor
- If climate changed biodiversity is changed
- Biodiversity is a factor among others to influence climate
- If biodiversity changed climate will be influenced

The linkage between climate change and biodiversity

Each type of climate supposes a certain biodiversity pattern, when species and habitats are adapted to the climate conditions

Changing climate results the transformation of the previous pattern to a new one through the loss of biodiversity.

Why loss

Loss is caused by frequent extreme weather conditions

- Changing climate supposes extreme weather conditions
- This is a stress for all adopted species

- The loss depends on:
 1. if there were shelters (refugium)
 2. if there were chance to distribute

Internal elements of climate

- Plate tectonics
- Thermohaline circulation
- Ocean currents
- Greenhouse gases
- Particularities in the air
- biogeochemistry
- Interaction among ice, land surface, oceans, atmosphere, biosphere
- Land surface – vegetation cover:
- Solar heat absorption
- Water retention
- rainfall

External element of climate

- Variation of sunlight intensity
 - Earth orbit
 - Earth rotation
 - Earth axis
 - Solar variation

Human activities

- Greenhouse gases from fossil fuel burning
- Agriculture
- Water reservoirs
- Deforestation
- Construction works
- Chemical trails
- HAARP (High Frequency Active Auroral Research Program)

Ecosystems services and climate

- Humankind benefits from natural resources and processes
 1. Provisioning services
(food, water, energy, etc.)
 2. Regulating services
(carbon sequestration, pest control, climate, etc.)
 3. Supporting services
(nutrient cycles, primary production, pollination)
 4. Cultural services
(recreation, scientific discovery, etc.)

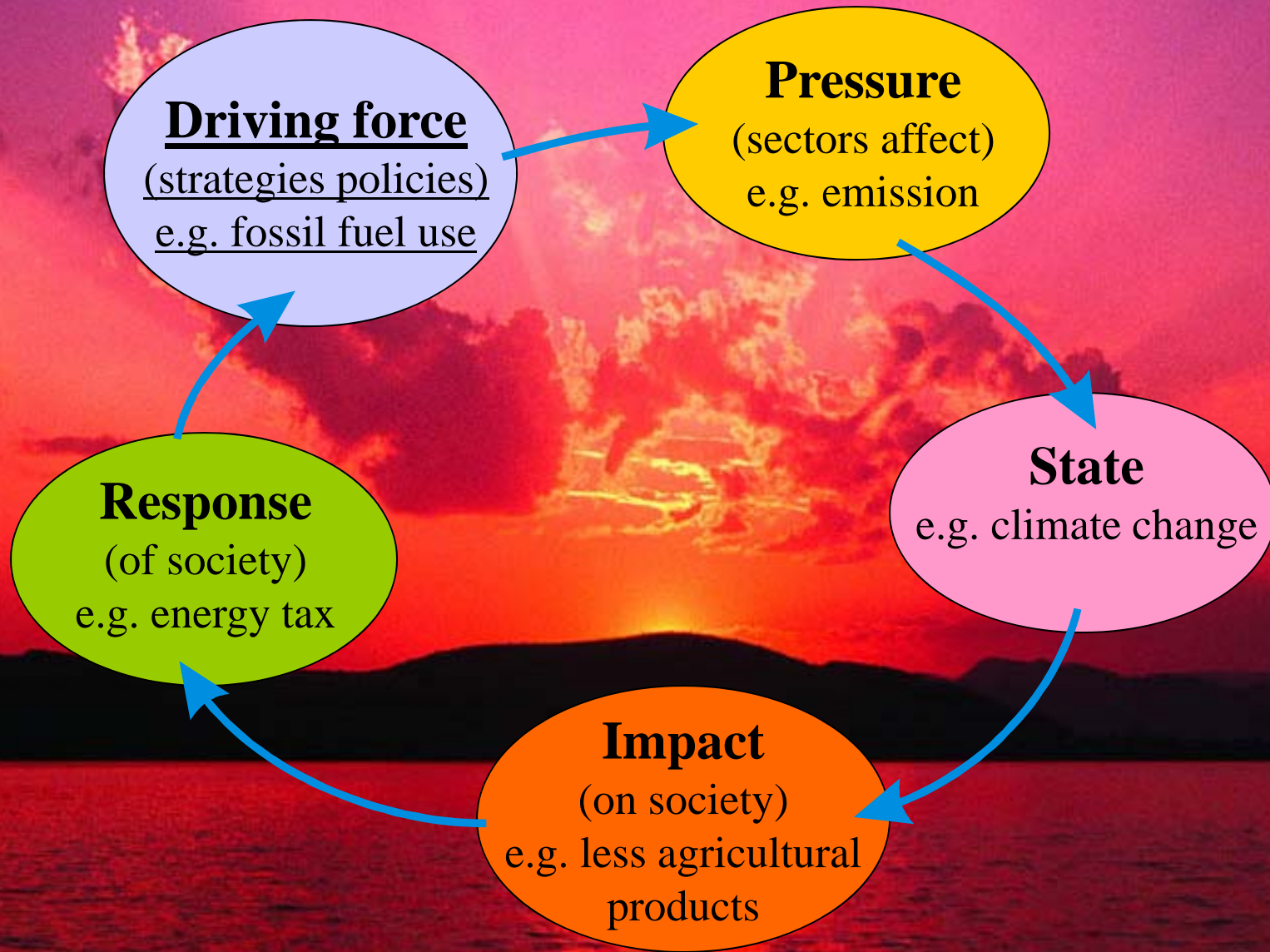
Why current mitigation policies fail?

- To mitigate climate change or biodiversity loss failed because policies do not target the underlying causes
- The direct link to biodiversity loss is the growing environmental pressure
- It comes from drivers, which link to economic growth

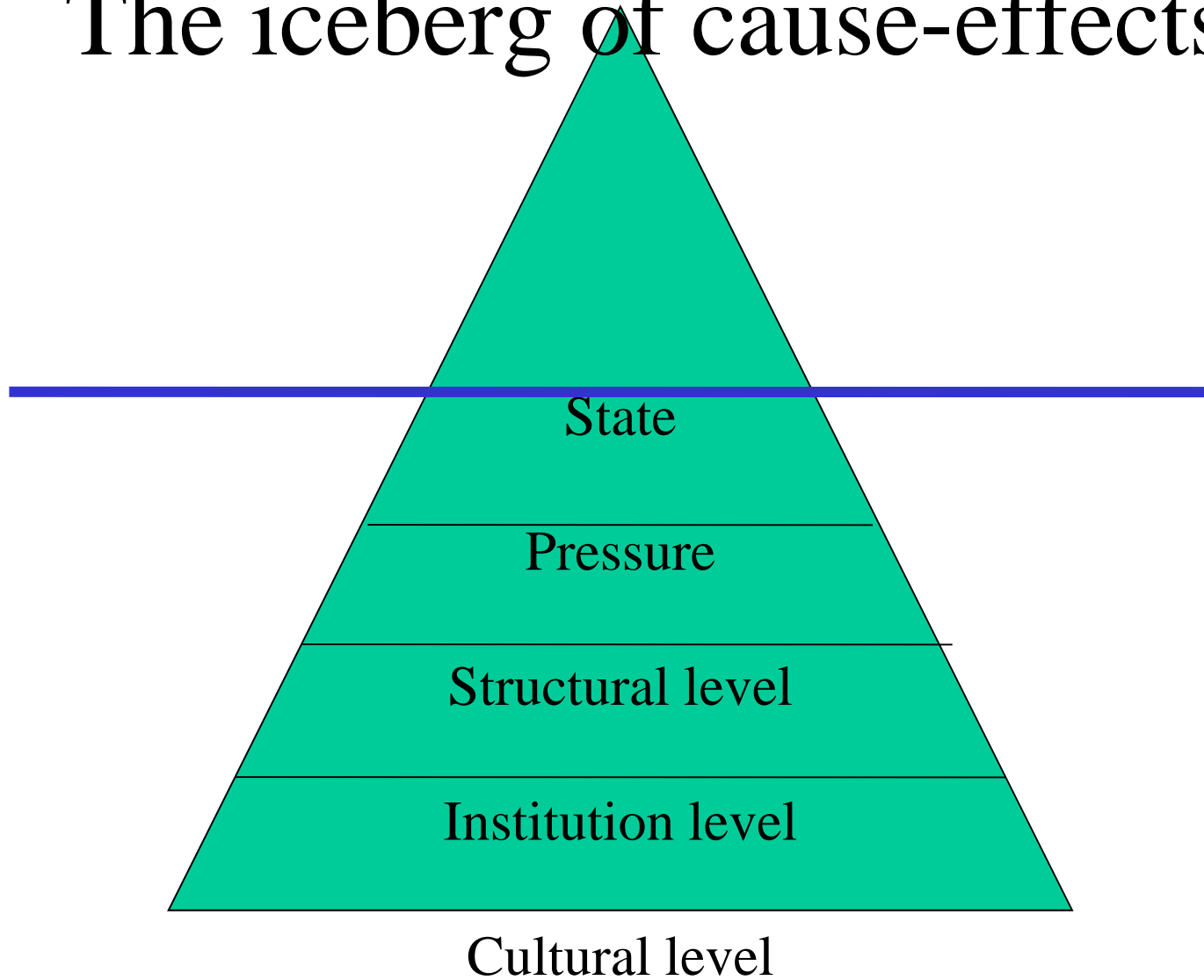
Pressure

- We make three different types of pressure to the environment by carrying out our human activities
- These three types of pressure go together
- When we use natural resources we put pressure to the space and pollute the environment
- When we pollute environment we put pressure on resources and space
- When we use space we put pressure on resources and pollute environment

Environmental indicators



The iceberg of cause-effects



Response

- Response can target the underlying causes (cultural level) – prevention
- Response can target the structural level – mitigation
- Response can target the impact - compensation

Biomass and agrofuels as mitigation tools

Is it the right thing to do?

Biofuel and sustainable development

- Aim:
 - Response GHG
 - Replace fossil fuel and increase energy security
 - Ensure farmers income and generate new working places
- Impacts:
 - Enhanced GHG
 - Enhanced dependence
 - Enhanced monoculture

How biomass use for energy becoming a global environmental problem?

- Biomass is the life itself
- It is the mass of living creatures and dead ones
- The living biomass based on the dead, organic biomass and on the non organic resources
- Together they ensures the biogeochemistry cycles of the Earth
- If we burn the dead biomass we would change the biogeochemistry cycles quantity and quality and we will decrease the amount of living biomass
- If we do so the structure and the function of the whole system will be changed, and we will get less biomass by the end of the road.

Why more land take up

- The available agricultural land is not sufficient to meet the needs of food, fibre and agro-fuel
- The available forest area is not sufficient to meet the need of fire wood to electricity
- These compete each others for the territories
- First set a side and poor quality land back to cultivation
- Global expansion of land take up
- Business interest enhances land take up as well

What to sacrifice for why?

- All sugar and oil plants are enough to replace 10% of the total fuel consumption of the world! Nothing left to eat.
- Change the tropical belt native ecosystems to high productivity sugar cane or oil palm plantation can replace the 30% of the total fuel consumption of the world.
- In Europe, 10% replacement of fuel by internal agro-fuel costs 40-75% agriculture land
- A 20% replacement requires the whole agriculture area of Europe

Why biomass production requires intensive agriculture?

- The aim of energy plantation to gain as much production as they can
- It requires big plots and monoculture
- It requires fertilizers and herbicides
- It requires selection of genetic stock
- It requires external energy sources

How about carbon neutrality?

- The ecological rock sack of energy use is not calculated
- The ecological rock sack of water (irrigation) is not calculated
- The cultivation of the soil mobilizes carbon (deflation, erosion, ploughing) – 1 billion tone of carbon/year in the global agriculture
- Fertilization of the soil creates N_2O
- To take up new ecosystems results GHG

An example from Indonesia

- Oil palm plantations are expanded
- Plantations are created from peat-bogs and marshlands
- In Indonesia 1,5 billion tone carbon emitted from burning peat and 0,6 billion from methane annually (Wetland International)
- Indonesia became the third biggest GHG polluter of the world

Social aspects

- People or cars first to eat?
- Those eat who pay
- 300 kg maize gives 100 liter ethanol
- 300 kg maize is food for one person for 1.5 years
- 1000 kilometer or life for 1.5 years?

Social aspects

- Global food prices have climbed up 83% over the last three years
- Rice 19 years high in March, and 50% increase in two weeks
- Wheat hit a 28 year high
- 4 billion people struggle to get eat
- Speculation of producers
- Climate
- Decreasing yield
- Water shortage
- Growing demand for food, fiber, energy

The best use of biomass for energy purposes

- We burn biomass to gain energy
- We use energy for machinery to cultivate land, to make land fertile by fertilizers, to clear weeds and pests by herbicides, in order to produce biomass
- Shall we use the biomass to make land fertile?
- When we burn biomass we empty local soil resources and spread them to the global environment
- Than we replace local soil resources from geological storages
- By doing this, we use a lot of resources, energy, pollutes environment, take up space
- Finally we change the structure of the global system and the global system on change

How to best use biomass?

- Make compost local
- Compost is long lasting in soil
- Help water household of the soil
- Supplies plant with nutrients
- Maximize carbon stays

Biomass can be seen in the context of energy issue

- 15% population uses the 60% of the total world energy production
- There is no other alternative to decrease the energy consumption
- The major issue of energy is that why we use so much energy?

Can human economy grow unlimited?

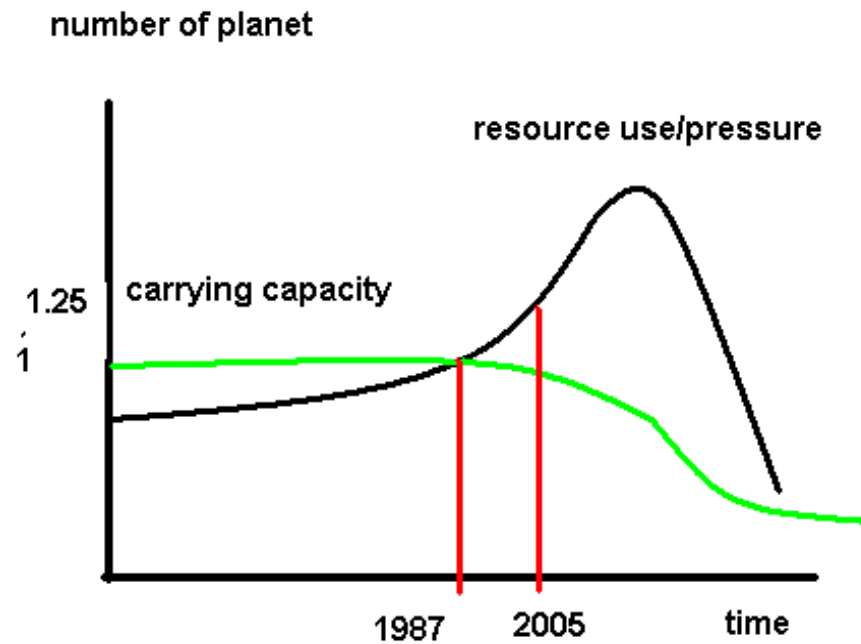
- Why natural systems do not grow unlimited once unlimited sun energy is available for the life and the life has the ability to catch it?
- Natural processes limit each other
- The gas cycle is limited by the silicate cycle (C,H,O,N versus N,P)
- Gas cycle would allow rapid growth, but silicate limits this

An alternative approach to global climate change

Problem statement

- Drivers: Making more products to meet the needs of a consumer society we must intensify production
- Pressures: People mobilize resources from geological storages, and in the same time reduce the extension of ecosystems
- These are extra burdens for the existing biogeochemistry of the Planet
- State: Biogeochemistry can't keep its equilibrium, a structural change becomes true (e.g. GHG)
- A new structure means a new function (e.g. climate change)
- Impact: decreasing biodiversity, less carrying capacity
- Response: Multinational environmental agreements, EU sustainability policy, Emission trading

Future Scenario I. Business as usual



Why response is inappropriate?

- Response does not address the underlying cause of the problem, which is the ethic of the consumer society
- Environmental policy wants to reduce outputs (emission -e.g. GHG) without limiting inputs
- Economy gives the response of efficiency
- The society gives the response of knowledge

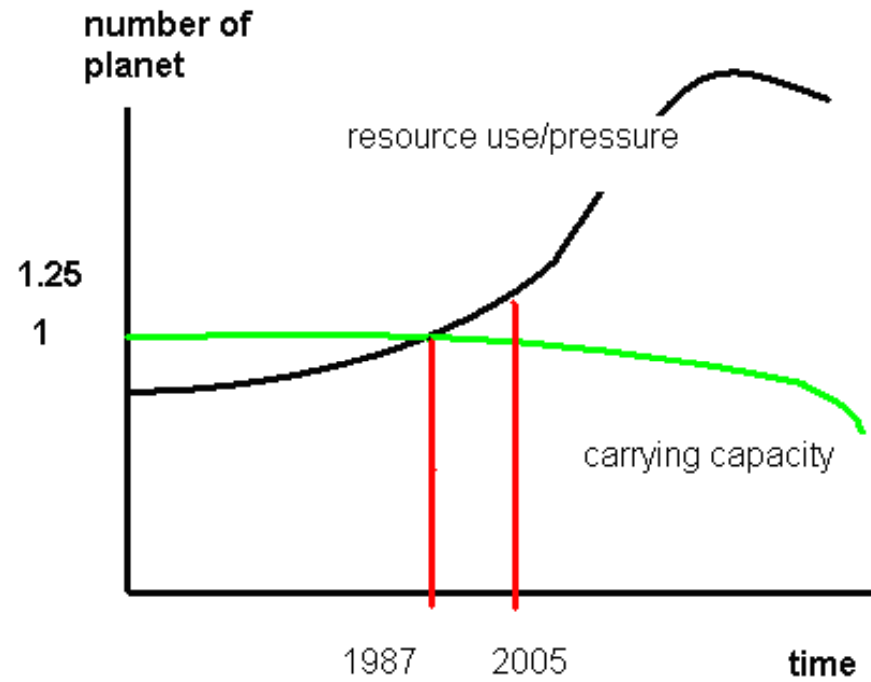
The myth of eco-efficiency

- High tech leads to bigger efficiency in using resources (eco-efficiency)
- High tech results labour efficiency, competitiveness and less working place (transition countries)
- Growing capital income from efficiency results bigger investment potential
- It results growing number of production and service facilities
- It results new demand for human resources
- It results growing pressure on the environment (efficient use, but growing demand for space and resource, growing beyond carrying capacity)

The myth of knowledge first

- Knowledge is just knowledge
- SD requires long term consideration of social and environmental impacts of the economy
- Long term consideration supposes wisdom in using knowledge

Scenario II. Eco-efficiency



How to solve the problem?

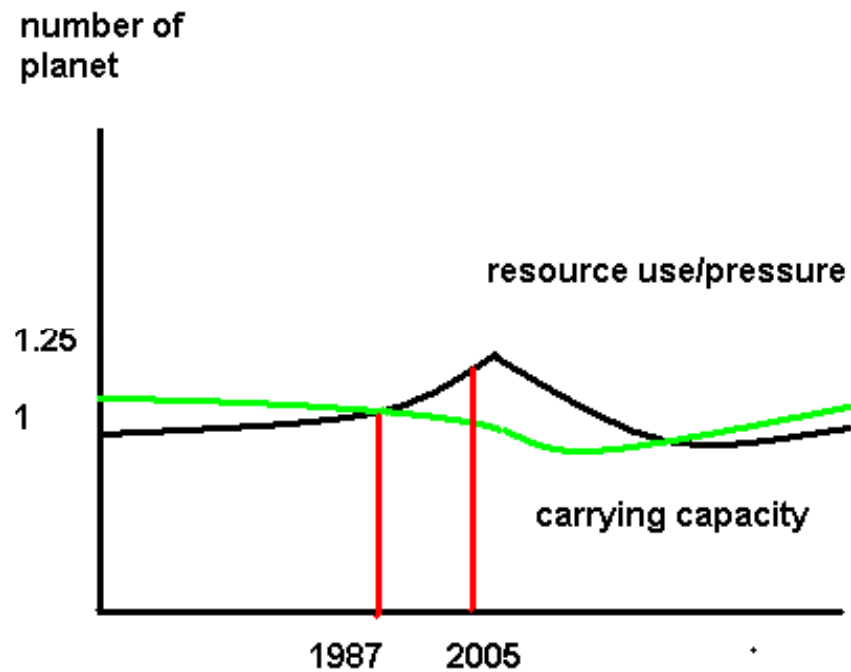
- Limit the inputs (total energy and material consumption)
- Value resources by limiting them
- Change production and consumption towards a less energy and material intensive pattern
- Consider space, resource and emission equally for sustainable resource use

Build understanding of sustainability

- Change perception towards development/quality of life
- Change values
- Build new moral

Scenario III. Sustainable resource

IISE



What sustainable use means

- Do not grow beyond carrying capacity
- Two parallel targets:
 1. Maximise eco-efficiency
 2. Put a resource cap on total energy consumption

The idea of a national non renewable resource budget

- ❖ An integrating set of tools to manage environmental, social and economic crises.

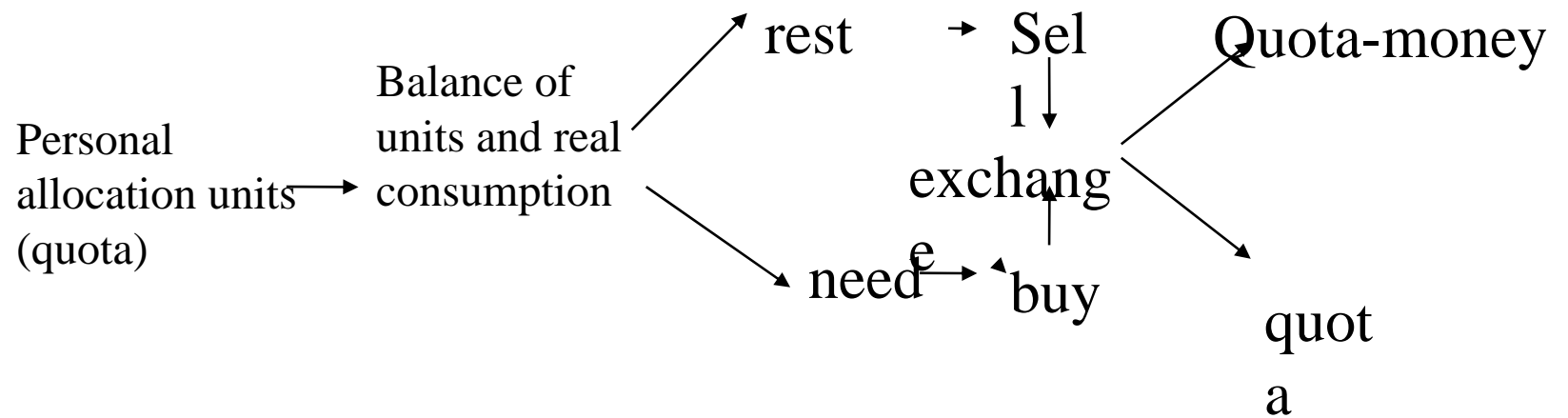
Regulation of resource input

- Outputs comes from inputs
- Less input means less resource use, less use of land, and less emission
- Production and consumption patterns to be changed
- Economic incentives
- There is still need to regulate emissions (e.g. toxics)
- Legal regulation

What is the national non-renewable resource budget?

- The aim is to reduce non-renewable resource use year by year
- A national cap and share (trade) system for resources instead of GHG
- Users are grouped, get a cap and share
- All users have personal allowance (called quota – right to consume)
- Users trade with savings
- A new type of money becoming into the system, called quota-money

How quota money born?



The natura of quota money

- The quota money is a complementary currency/new currency
- Complementary currency requires financial security – guarantee
- In this case the forint is the guarantee at the managing organisation
- New currency: the guarantee is the future energy savings and the work associated.
- Quota money has zero interest
- Turnover is secured by the pressure of saving needs
- There is an exchange for the quota money including a fee

Quota money fro what?

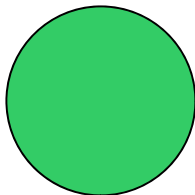
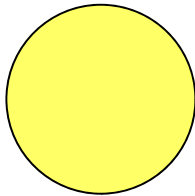
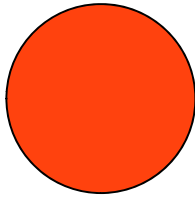
- An internal local market established for environmentally sound goods and services
- The market is free, must meet with requirements
- Excludes certain goods
- Credit for investments in order to produce the appropriate goods for the internal market or save energy
- Use for paying tax

Revolving Fund

- Revolving Fund is a financial instrument to have sufficient amount of credit
- Revolving Fund uses the quota money for crediting
- Zero interest – low speed return is possible
- Credit covers all costs of investment, and returns at 100% to the fund from the savings
- Saving create quota money
- Speed of return depends on speed of saving

We need room for interaction to renew
resources and keep processes at the right
track

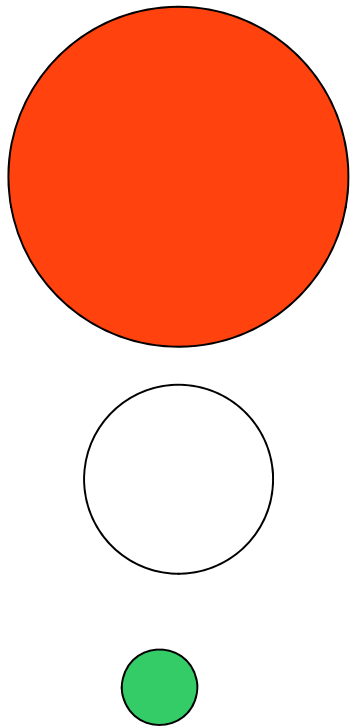
The traffic light concept



Red: intensive use of areas (agricultural land, forest, settlements, industry)

- Yellow: sustainable use
- Green: non use

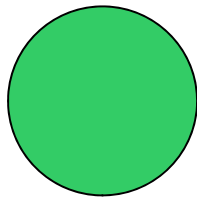
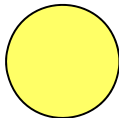
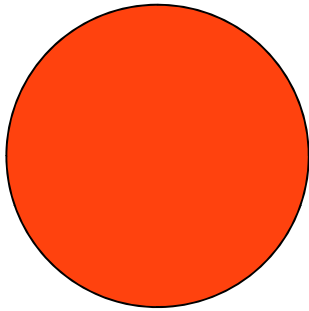
Stage I. Introduce regulatory framework



Paying tax on
intensive use
(modest tax, lot of
people)

- Incentives for sustainable use
- State buys, no expense

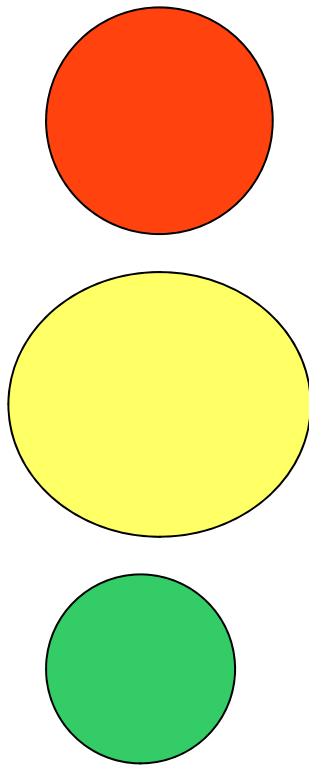
Stage II.



Increasing tax

- People move to sustainable use and non use

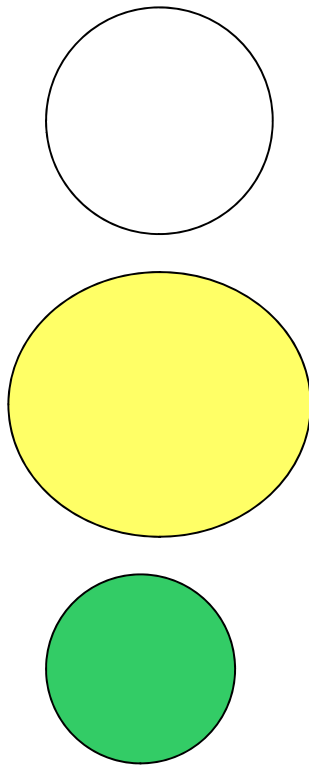
Stage III.



Tax is increased
(hard tax, less people
in the red)

- More and more people move to sustainable use and non use

Stage IV.



Tax is eliminated

- sustainable use ensures that there is minimal negative external pressure on the non use area

Conclusions

We are not allowed to change the structure of the global system!

- If we changed the structure and the function is changing we have to adapt to these changes
- We force ourselves into an adaption trap
- We and many others might not adapt