

Integrated models in the GER

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Assessing the impacts of Green Economy investments at the global and National level

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Paris - March, 2010

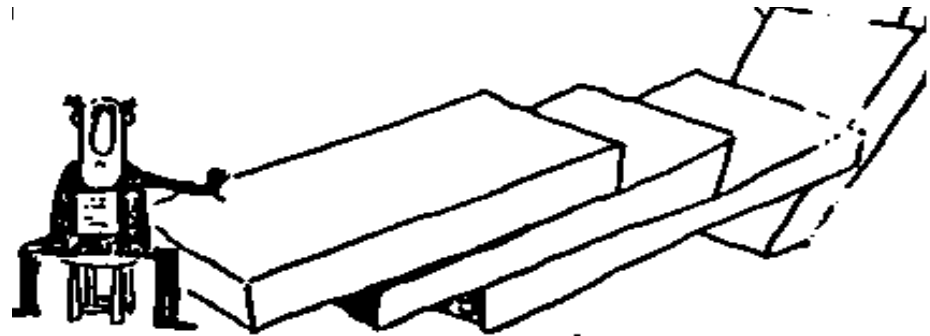
Millennium Institute

- Established in 1983, MI is a not for profit organization based in Arlington VA, USA.
- Core capabilities:
 - Illustration of the synergies and implications of different options across a broad framework
 - Provision of a basis for productive long-term planning and unite various parties around consistent policies
 - Deeper understanding of the interrelations existing among critical issues

Motivation for this work

- There is a need for integrated tools that could serve as a mean to close the gap between available dynamic and all embracing thinking and static models;
- These tools are required when facing critical issues such as the upcoming energy transition and climate change, because conventional modeling tools do not examine their broader causes and impacts.

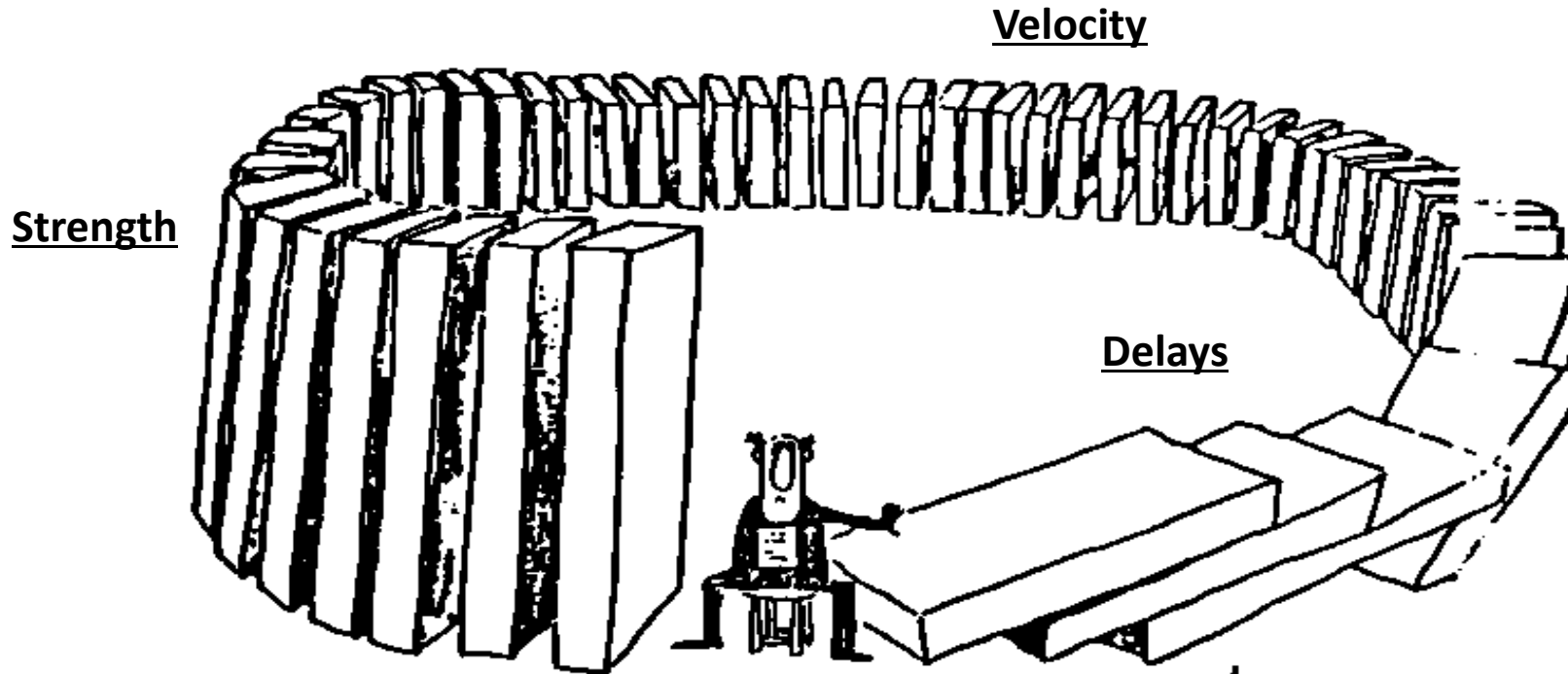
Why Take a Systemic View?



Levin

Drawing by Levin; © 1976 The New Yorker Magazine, Inc.

To Avoid Unexpected Results!



Drawing by Lewis; © 1976 The New Yorker Magazine, Inc.

lewis

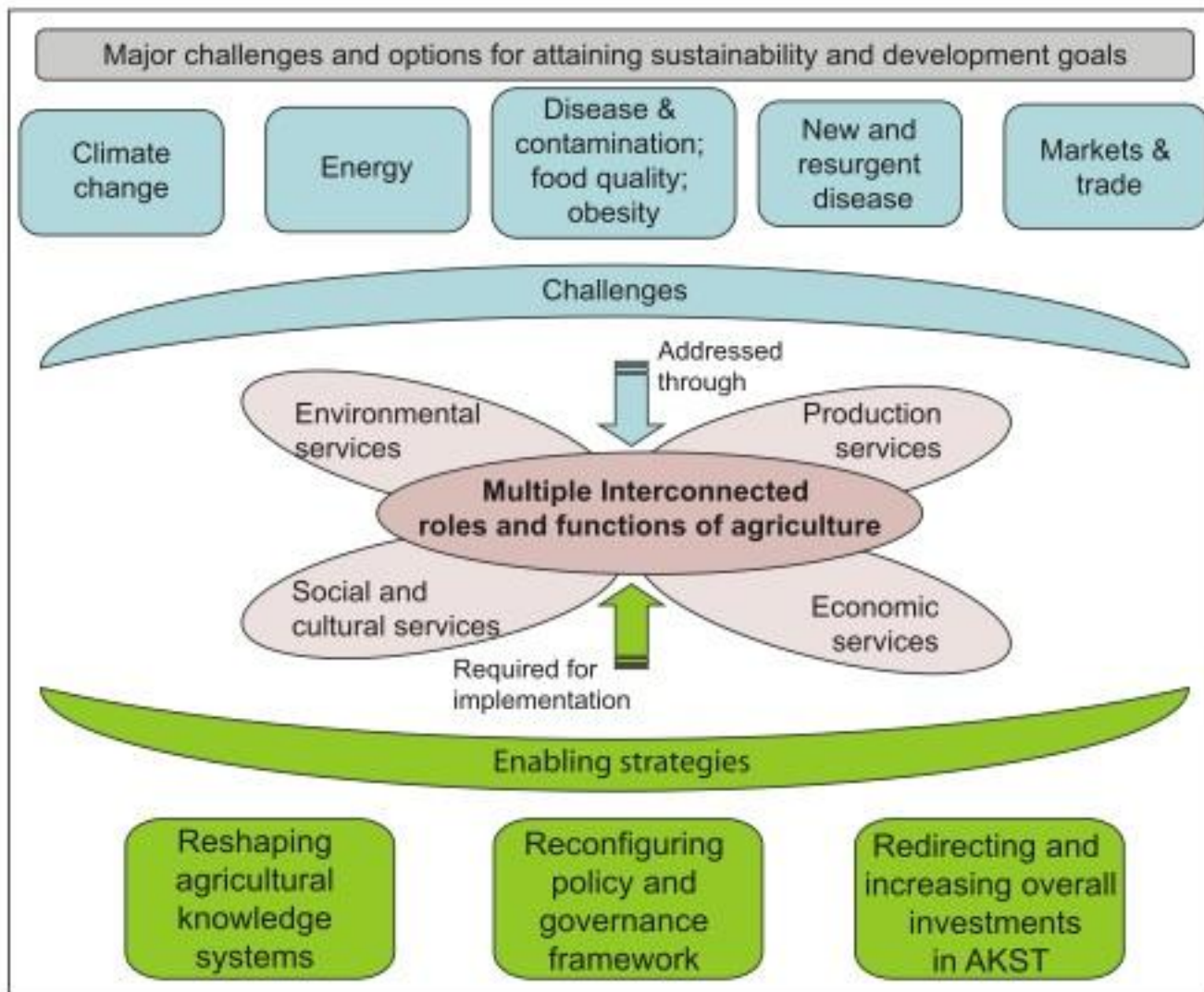
IAASTD: The Reports

www.agassessment.org



Global / sub-Global Reports: 400 authors, 52 countries

What's the Problem? Key Findings NA-E



Major challenges and options for attaining sustainability and development goals

Climate change

Energy

Disease & contamination;
food quality;
obesity

New and resurgent disease

Markets & trade

Challenges

Environmental services

Production services

Multiple Interconnected
roles and functions of agriculture

Social and cultural services

Economic services

Required for implementation

Enabling strategies

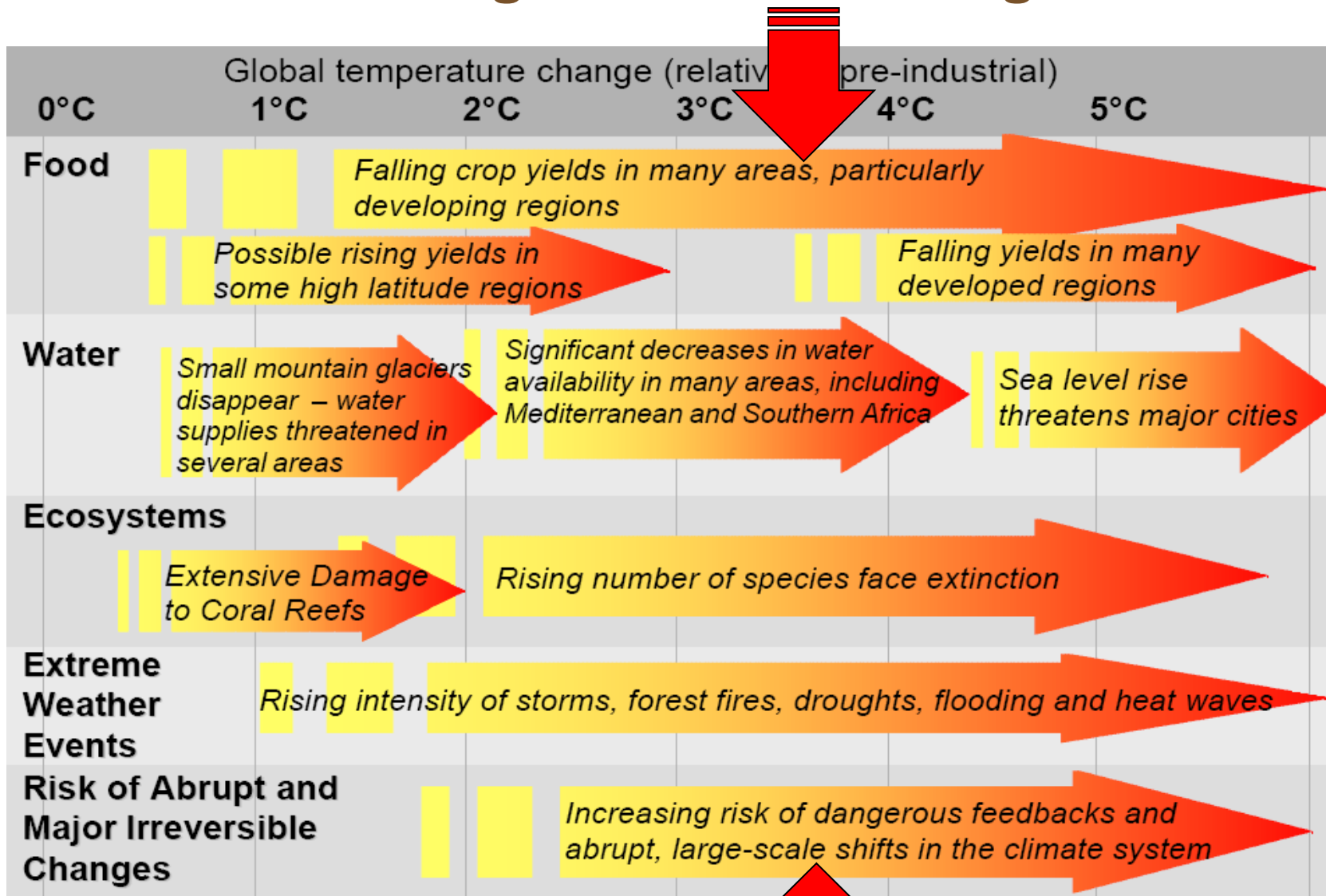
Reshaping agricultural knowledge systems

Reconfiguring policy and governance framework

Redirecting and increasing overall investments in AKST

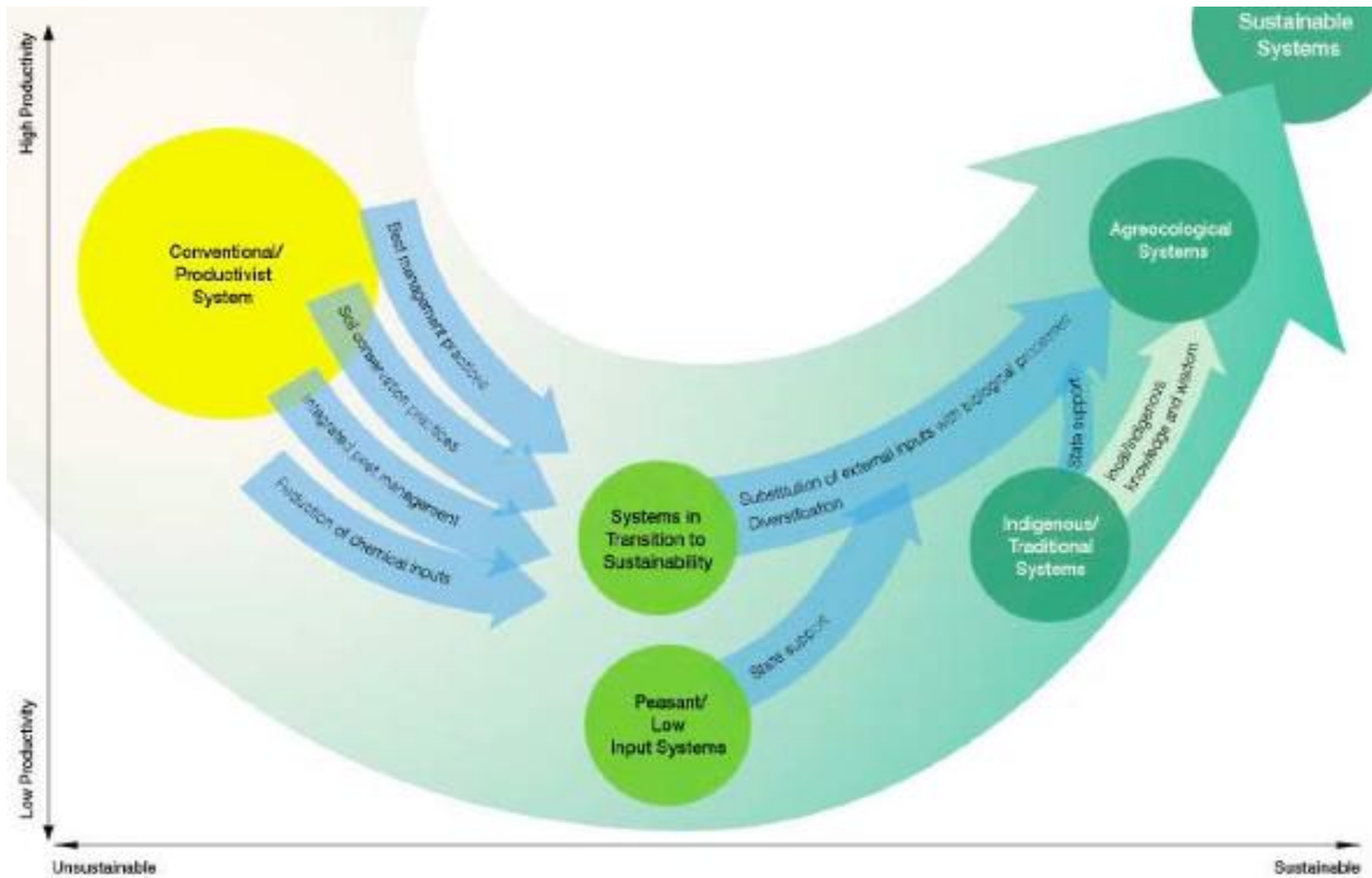


Critical Challenges: Climate change



Source: Stern Review

Transition to organic / ecological / resilient agriculture



Options for action: consumption patterns and sustainable development



Business as usual is not an option

Methodologies

- Optimization models, which generate “*a statement of the best way to accomplish some goal*” (Sterman, 1998), are normative, or prescriptive, models.
- Econometrics measures economic relations, running statistical analysis of economic data and finding correlation between specific selected variables.
- Simulation models aim at understanding what the main drivers for the behavior of the system are.

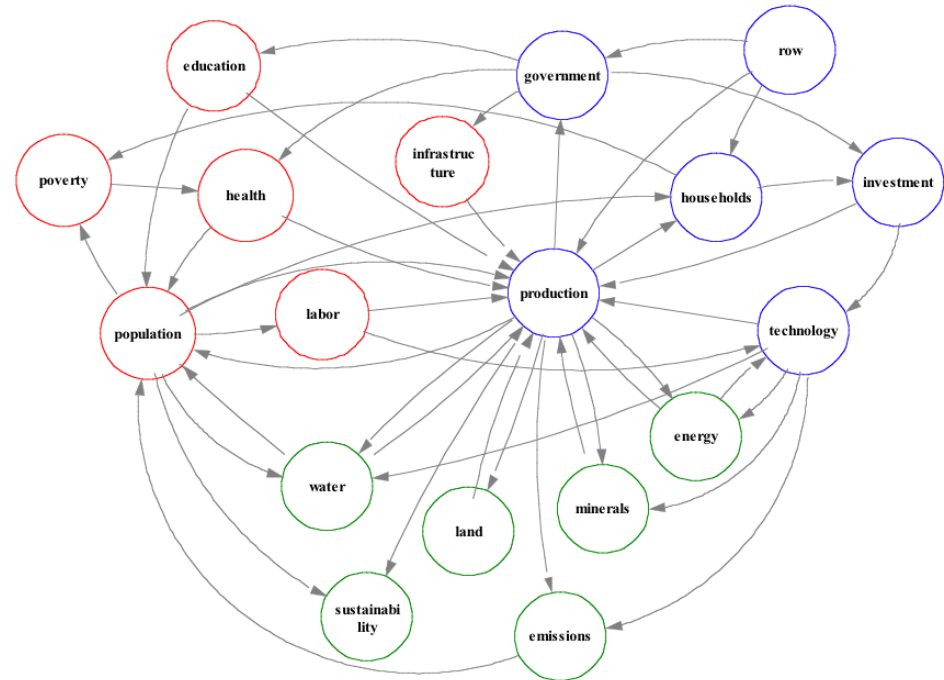
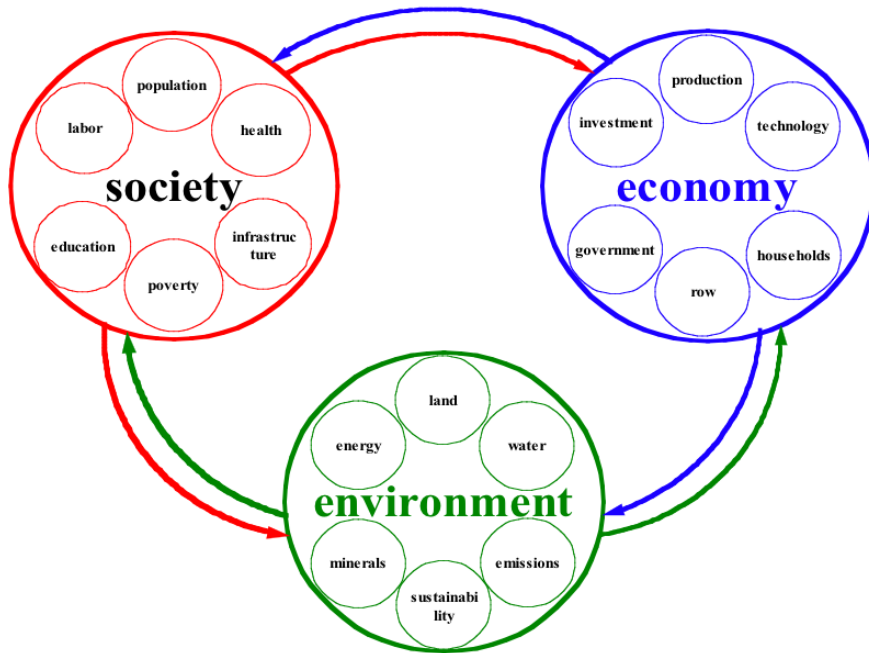
Methodologies (2)

- Most CGE models only point out the optimal solution and don't describe how the economy will get to that position;
- T21 shows the path the economy takes as a result of various policies;
- T21 can highlight the ups and downs on the way, and the possibly good or bad side effects along the way.

Characteristics of T21

- Descriptive VS Prescriptive structure
 - Descriptive: aiming at understanding systems
 - Prescriptive: aiming at applying assumptions
 - The results are not necessarily directly related to assumptions
- Causality VS Correlation
 - Represents feedback loops, non linearity, delays
 - Simulates against history
- Policy Evaluation VS Policy Optimization
 - Supports a collaborative approach and model development

Structural overview



Its not (only) the tools

1. Political will
2. Political courage

The question: How do we help these?

GER Models: Parallel Activities

1. Global analysis:

- 8 Sectoral models (sectoral chapters)
- Integration of the 8 sectors (and more) into a global model

2. National models (modeling chapter)

- 6 national case studies: USA, Ecuador, Denmark, Mali, Mauritius and China

Main areas of overlapping

- Finance chapter
 - Financing options
- Enabling conditions chapter
 - Policies
- Sustainable consumption
 - BAU and alternative demand projections

GER Modeling Global Analysis

General Observations

- Globally, green investments lead to:
 - Moderate economic gains, with considerable avoided costs going forward;
 - Higher employment, with tradeoffs and losses in some sectors;
 - Curbed consumption of energy & natural resources, more sustainable fishery and forestry, agriculture;
 - Reduction of CO₂ and GHG emissions, below BAU but above 1990 and 2009;
 - Lower ecological footprint, constant at 2009 level.

General Observations (2)

- Synergies and side effects across sectors:
 - Efficiency improvements reduce the consumption of resources and increase GDP; higher GDP increases consumption;
 - Policy frameworks that would support the transition to more sustainable consumption would have considerable impacts (e.g. China)

GER Modeling Chapter

National Case Studies

Key Observations

- In all countries, green investments lead to:
 - marginal to moderate economic gains
(primarily due to higher employment and efficiency - in energy and resource use)
 - lower consumption of energy & natural resources
 - reduction of emissions (below BAU)
- Synergies and side effects across sectors:
 - Combination of policies and investments often generates the highest payoff
 - Tradeoffs in employment

Approach

- Investments are assumed to be additional throughout the simulation
 - increased green economy investments do not reduce existing investments (apart from power)
- Funding assumed to be available through:
 - Public and private financing (e.g. debt -Mali-)
 - No simulations assumed increased taxation to finance green investments
 - Some simulations (e.g. China) did not incorporate green investments in national accounts (costs offset each other, as employment –but the energy bill declines, determining the increase of GDP)

Mali: focus

- Agriculture
 - biofuels (and climate change)
- Land management
 - deforestation/reforestation
- Water
 - river management
- Energy
 - renewable energy
- Sanitation

Mali: Assumptions

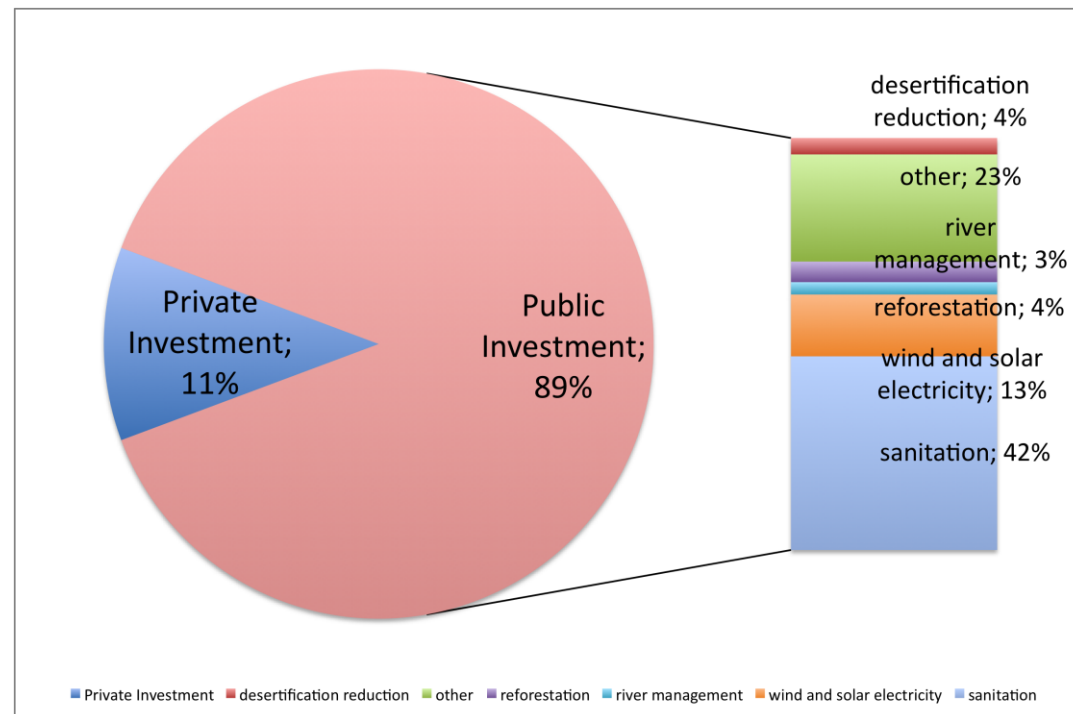
- Three Scenarios:
 - BAU: no fundamental changes in policy or external conditions up to 2030
 - Moderate Green Investment: incremental green investment: 1%-1.2% of GDP; public: 1% of GDP, private: 1% of total private investment
 - Large Green Investment: incremental green investment 1.5%-1.8% of GDP; public: reach a steady level of 1.53% of GDP in 2015, private: follow suite with 1.53% of total private investment

Mali: Assumptions

In both green economy scenarios, investment (public & private) is distributed across sectors in the same manner.

- Additional investments, e.g. broad support to increase agricultural yields, are included in BAU.
- Other investments, e.g. access to water, result from the combination of simulated green investment in various areas.

Allocation of green investment:



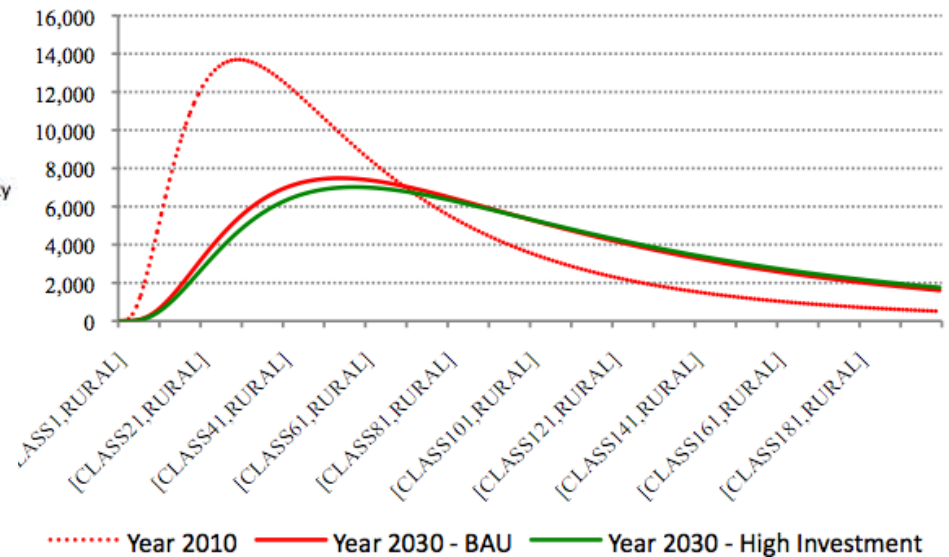
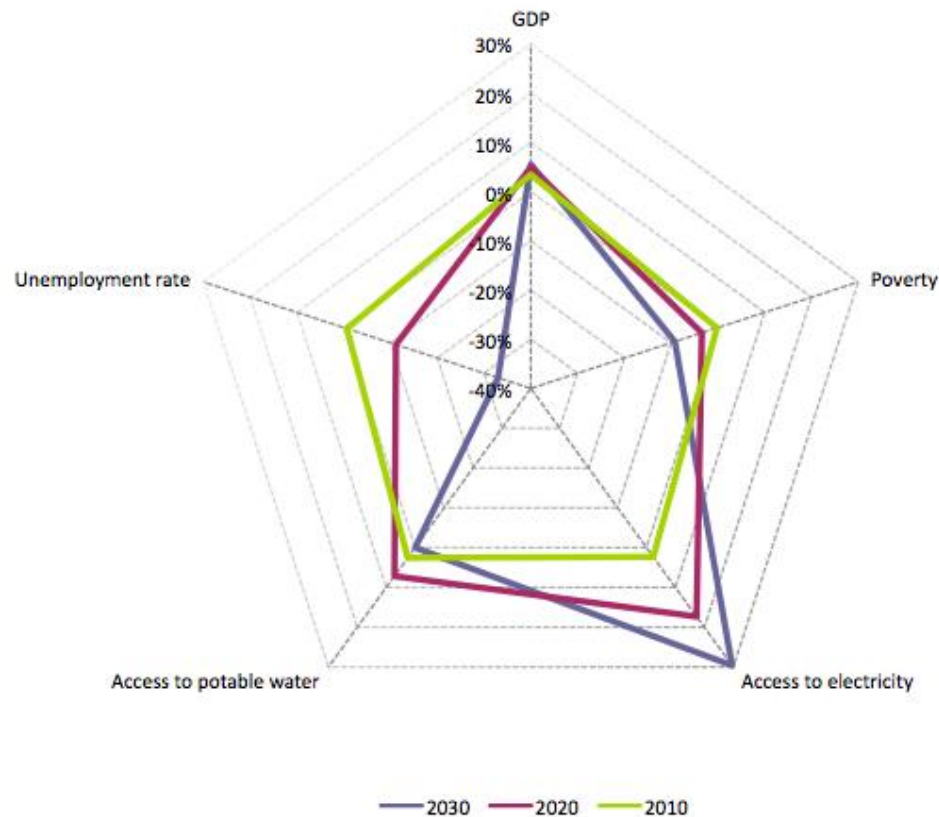
Mali: Results of Green Investment

- Slight acceleration of economic growth
 - Faster but limited decreases in monetary poverty and unemployment
- Major improvements in social poverty reduction
- Lower energy consumption, fossil fuel dependence
 - Slow growth of CO₂ emissions and improved trade balance
- Increased national debt (but debt/GDP ratio still decreasing) if investments are financed by domestic resources only

Mali: Figures of Projection

Cross-sectoral impacts of high green investment scenario (relative to BAU)

Rural income distribution by income class



You cannot solve the problem with the same kind of thinking that created the problem

Albert Einstein

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