



## Millennium Ecosystem Assessment

# Lessons from the Millennium Ecosystem Assessment and the Int'l Assessment of Agricultural Science and Technology for Development

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# MA: Largest assessment of the health of Earth's ecosystems

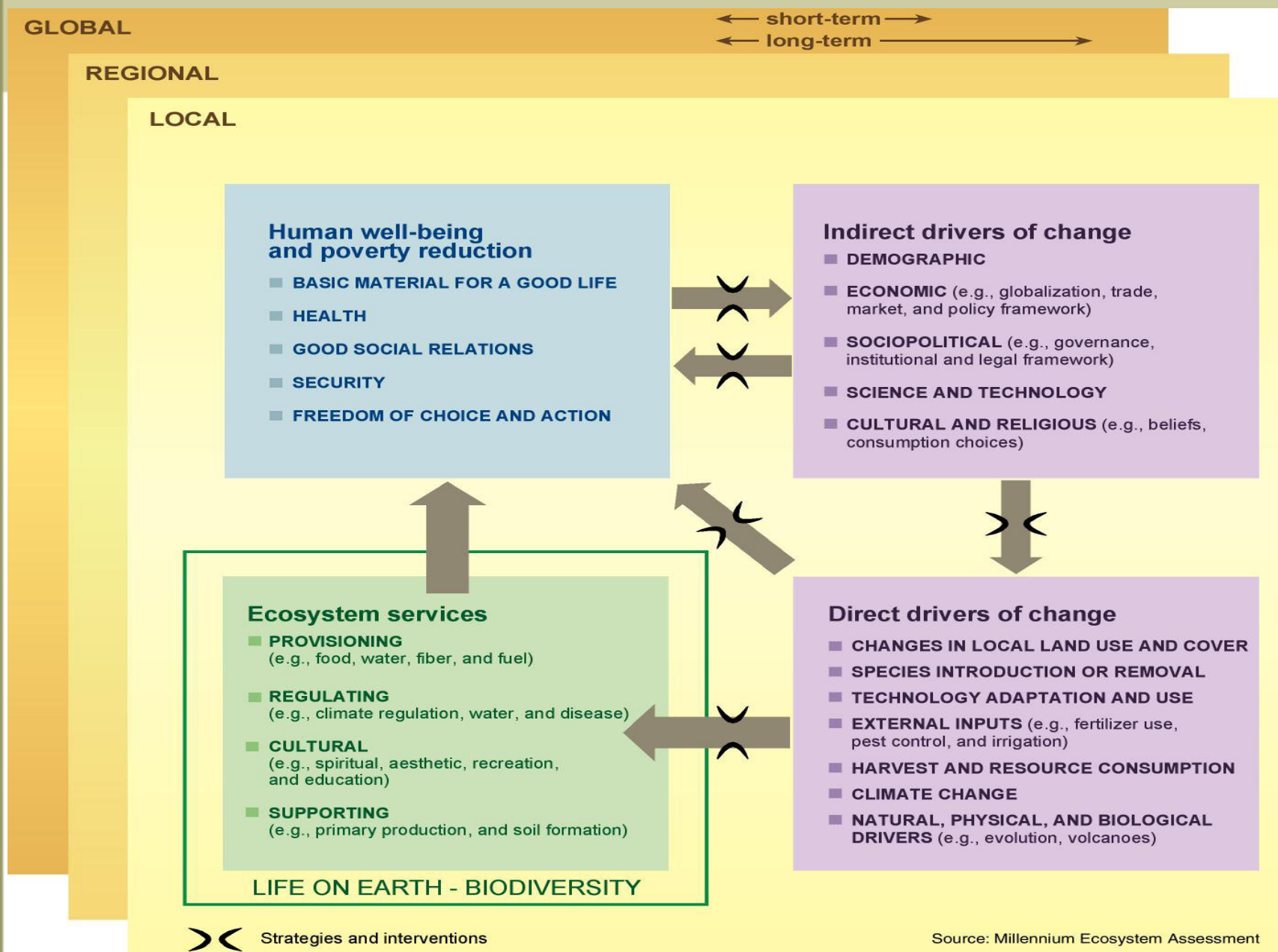
## **Experts and Review Process**

- Prepared by 1360 experts from 95 countries
- 80-person independent board of review editors
- Review comments from 850 experts and governments
- Includes information from 33 sub-global assessments

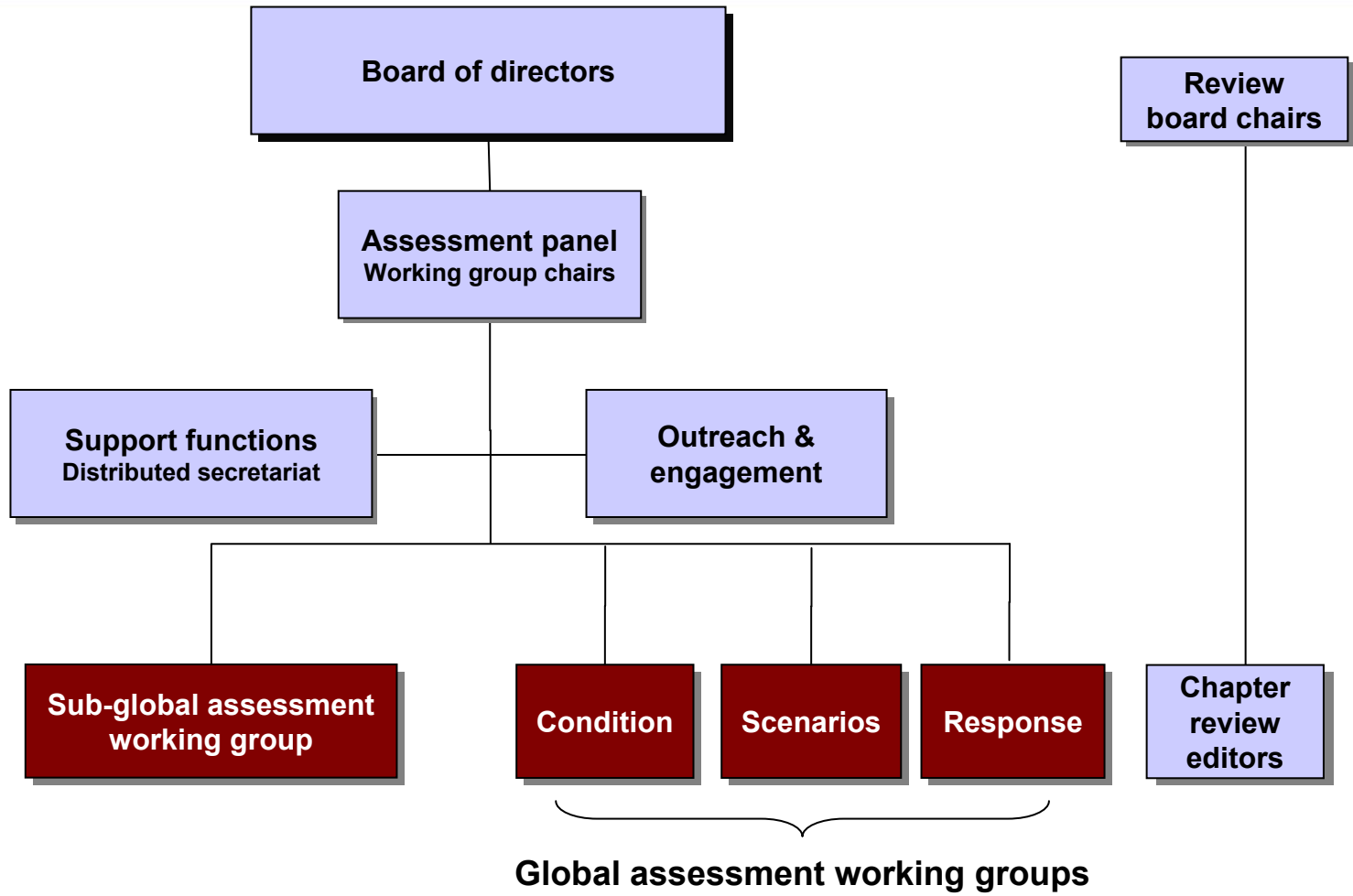
## **Governance**

- Called for by UN Secretary General in 2000
- Authorized by governments through 4 conventions
- Partnership of UN agencies, conventions, business, non-governmental organizations with a multi-stakeholder board of directors

## MA Framework



# Organisation



# Looking into the future

**Out of curiosity**

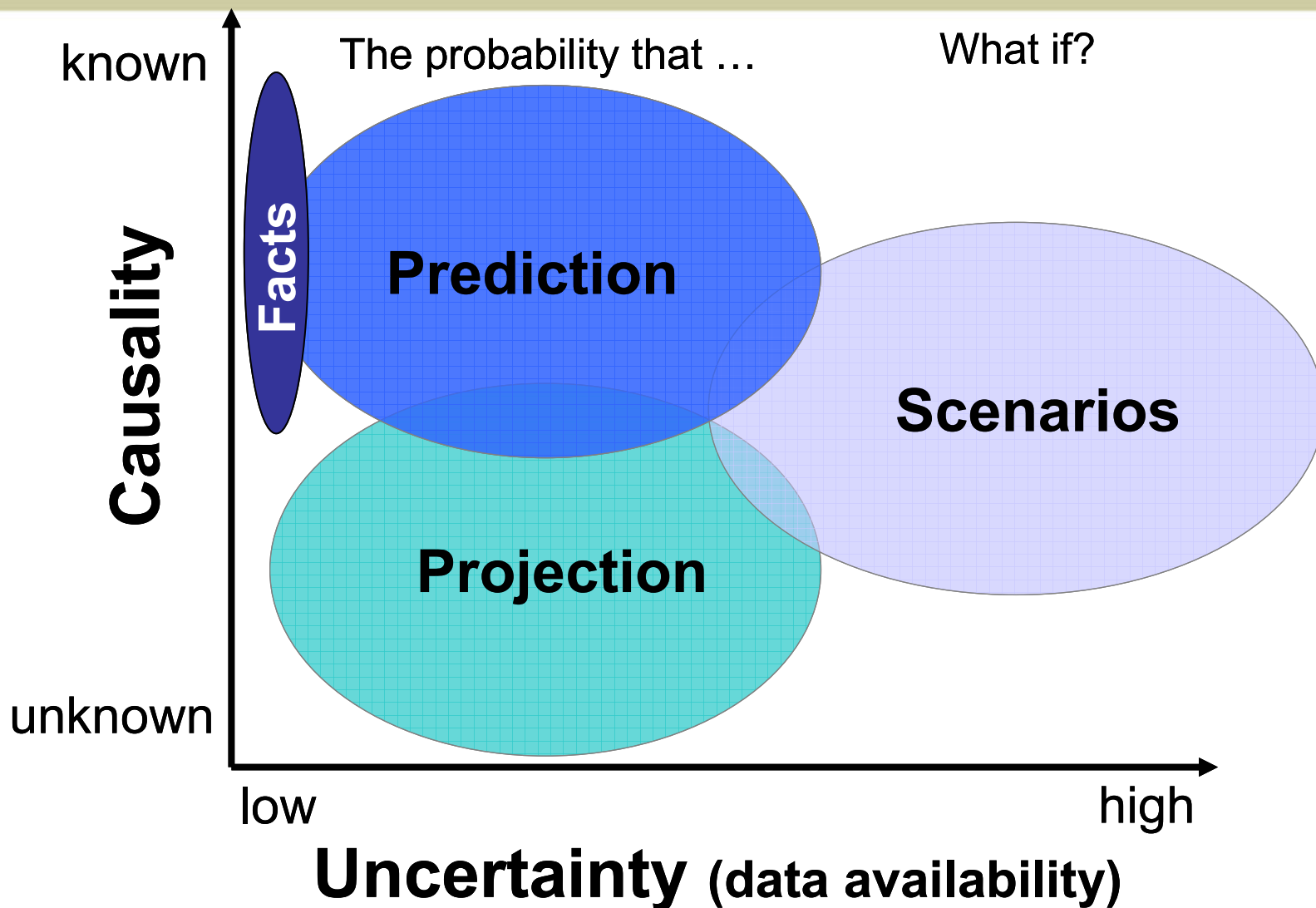
**For scientific exploration**

**For decision-making**

- Decisions are based on expected outcomes and the trade-offs they imply
- Decisions involve uncertainty about how the future will unfold

**For planning purposes/strategic planning exercise**

# Scenarios, predictions & projections?



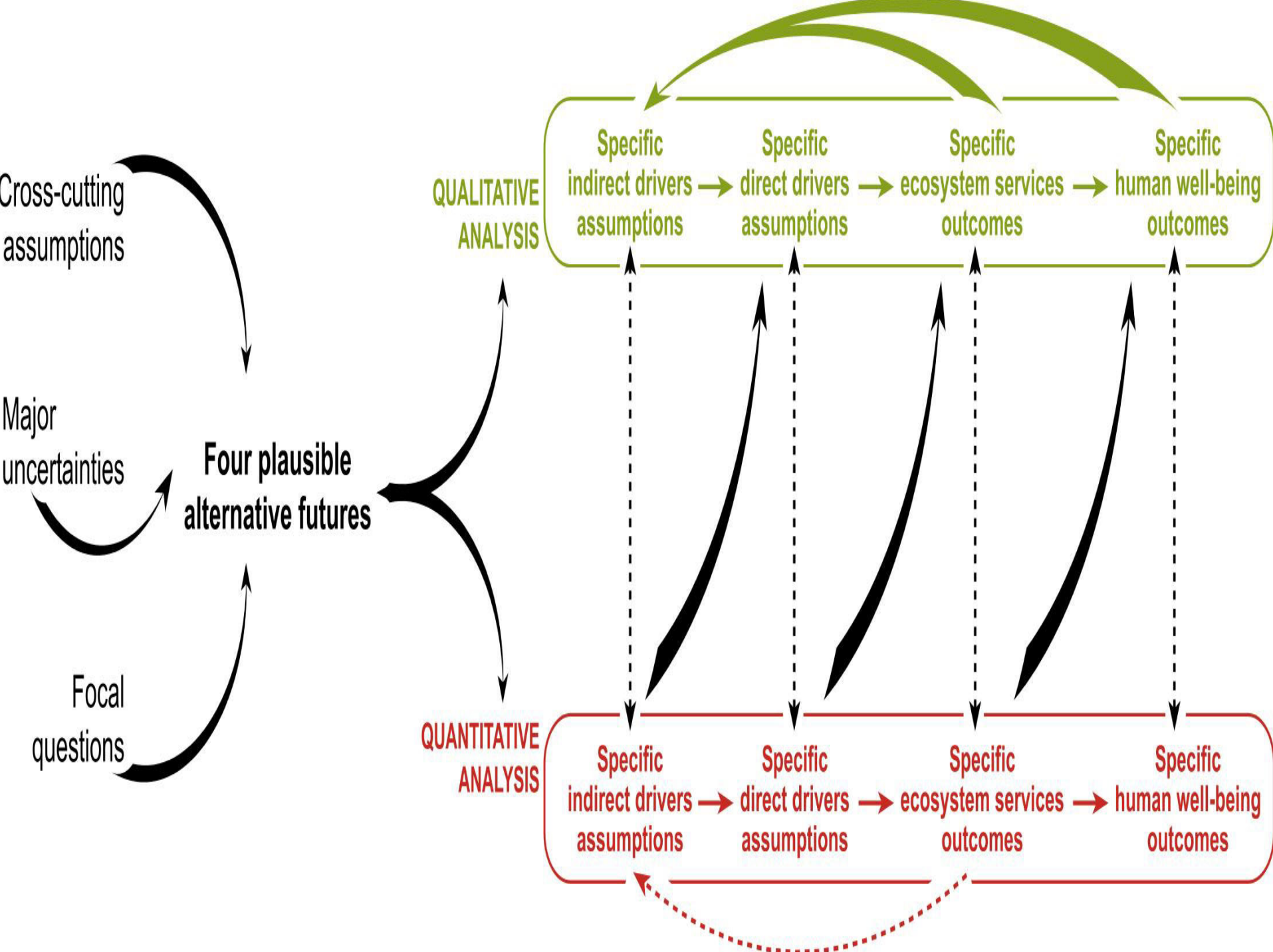
# Scenario Definitions

**Plausible stories** about how the future might unfold from existing patterns, new factors and alternative human choices. The stories can be told in the language of both **words** and **numbers** (Raskin, in press).

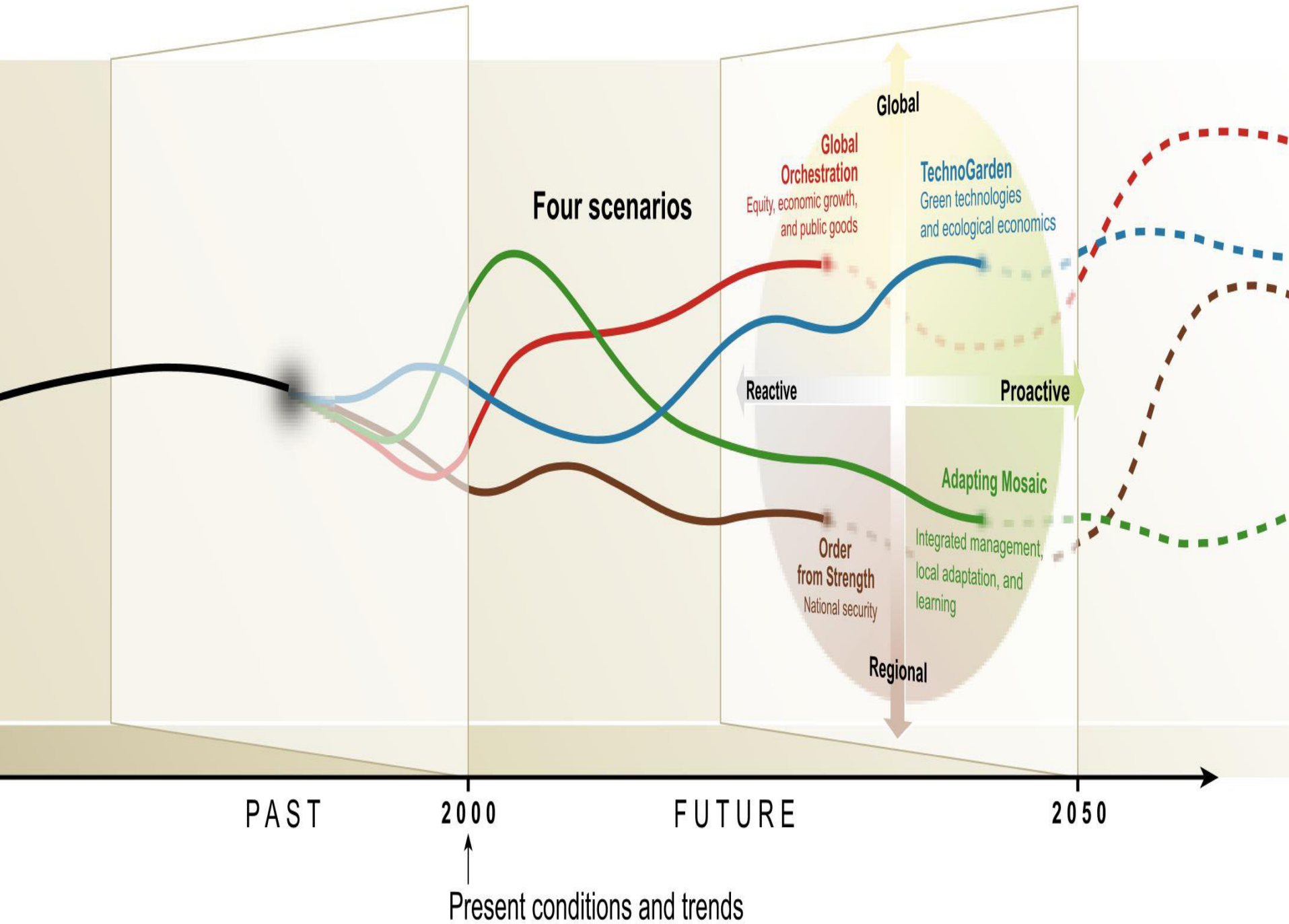
Plausible descriptions of how the future may develop, based on a coherent and internally consistent set of **assumptions** about key relationships and **driving forces** (Nakicenovic 2000).

A **tool** for ordering one's perceptions about alternative future environments in which one's **decision** might be played out (Schwartz 1996).

Plausible alternative futures, each an example of what might happen under particular assumptions (MA).









# Global Orchestration

focus on macro-scale policy reform together with a socially conscious globalization, reactive approach to env. management

Dominant Approach for Sustainability	Economic Approach	Social Policy Foci
<b>Create demand for environmental protection via economic growth and social improvements; public goods</b>	<b>Redefinition of the public and private sector roles; improving market performance; focus on global public good</b>	<b>Increase global equity; public health; global education</b>



# Order from Strength

retreat from global institutions results in a fragmented world, focus on national security and protectionism, reactive approach to env. mgmt

Dominant Approach for  
Sustainability

Economic Approach

Social Policy  
Foci

**Reactive problem-solving by individual nations; sectoral approaches, creation of parks and protected reserves**

**Regional trade blocs, mercantilism, self-sufficiency**

**Security and protection**



# Adapting Mosaic

retreat from global institutions, focus on strengthened local institutions and local learning, proactive approach to env. mgmt

Dominant Approach for Sustainability	Economic Approach	Social Policy Foci
<b>Learning via management and monitoring, shared management responsibility, adjustment of governance structures to resource users, common-property institutions</b>	<b>Focus on local development; trade rules allow local flexibility/interpretation; local non-market rights</b>	<b>Local communities linked to global communities; local equity</b>



# Techno Garden

emphasis on development of technologies to substitute for ecosystem services, globalized world, proactive approach to manage ES via technology

Dominant Approach for Sustainability

Economic Approach

Social Policy Foci

**Green technology, eco-efficiency, tradable ecological property rights**

**Global reduction of tariff boundaries, fairly free movement of goods, capital and people, global markets in ecological property**

**Improving individual and community technical expertise; policies follow opportunities; competition**

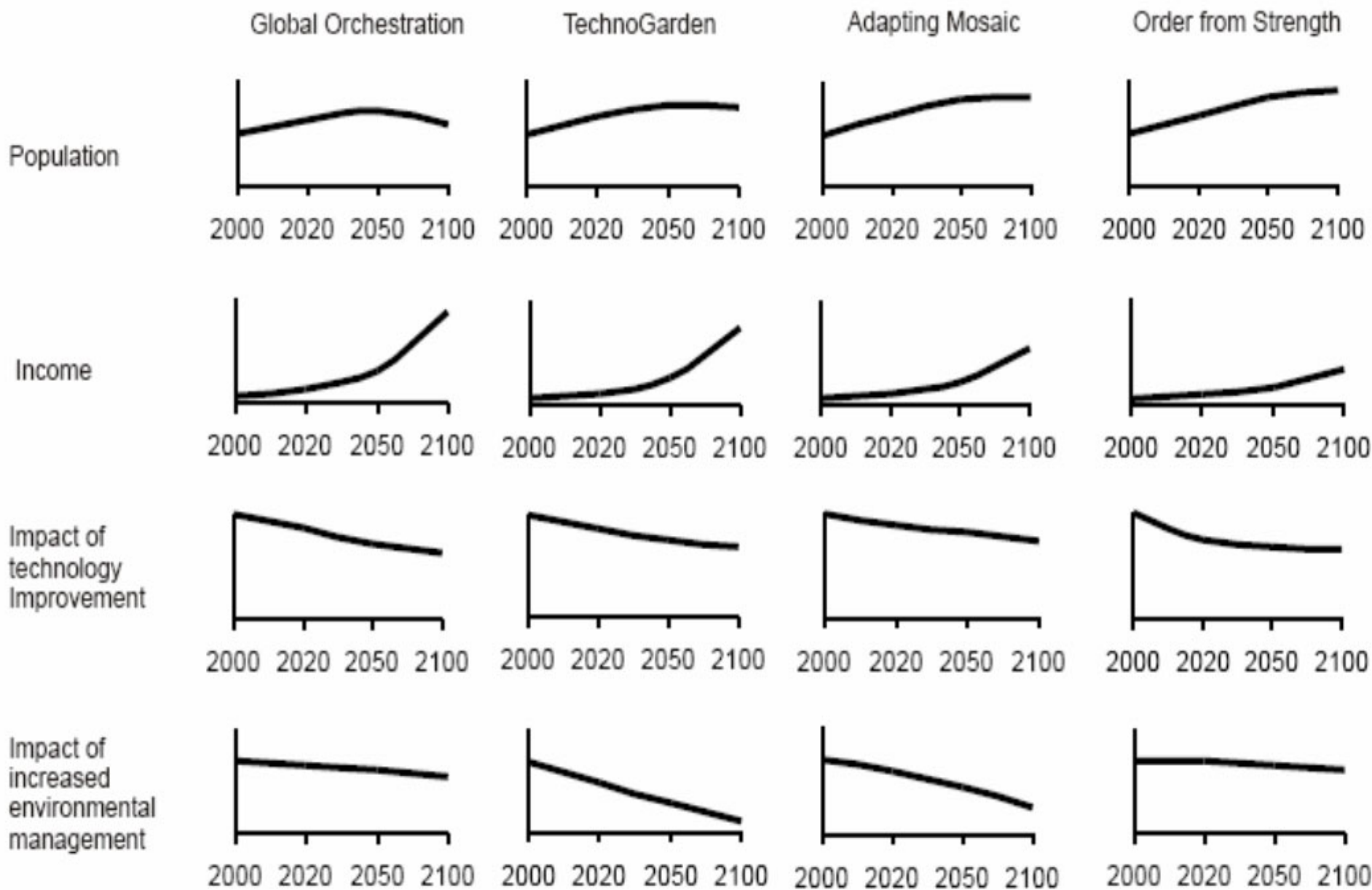
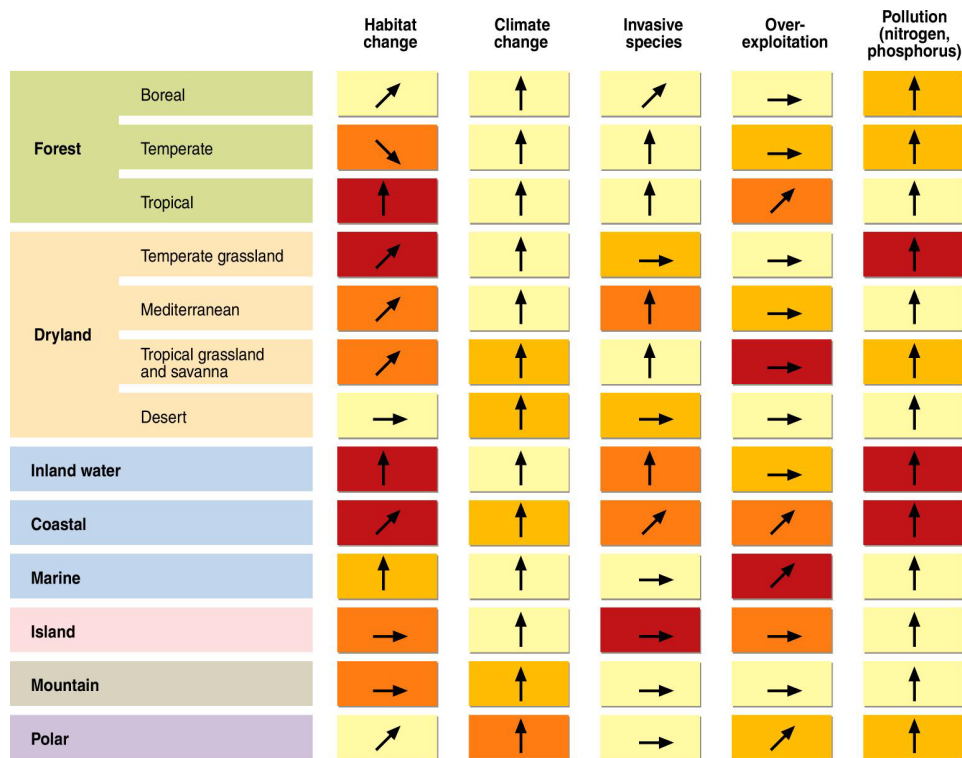


Figure 9.4. Impact of Trend in Crucial Indirect Drivers on Pressures on Ecosystems in the MA Scenarios. Population and Activity Growth Lead to Increased Pressures, Technology Improvement and Increased Impact of Increased Environmental Management to Less Pressures.



# Direct drivers growing in intensity



**Most direct drivers of degradation in ecosystem services remain constant or are growing in intensity in most ecosystems**

Driver's impact on biodiversity over the last century

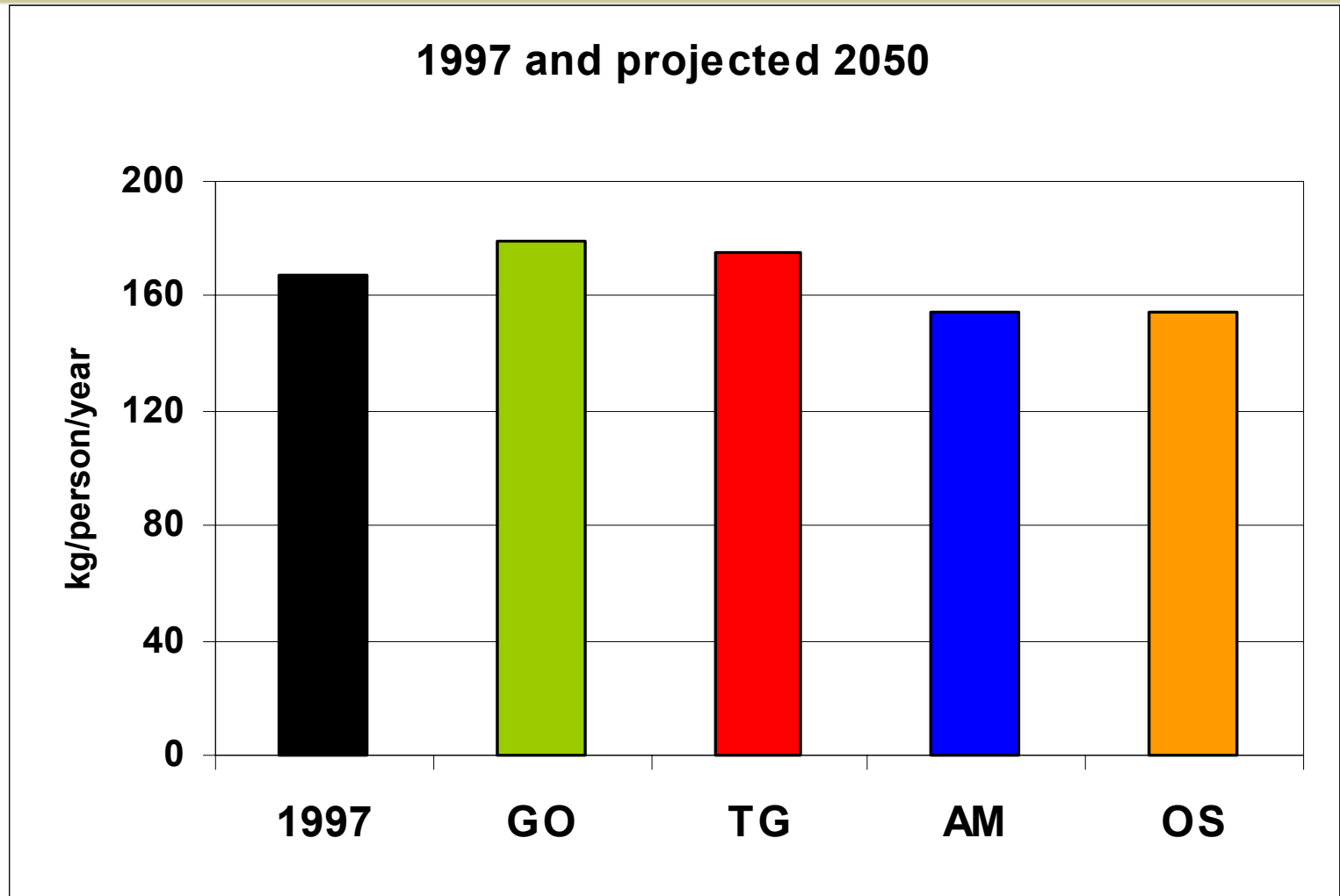
Low  
Moderate  
High  
Very high

Driver's current trends

Decreasing impact  
Continuing impact  
Increasing impact  
Very rapid increase of the impact

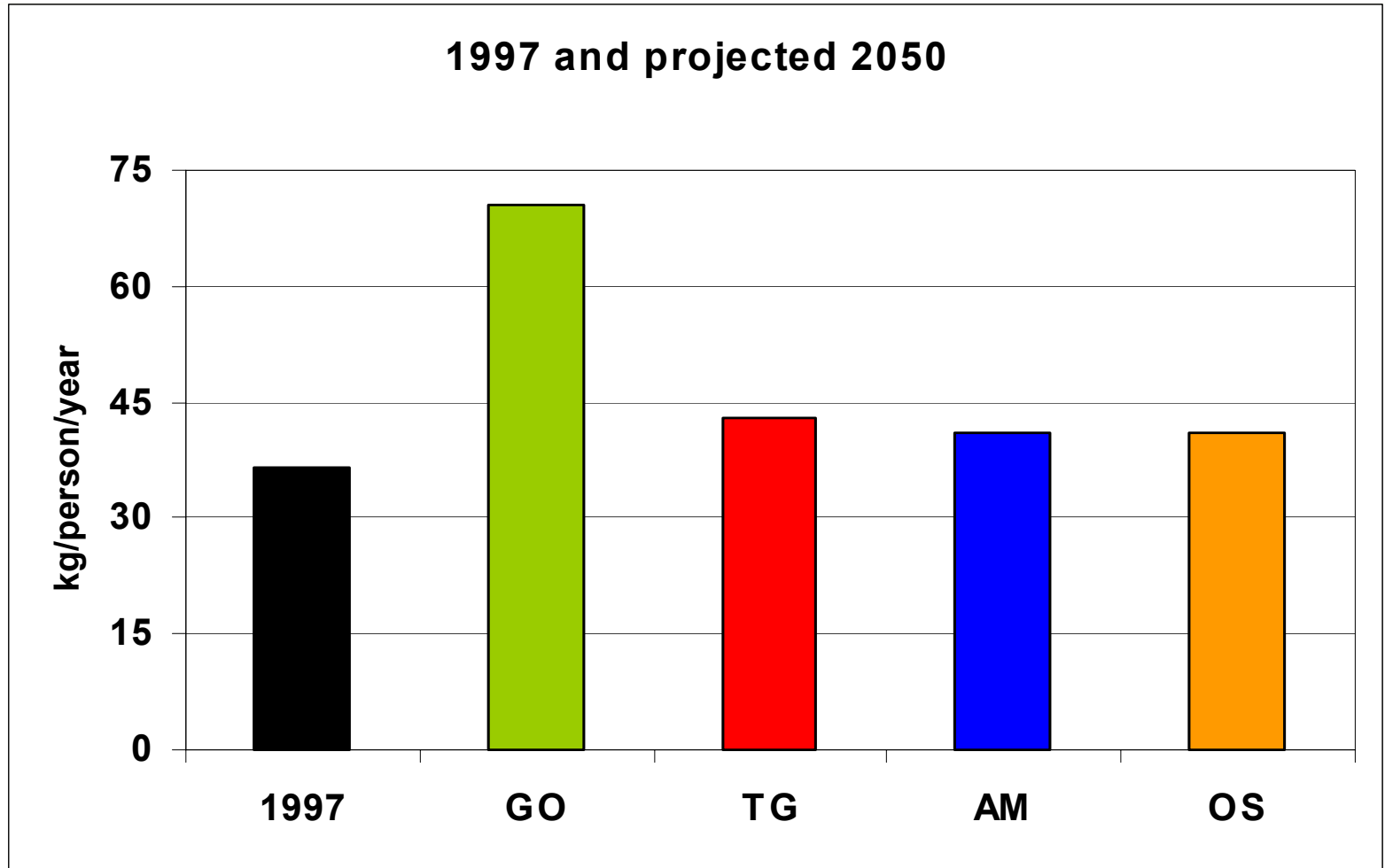
Source: Millennium Ecosystem Assessment

# Per Capita Cereal Food Demand in Developing Countries

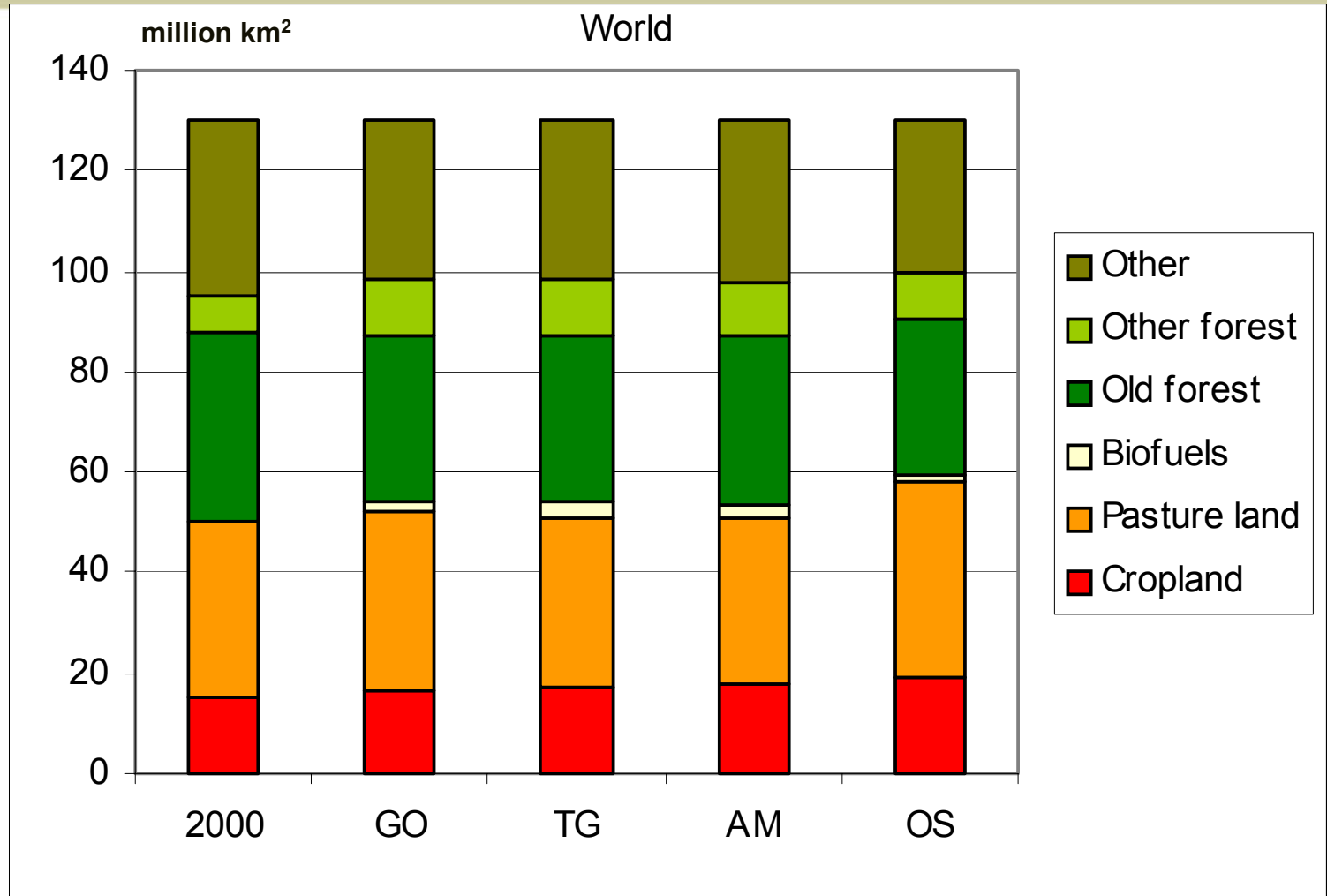




# Global Per Capita Meat Demand

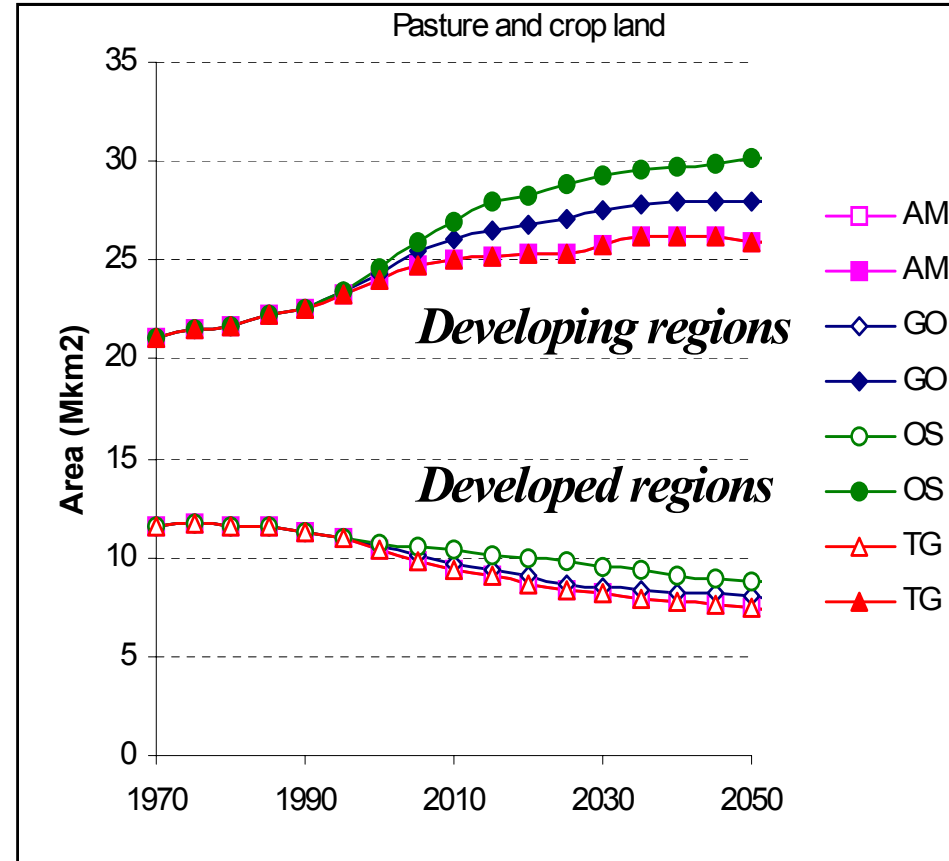
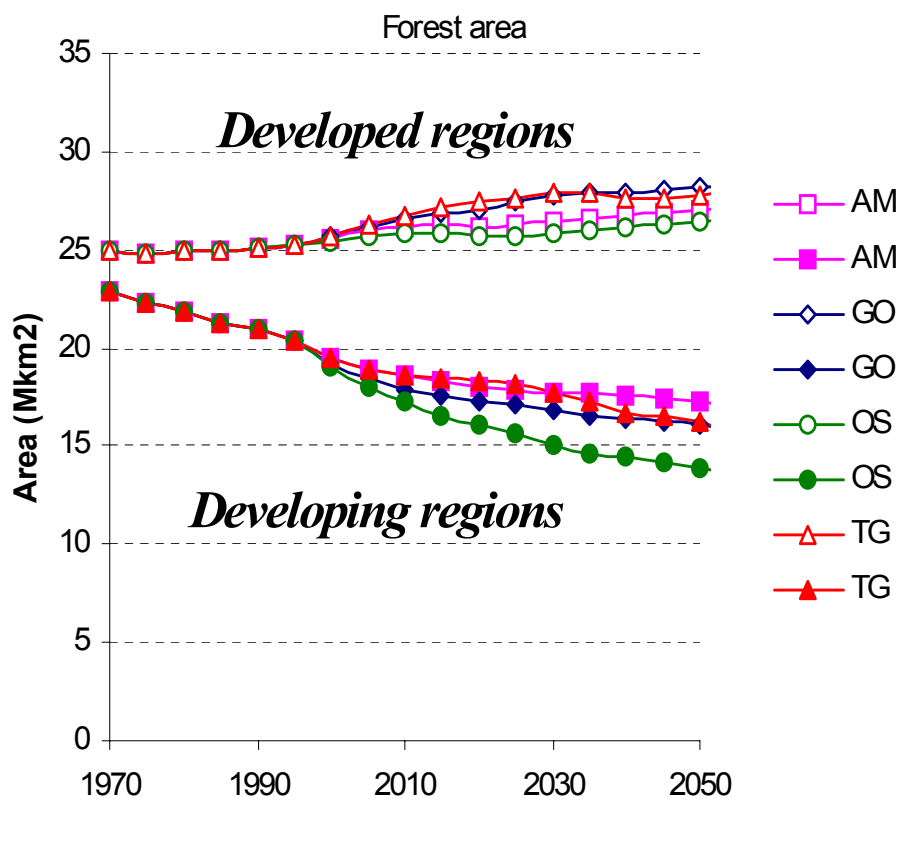


# Global Land Use in 2050



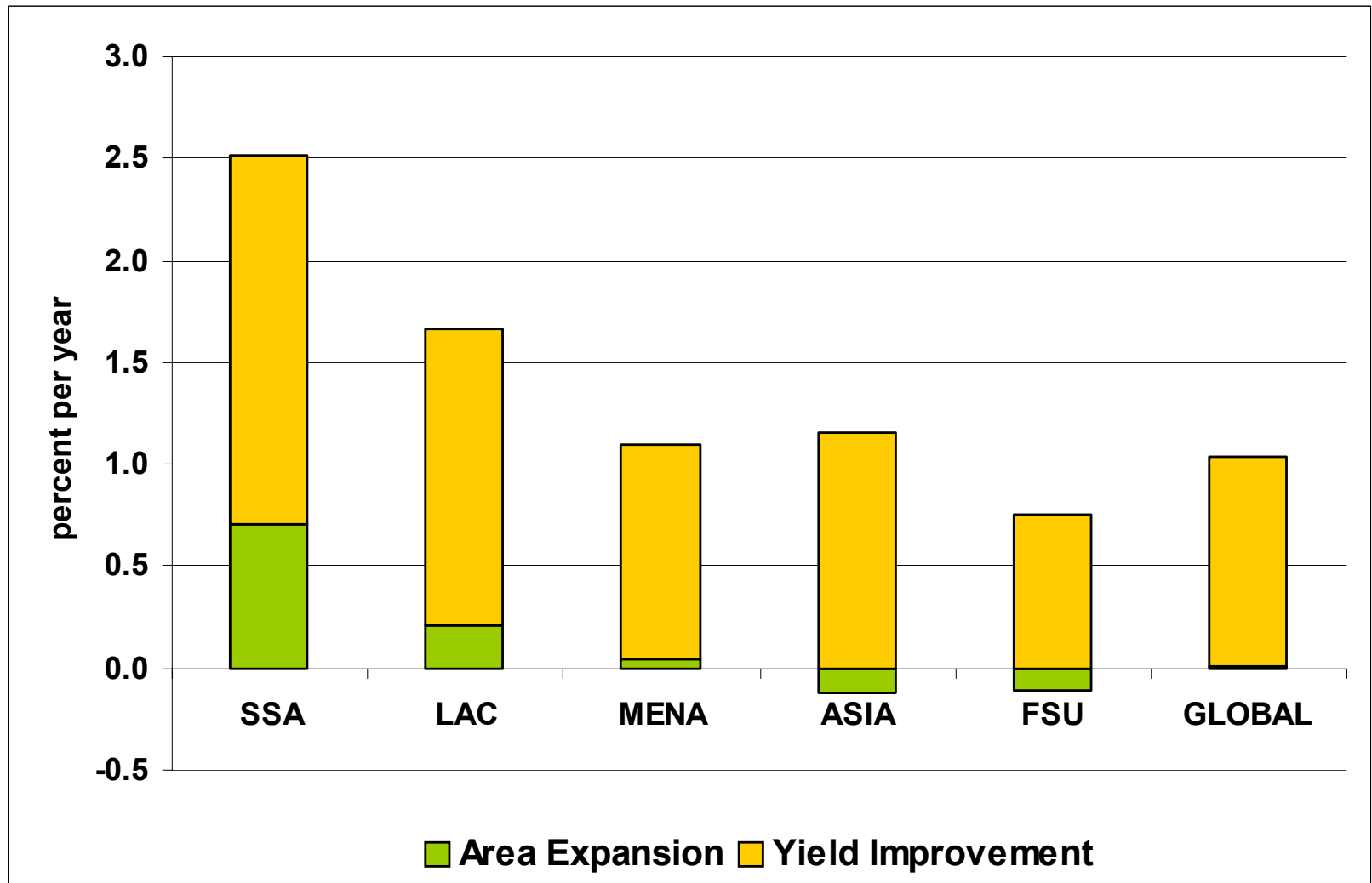
Source: IMAGE Model Calculations, RIVM

# Change in Land Use, Agriculture vs. Forests

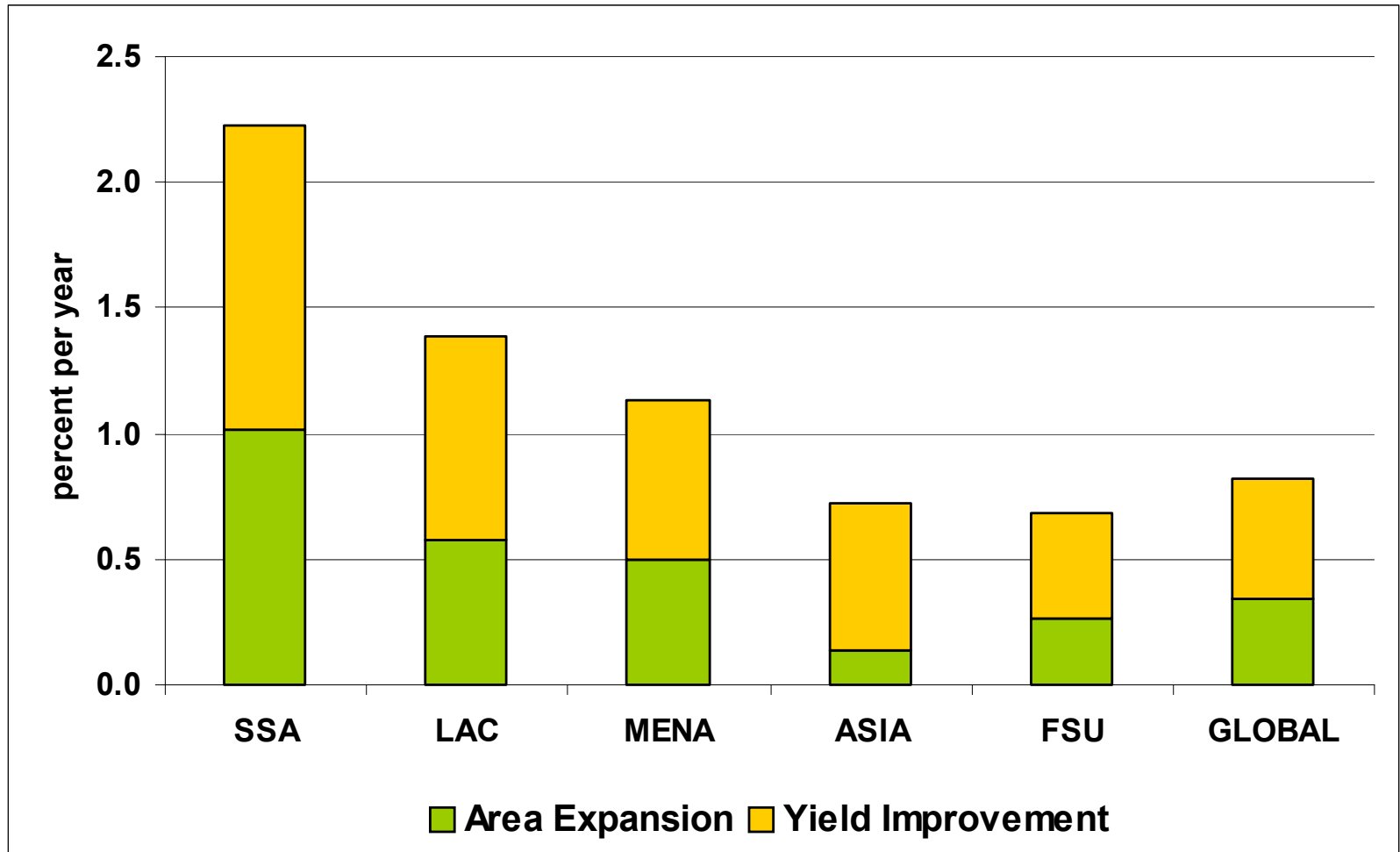


Source: IMAGE Model Calculations, RIVM

# Sources of Growth, Global Orchestration

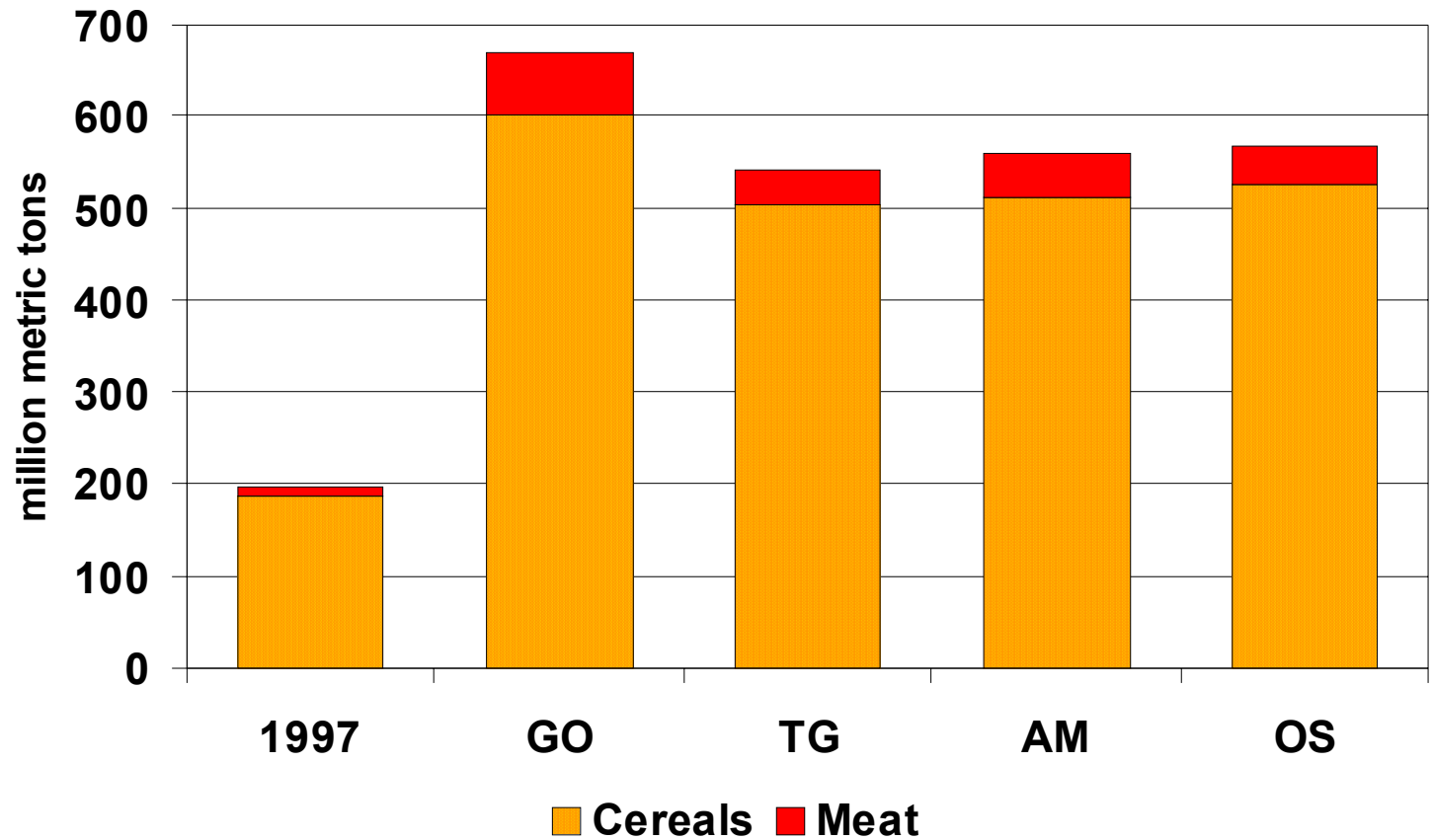


# Sources of Growth, Order from Strength

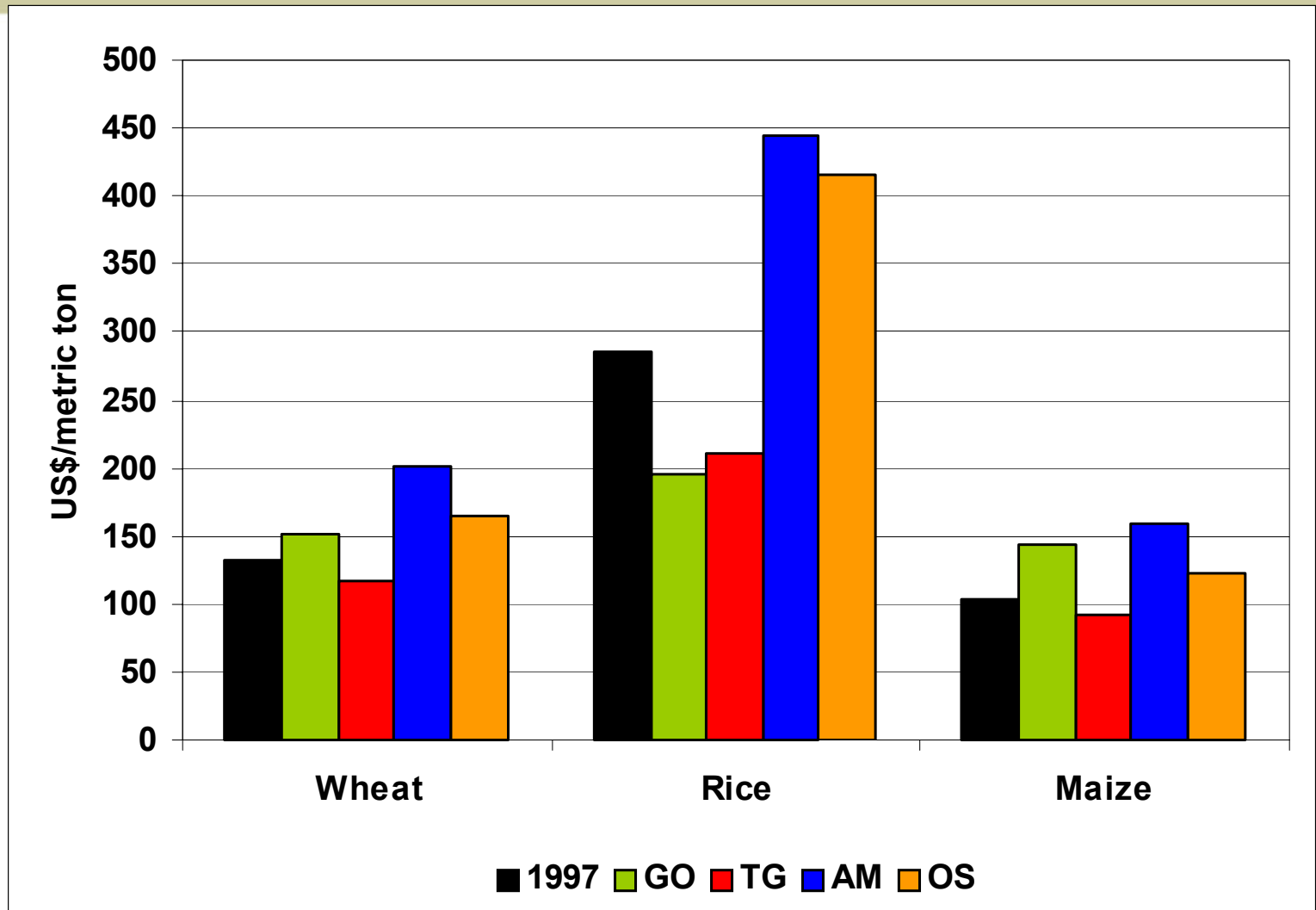


# International Trade

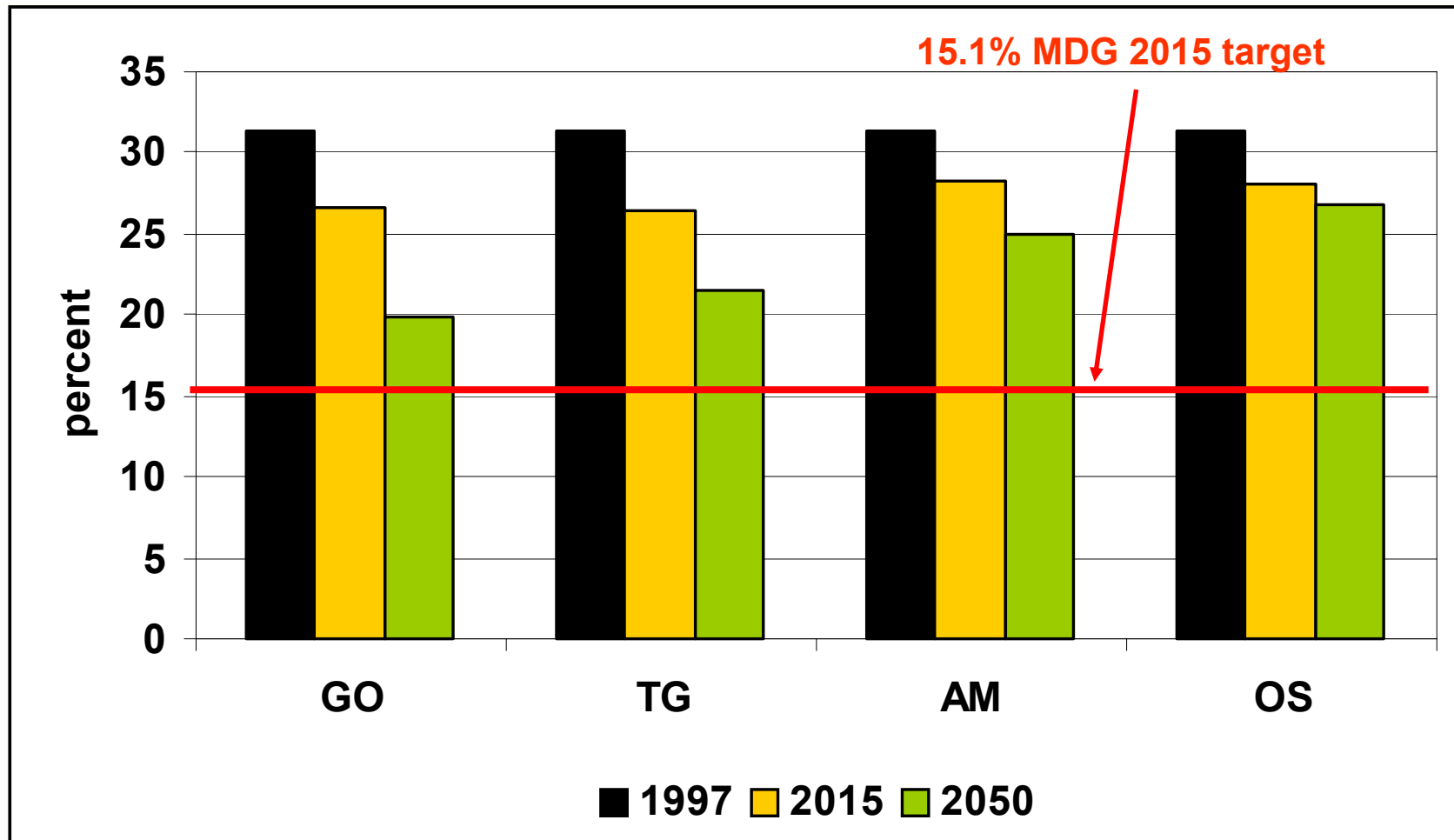
Global Trade in Cereals and Meat, 1997 and projected 2050



# International Cereal Prices



# Share of Malnourished Children





## **Results of the scenarios analysis: Trends that can be found in all scenarios, but which differ in intensity**

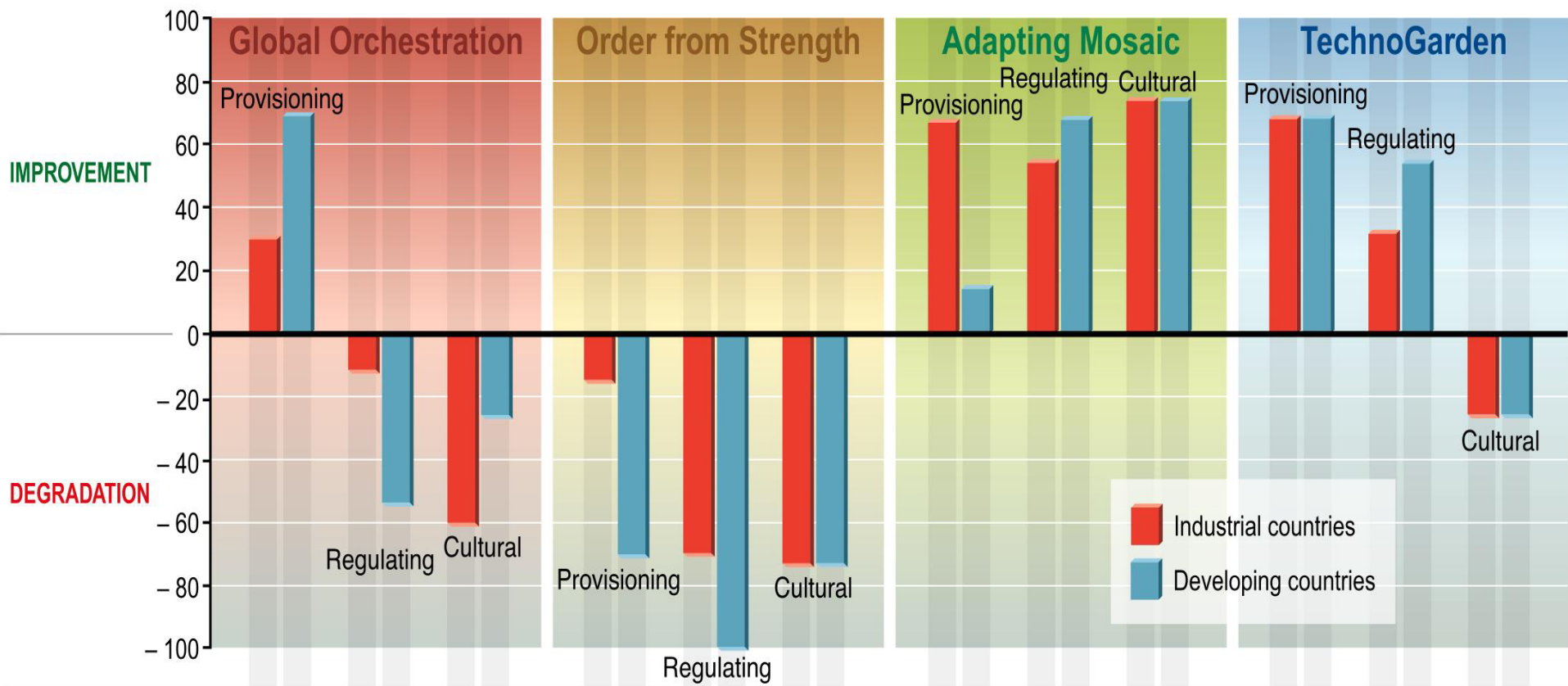
**Demand for provisioning services, such as food, fiber, and water, increases across scenarios.**

**Forest area declines on a global scale, while agricultural land expands, but at very different rates.**

**Food security remains out of reach for many people and child malnutrition will be difficult to eradicate even by 2050, despite increasing food supply under all four scenarios and more diversified diets in poor countries.**

# Ecosystem services outcome across the scenarios

Changes in ecosystem services  
in percentage

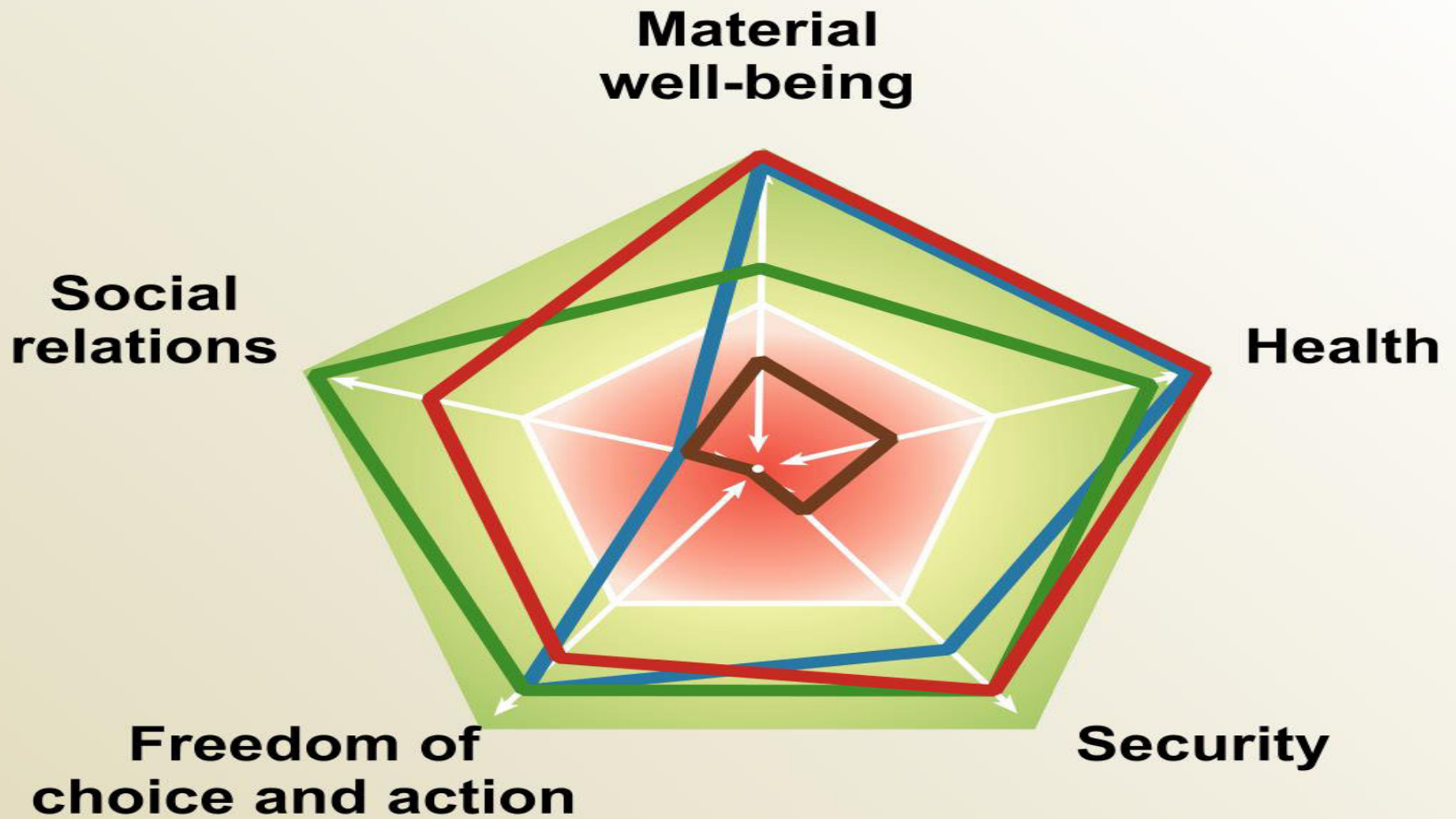


Number of services																		
Enhanced	3	4	0	1	0	1	1	1	0	0	0	1	4	3	5	6	4	4
No change	2	2	8	2	3	2	3	0	3	0	2	0	2	1	4	3	0	0
Degraded	1	0	1	6	2	2	2	5	6	9	3	4	0	2	0	0	1	1

# Outcomes of the scenarios analysis (1)

**Focus on increasing the flow of provisioning services often leads to reductions in supporting, regulating, and cultural ecosystem services. This may reduce the future capacity of ecosystems to provide services.**

**Monitoring ALL ecosystem services will increase society's capacity to avert large disturbances of ecosystem services, or adapt to them rapidly when they occur.**



Source: Millennium Ecosystem Assessment

- Global Orchestration
- Order from Strength
- Adapting Mosaic
- TechnoGarden

## Outcomes of the scenario analysis (2)

The future will represent a **mix of approaches** and consequences described in the scenarios, as well as events and innovations that have not yet been imagined.

All scenarios show different **trade-offs** between possible management strategies currently discussed in various policy fora.

# Int'l Assessment of Agricultural Science and Technology for Development (IAASTD)

## Overarching question:

**“How to reduce hunger and poverty, improve rural livelihoods, and facilitate equitable, environmentally, socially and economically sustainable development through access to, and use of agricultural knowledge, science and technology”?**

- started in beginning of 2005 with overall design meetings
- subglobal and global teams established
- first writing meetings in second half on 2005

# IAASTD – sub questions

**What are the challenges that can be addressed through agricultural KST?**

**What are the likely positive and negative consequences of agricultural KST?**

**What are the enabling conditions required to optimize the uptake and diffusion of agricultural KST?**

**What investments are needed to help realize the potential of agricultural KST?**

# IAASTD Global Report

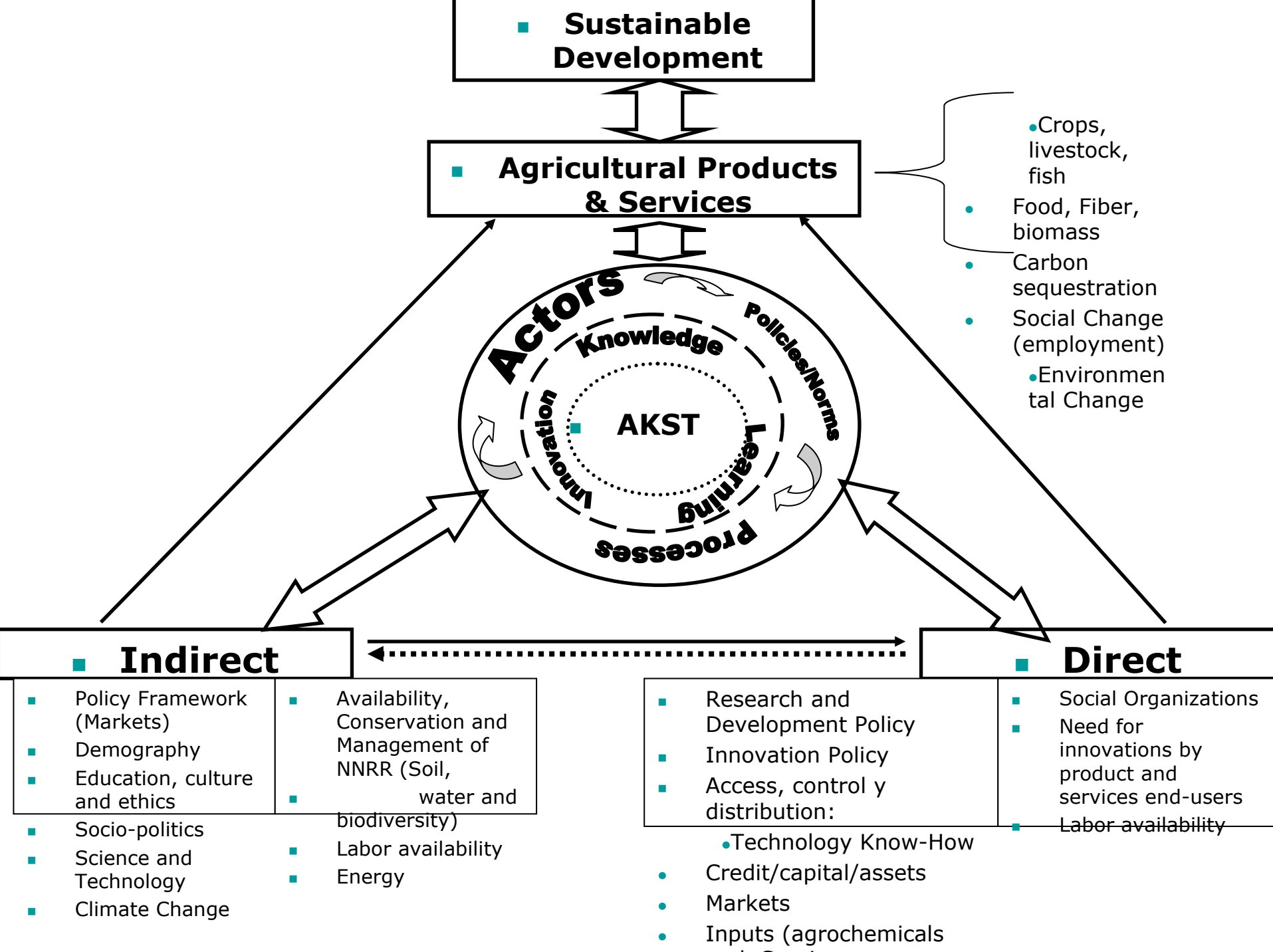
**Historical lessons**

**Plausible futures (now to 2050)**

**Relevance, quality and effectiveness of agricultural KST, and institutions and policies in relation to the broader objectives of :**

- Hunger and poverty reduction and the improvement of rural livelihoods and incomes
- The environment (e.g., water, soils, biodiversity, climate)
- Equitable, socially and economically sustainable development
- Human health (e.g., nutrition and food safety)





# IAASTD scenarios work

- **based on MA scenarios -> four scenarios focusing on agriculture and esp AKST**
- **idea to develop two 'rosier' versions of GO and AM**
- **started in Oct 05 with work on sub-global scenarios**
- **global storyline writing meeting in Jan 06**
- **first draft scenarios available in mid 06**

# GLOBAL ORCHESTRATION

**Trade  
Marketing and  
Information**

**Demographics**

**Culture  
and ethics**

**Economics**

**Socio  
Politics**

**Natural  
Resource**

**Energy**

**Clim. Chang**

**Knowledge  
Paradigm**

**Science and  
Technology**

=> "Surprising events"  
that can change  
direction

Different Trade  
Agreements will be  
consolidated

Permeable Borders  
– Free Global  
Market (goods,  
knowledge)

Some countries  
(LAC, Asia) will  
obtain more  
benefits/More social  
concern (WTO)  
Infection  
diseases,  
malnutrition  
declines

**COALITION  
CHINA-INDIA**

No true formation of  
World Trade Market  
(indirect barriers,  
strategy)

Continuous  
migration to urban  
areas

Populatio  
n growth  
stabilizes

T

Neutral Growth

Continue  
individual  
system/no corp.  
responsibilities

Creation of  
mechanisms to  
improve quality  
life

Organization  
of small  
farmers to  
access

Adopted foreign  
habits will decline

Growing interest  
for local  
production

Temperate  
crops  
countries will  
be benefited

GDA as a measure  
of economic wealth

Improvement in  
incomes, but  
increase in  
disparity

Poor poorer, Rich richer  
but few (in-transition)  
countries in better  
shape

Crop regional  
specialization

Overall growth

Continue scheme: winners  
(rich farmers, enterprises)  
/losers (minorities and small  
business)

NGO and political  
effort to balance  
corporate power

**US/EU change  
politics...more investment in  
neighbors**  
New opportunities for  
disadvantaged (intensive,  
processing for export)

No significant  
reduction in  
inequalities

Increased water use.  
Water scarcity, land  
deg., intern. conflict

Reaction to  
preserve water,  
ecosystems

Fisheries  
collapse

Reforestation,  
Productive tree  
Systems

Inter. Effort of  
Corporation, NGOs to  
preservation

Biodiversity more protected,  
with specific priv. Interest  
2040

Decline in use  
of charcoal

Oil prices increase  
to over \$100/barrel

Application of efficient  
biofuels systems (10%)

Countries with  
BS will seek  
alliances

**A true BS alternative to  
conven. fuel is discovered**

BS more accessible to  
few other countries

Non-competitive  
agriculture eliminated if  
not switched to lucrative  
act.

Natural disasters  
increase

**Newer generation forces  
dramatic CC policies**

More understanding  
of clim. changes

Reactive responses  
to eco-environ.  
issues

All ag. sectors  
must included  
Private sector will  
increase impact

More PPP in  
research

Extension from  
diverse sectors

Global access to  
info through  
internet

More consultant  
work

Some countries  
shift to non-ag  
activities

More emphasis  
on health issues

More tech. to  
increase  
yields

3<sup>rd</sup> Generation  
GMO's

Expansive use of gen. Eng.  
Crops (stress tolerant)

More research to  
developing problems  
(eg. due to natural  
disasters)  
Expansion in  
Aqua culture

Livestock,  
feeding

2010

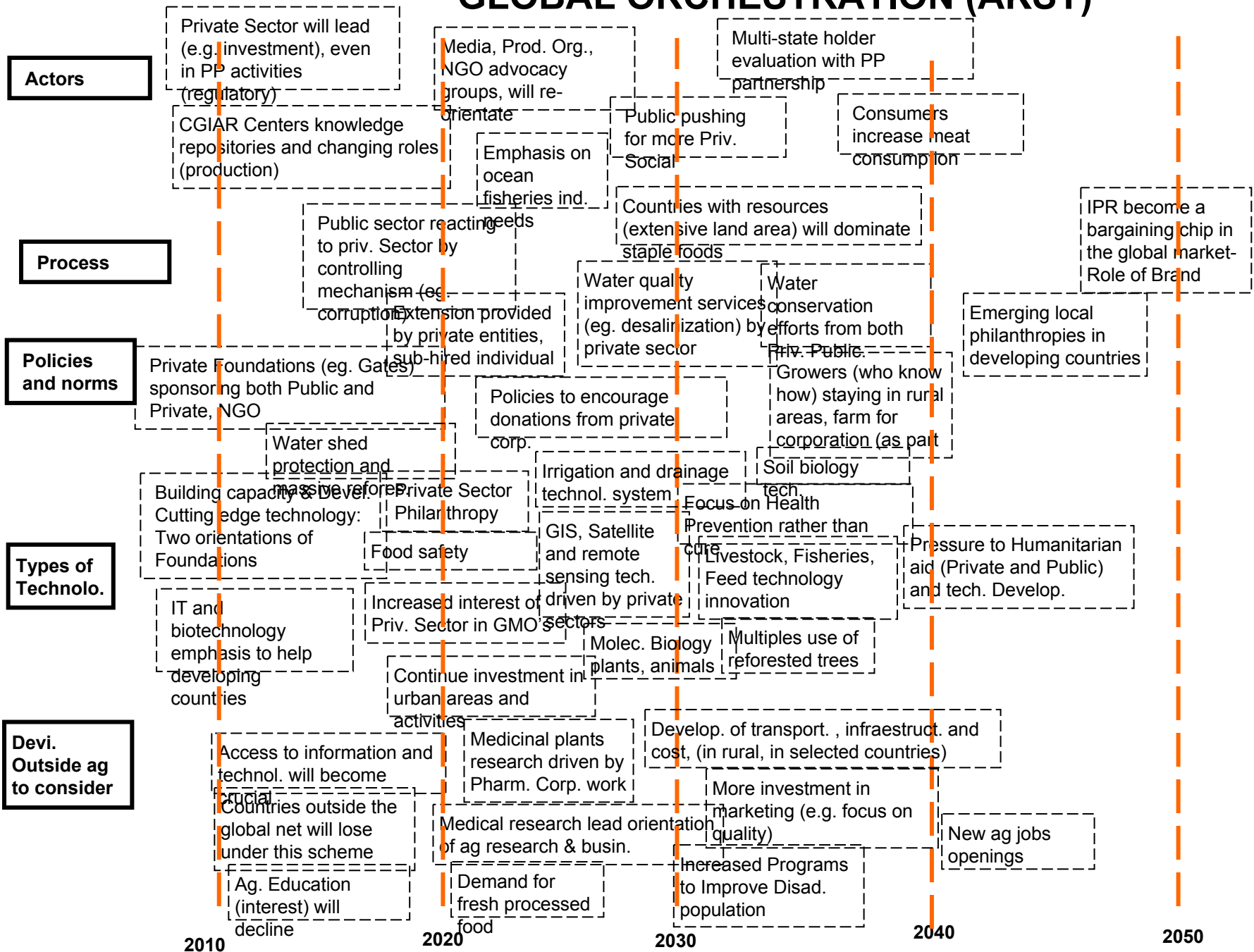
2020

2030

2040

2050

# GLOBAL ORCHESTRATION (AKST)



# Key Issues

**A major macro question for this Assessment is:**

- **What are the positive and negative consequences of various agricultural/food systems, agricultural technologies (e.g., conventional farming, organic farming, use of inorganic fertilizers, on-farm conservation of local genetic resources, irrigation, trans-genics and processing) for hunger, poverty and human health, social equity, the environment and the economy?**

**Three issues will cross-cut the global and sub-global assessments:**

- **How have changing markets and changing access to markets affected the development and sustainability goals? What are the projected implications of market changes in the future?**
- **What have been, and what are projected to be, the implications of institutional and policy change and funding (private vs. public investment, IPR, legislative frameworks) on the generation, access, dissemination and use of AKST?**
- **How has natural resource availability, access and management (particularly water resources) affected the development and sustainability goals, and how will projected changes in natural resource availability, access and management affect the development and sustainability goals in the future?**