

Presenter: Dr. Detlef Van Vuuren

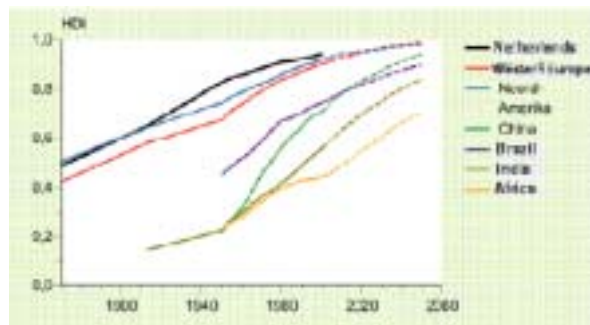
Topic:

Scenarios: Millenium Ecosystem Assessment and IPCC Scenarios

Summary (by Imam Basuki)

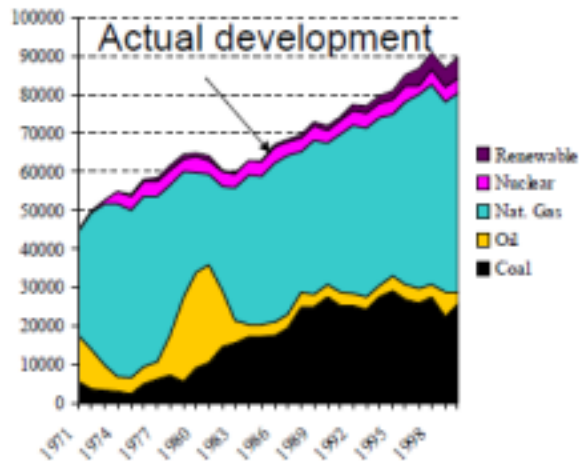
1. Scenarios

a. Present trends influence the future

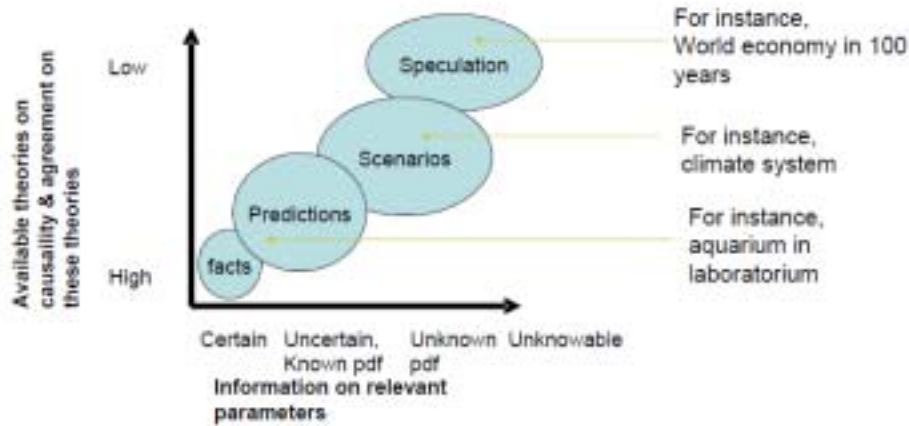


b. Act based on certain (modeled) future

c. How to avoid wrong prediction (case from Netherland which wrongly predict the development of nuclear power to replace natural sources).



2. Different tools to future



3. Scenario

a. Objectives:

- i. Exploring possible states
- ii. Testing strategies

b. Context:

- i. Support and strategic planning
- ii. Scientific research
- iii. Education
- iv. Provide common language/perception

c. Element:

- i. Time horizon
- ii. Period
- iii. Geographical Context, etc.

d. Types:

- i. Deductive: using logical thinking to questions future vs Inductive: using data to predict future
- ii. Exploratory vs Anticipatory
- iii. Qualitative vs Quantitative
- iv. Probabilistic vs Storyline
- v. Multi-scenarios vs Baseline

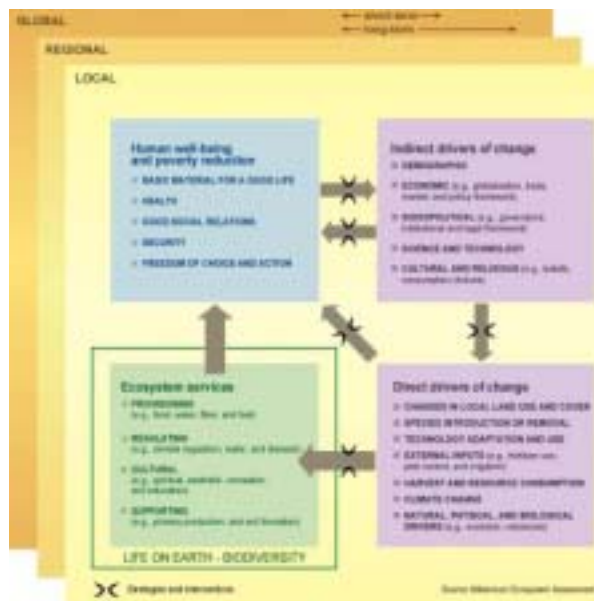
4. Steps in Scenario' Development: Millenium Ecosystem Assessment/MEA' set up reflects below steps (Figure x).



a. Defining focal question and boundary conditions

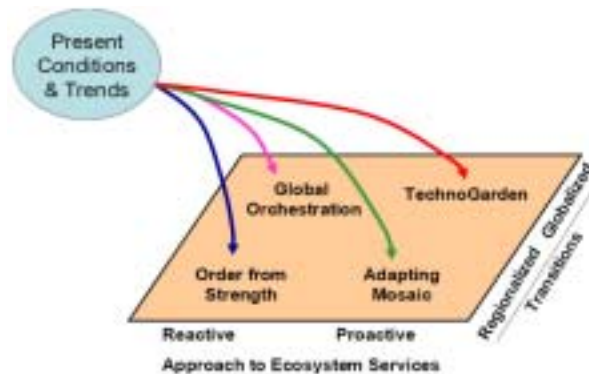
- i. What are the consequences of plausible changes in development of pathways for ecosystems and their services over the next 50 years? What are the consequences of ecosystem change for human well being?

b. Using conceptual framework and drivers



- i. Drivers involved including direct and indirect one, for each consist of natural and anthropogenic sources.

- ii. Indirect drivers include: demographic, economic, socio-culture, science etc.
Direct drivers include land use change, carbon emission, energy consumption etc.
- iii. Conceptual framework includes:
 1. Global orchestration; Order from strength; Adapting mosaic; Techno-garden
 2. Each subjected to regional – global axis and reactive – proactive axis.



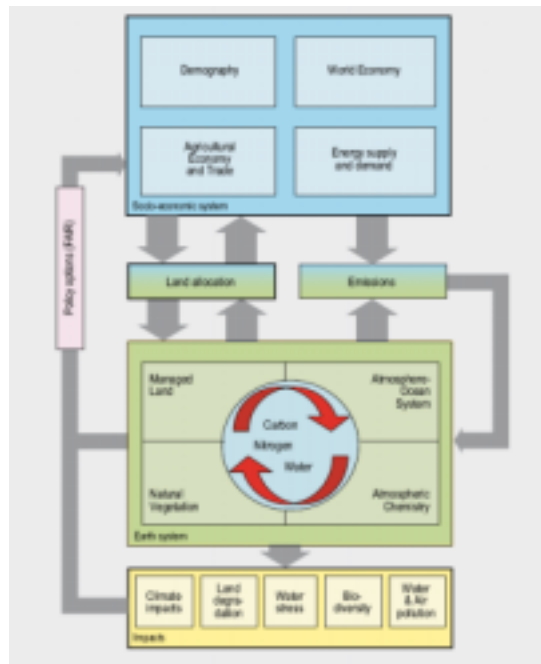
c. Developing initial storyline-based scenario

- i. Global orchestration: this scenario depicts a globally connected society focuses on global trade and economic liberalization and takes a reactive approach to ecosystem problems. It takes steps to reduce poverty and inequality, and to invest in public goods such as infrastructure and education.
- ii. Order from strength: this scenario represents a regionalized and fragmented world, concerned with security and protection. It emphasizes regional markets and takes reactive approach to ecosystem problems.
- iii. Adapting mosaic: this scenario represents regional watershed-scale ecosystems as the focus of political and economic activity. Local institutions are strengthened and local ecosystem management strategies are common; society develop a strongly proactive approach to the ecosystem management.
- iv. Techno-garden: represent a globally connected world relying on environmentally sound technology, using highly managed and engineered, ecosystem to deliver services. It take proactive approach to ecosystem management in order to avoid problems.

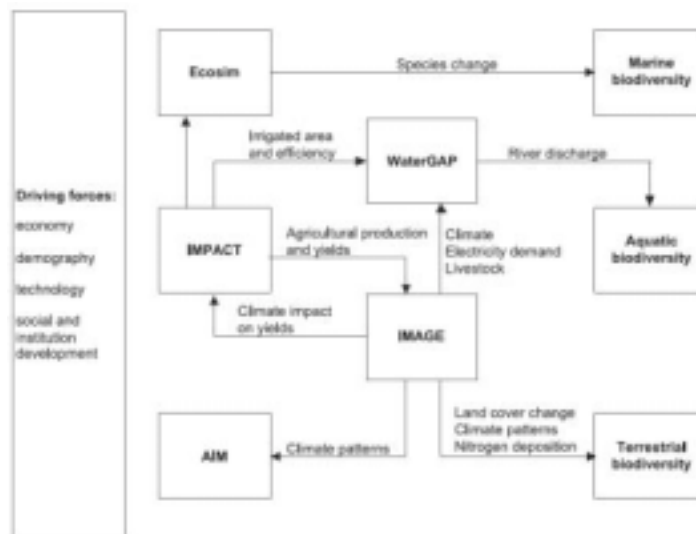
d. Quantification

1. Different tools are available:
 - Define exogenously (e.g. published projections are often individually driven)
 - Extrapolate prediction
 - Modelling
5. Framework of the integrated assessment:

Model IMAGE 2.4.



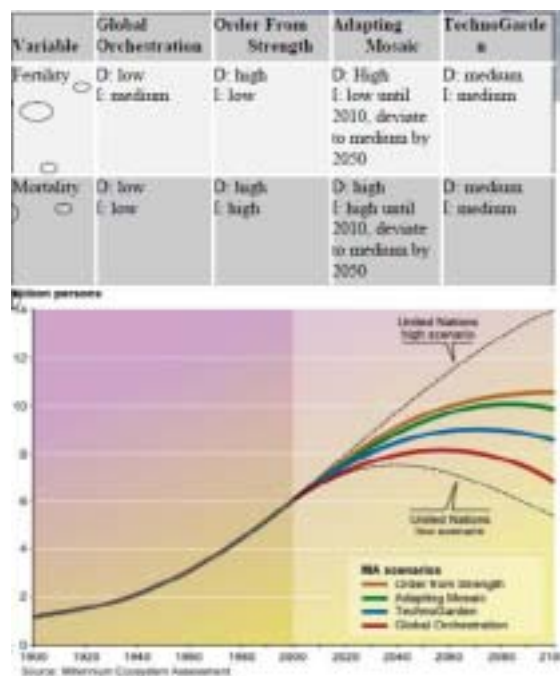
No single model could represent ecosystem, so it is needed to linkage models.



Quantification works well for most drivers, which are direct and indirect.

Quantified Drivers	Unquantified Drivers
Indirect Population growth Economic activities Technology change Direct Energy use Emissions of air pollutants (S,N) Emissions of GHG and climate change Land use/cover change Harvest and resource consumption External inputs (irrigation, fertilizer use)	Indirect Sociopolitical Culture and religion Direct Species introduction/ removal

Example of model quantification (100 yrs on population)



Coverage of ecosystem services in the models is poor.

Provisioning services:

- + food, fuel, freshwater,
- ? Genetic resources, biogeochemic cycles
- Ornamental resources,

Supporting services:

- + provisioning of habitat, primary production
- ? Nutrient cycling,
- Soil formation

Regulating services:

- + climate regulation, erosion control,
- ? Air quality, water regulation, water purification,
- regulation of human disease, biological control, pollination, storm protection

Cultural services:

- spiritual, aestatic, education, recreational

e. Results

All scenarios resulted as below:

- Food production increases further, but hunger not solved

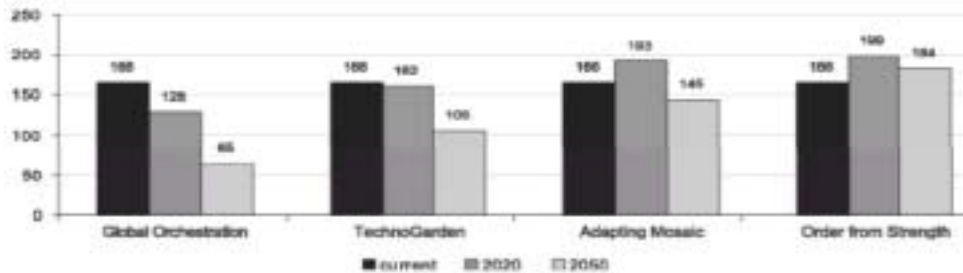
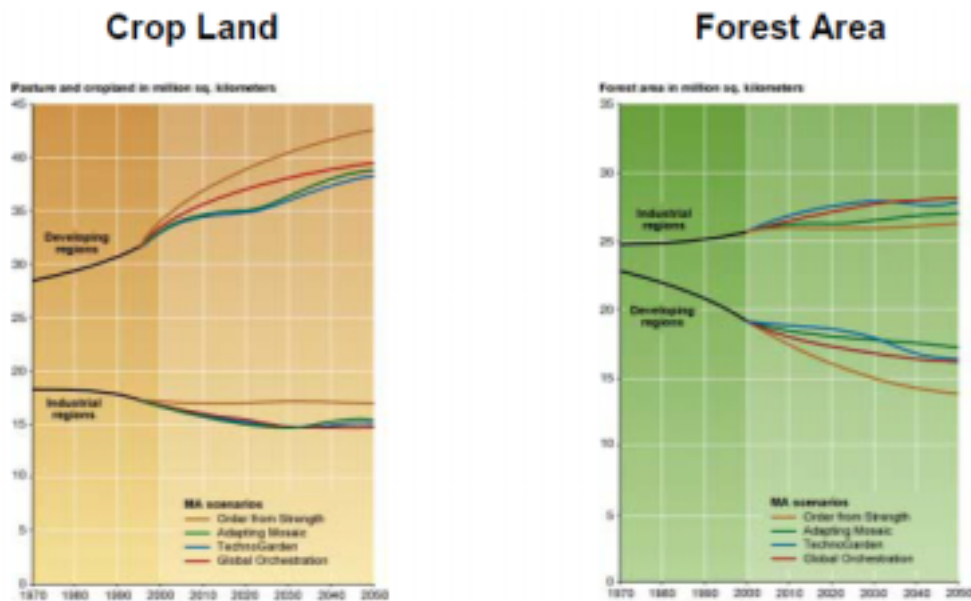
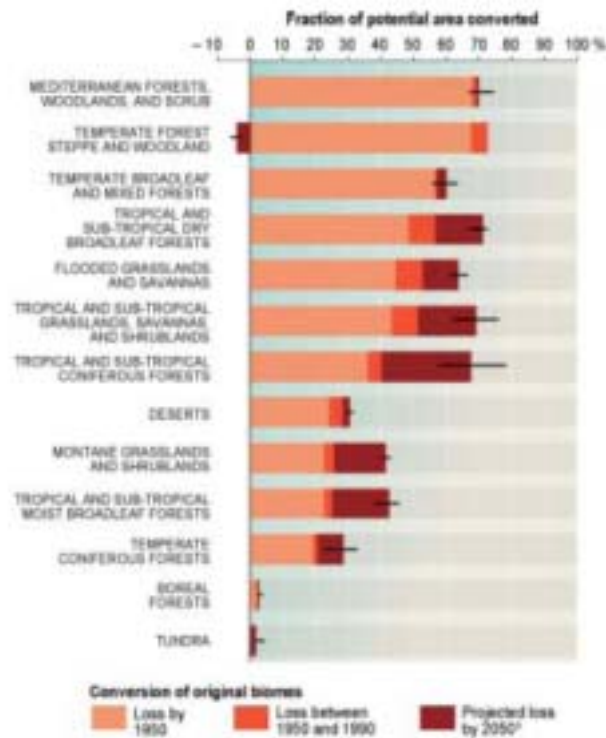


Figure 9.31. Number of Malnourished Children in Developing Countries in the MA Scenarios in 2020 and 2050 (IMPACT)

- Increase in food production mostly through increase yield, but partly also through expansion of agriculture land at the expense of nature



- Changes in direct drivers
 - o Habitat transformation → 10-20% further of grass and forestland converted in 2050



- Integration of qualitative and quantitative

Table 9.2: OUTCOMES OF SCENARIOS FOR ECOSYSTEM SERVICES IN 2050 COMPARED WITH 2000 (5, NDM)

Definitions of "enhanced" and "degraded" are provided in the note below.

	Global Orchestration		Order from Strength		Adapting Mosaic		TechnoGarden	
	Industrial Countries ^a	Developing Countries ^a	Industrial Countries ^a	Developing Countries ^a	Industrial Countries ^a	Developing Countries ^a	Industrial Countries ^a	Developing Countries ^a
Provisioning Services								
Food (extent to which demand is met)	▲	▲	◀▶	▼	◀▶	▼	▲	▲
Fuel	▲	▲	▲	▲	▲	▲	▲	▲
Genetic resources	◀▶	◀▶	▼	▼	▲	▲	◀▶	▲
Biotechnical/ pharmaceutical discoveries	▼	▲	▼	▼	◀▶	◀▶	▲	▲
Ornamental resources	◀▶	◀▶	◀▶	▼	▲	▲	◀▶	◀▶
Fresh water	▲	▲	◀▶	▼	▲	▼	▲	◀▶

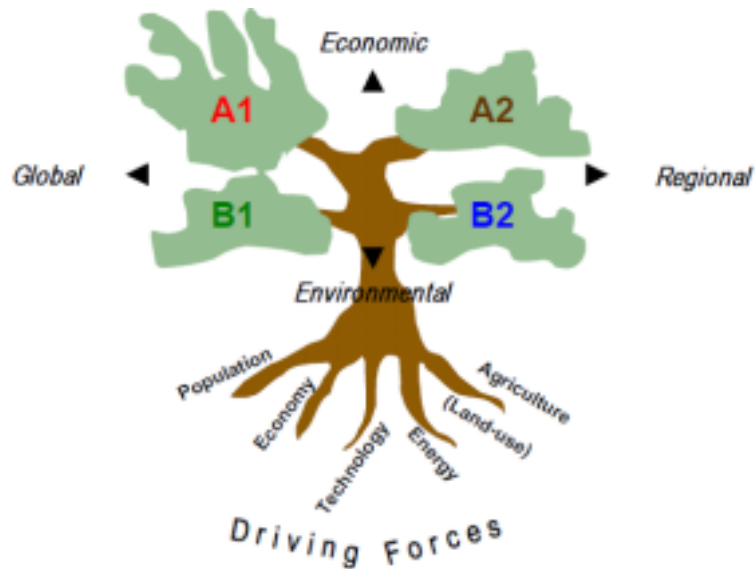
f. Conclusions

- Pressures on ecosystem likely to increase (greater demand on provisioning services; e.g. LUC, CC, N-load, water stress, invasive species)
- Pressures accumulate in sub-sahara Africa, middle east, and south Asia
- ES could be improved, given right combination of policy and measures
- Severe degradation of ES can threaten MDGs

5. IPCC scenario

Purpose of IPCC SRES:

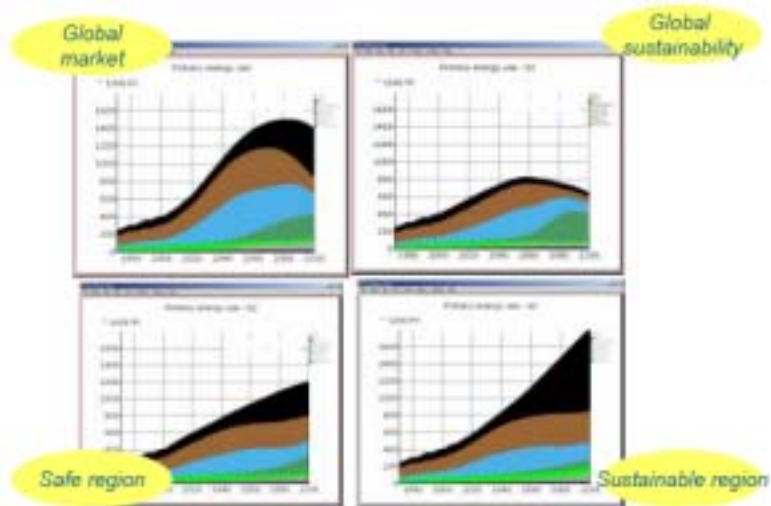
- Input into climate model (GHG emission)
- Based on mitigation analyses
- Basis for adaptation analyses
- Challenge for policy maker to build long term thinking



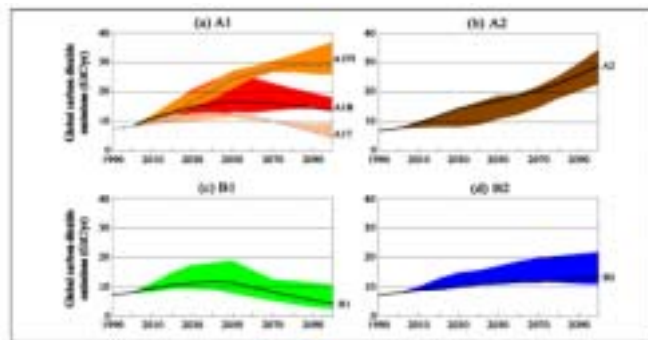
Nakicenovic et al., 2000

Translation into formation on drivers by six modeling teams:

- AIM, ASF and MARIA (Japan)
- MESSAGE (Austria)
- IMAGE (Netherland)
- MiniCam (USA)



Example of Emission driver:



Emissions expected to increase – but may level off or even decline in the second half of the century;

End of summary

Questions and Answers:

- a. How to comprehend complex factors of ecosystem

We could only cover the available data. The model is calibrated, consistent, and good enough.

- b. Does the model cover renewable and non renewable resources

Yes, by time to time the model covers more energy sources and the dynamics. But, no representation of timber supply and mineral depletion. Only some resources are well represented.

- c. Have you integrated invasive species in the model (Oana)?

Yes.

- d. Had MEA done in MDG (Carina)?

No, because it is objected for longer term.

- e. Why are scenario processes so time consuming (Martin S.)?

Because it needs more time to have common agreement among confrontative views (e.g. pessimistic vs optimistic views).

- f. What was the process to choose model (Anne)?

Each participating country should have good data for the chosen model.

- g. Had the model been validated (Martin S.)?

NO. It's hard to validate a model for long term.

- h. Had the structure of models changed (Anne)?

No. Now IPCC has 4 models from previously six.

- i. What do the markers mean (Wolfgang C.)?

They represent concentration range of C.

- j. How to achieve 2C temperature increase only (Anne)?

2C target corresponds to around 400-450 ppm of CO₂ equivalent (50-80% probability). It also corresponds to a 50% emission reduction in 2050.

- k. Are the new scenarios involving climate policy (Anne)?

Yes, the scenarios 2, 3, and 4 will involve climate policy.