Resource and economics modeling:

Merging several approaches using the Threshold 21 (T21) model

T21

INTEGRATED DEVELOPMENT MODEL

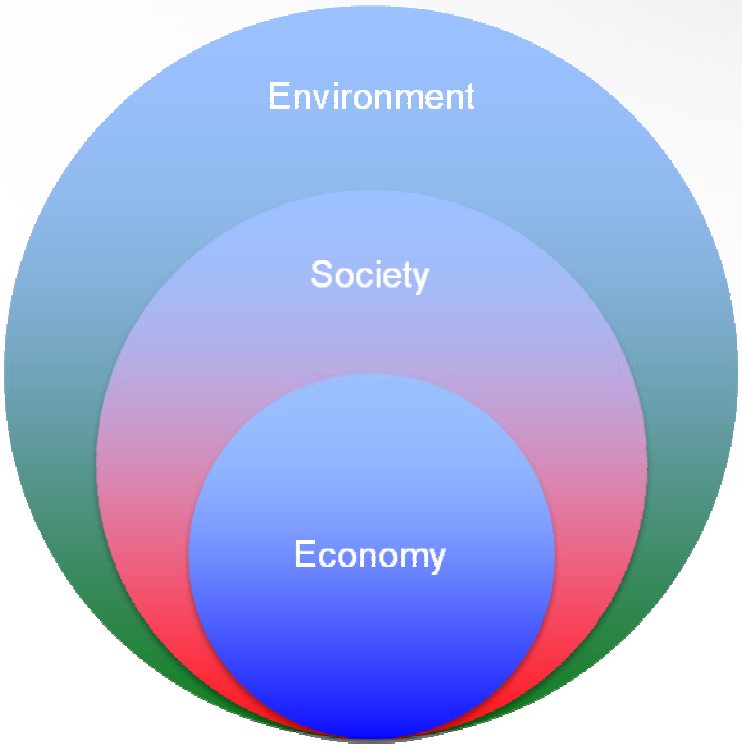
Andrea M. Bassi, Ph.D.

Nairobi, 21 September 2011

Characteristics of MI projects

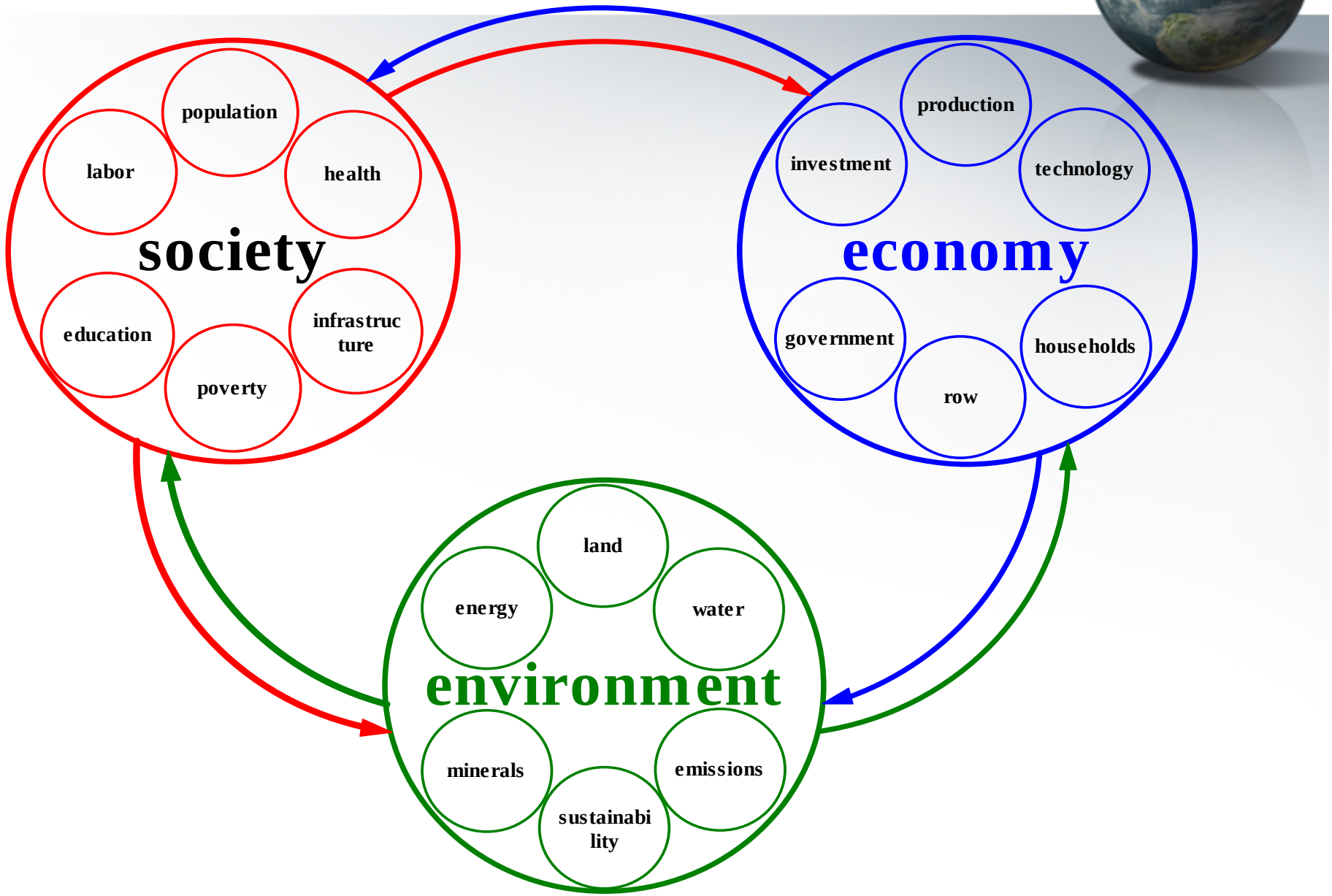
- Fully customized models (to local context) and analysis, focused on elaborated national vision and implementation policy *(open source models).*
- Flexible, easy to learn and use software for the simulation of different investment scenarios
- Integration of different stakeholders from across government (our clients) and interested parties in the modeling and policy dialogue process
- Local capacity development for ST and SD modeling, qualitative and quantitative scenarios.

Approach – Methodology:
A knowledge integrator

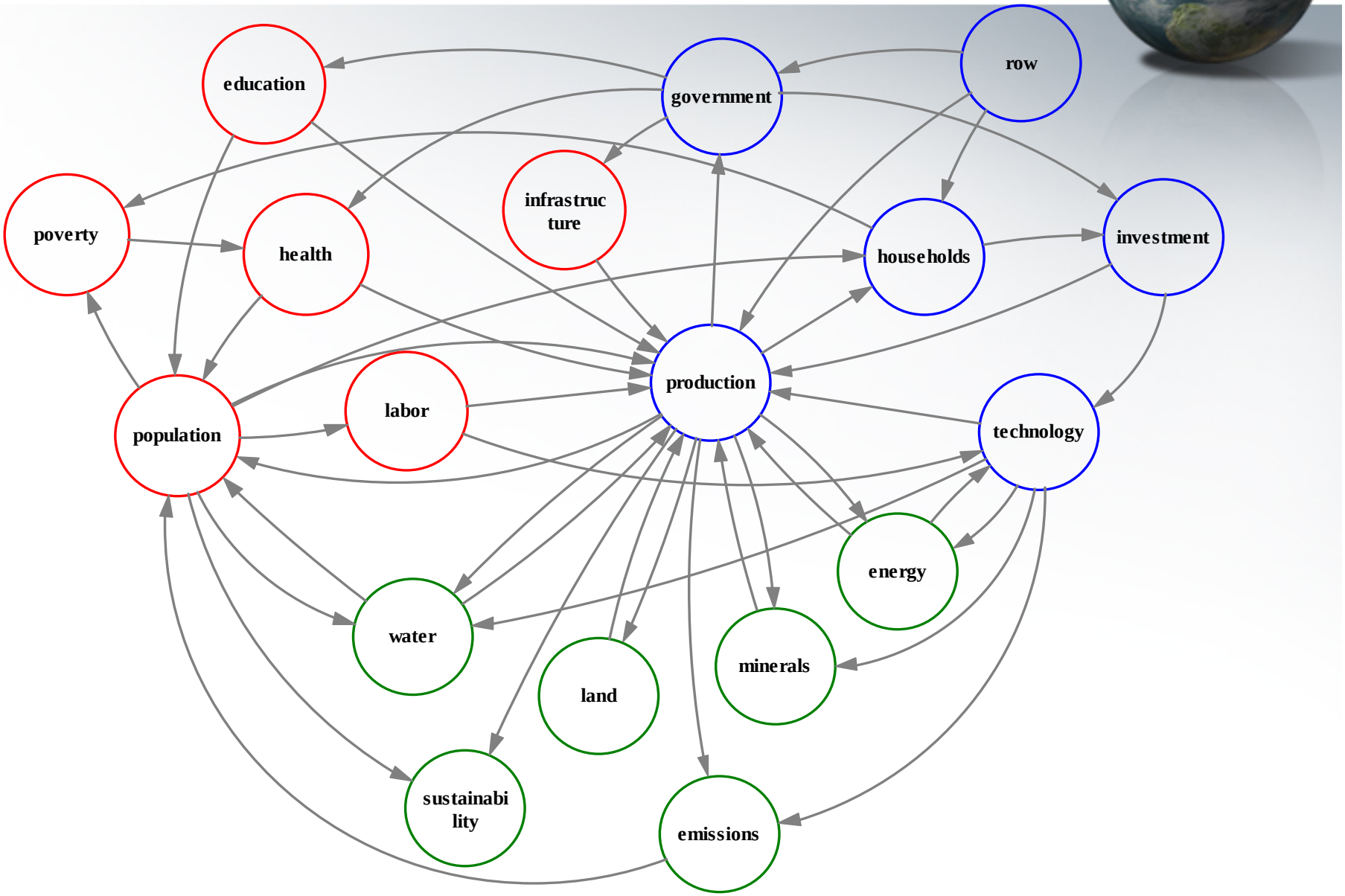


Society	Economy	Environment
Population	Agriculture	Land
Nutrition	Fishery	Water
Education	Forestry	Energy
Employment	Industry	Waste
Poverty	Services	Emissions
Public Infrastructure	Economic Accounts	Footprint

T21 Structure

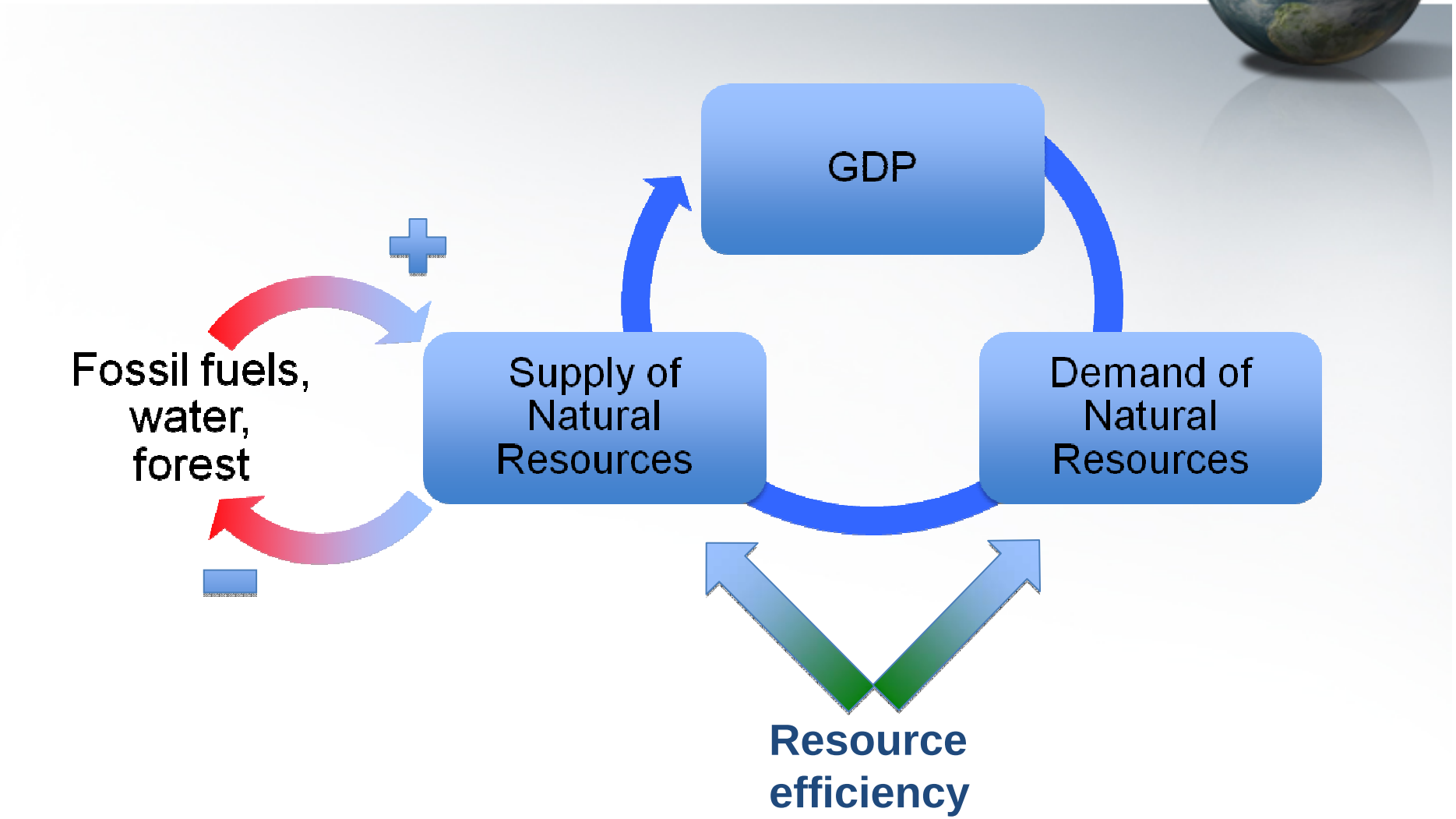


T21 Structure



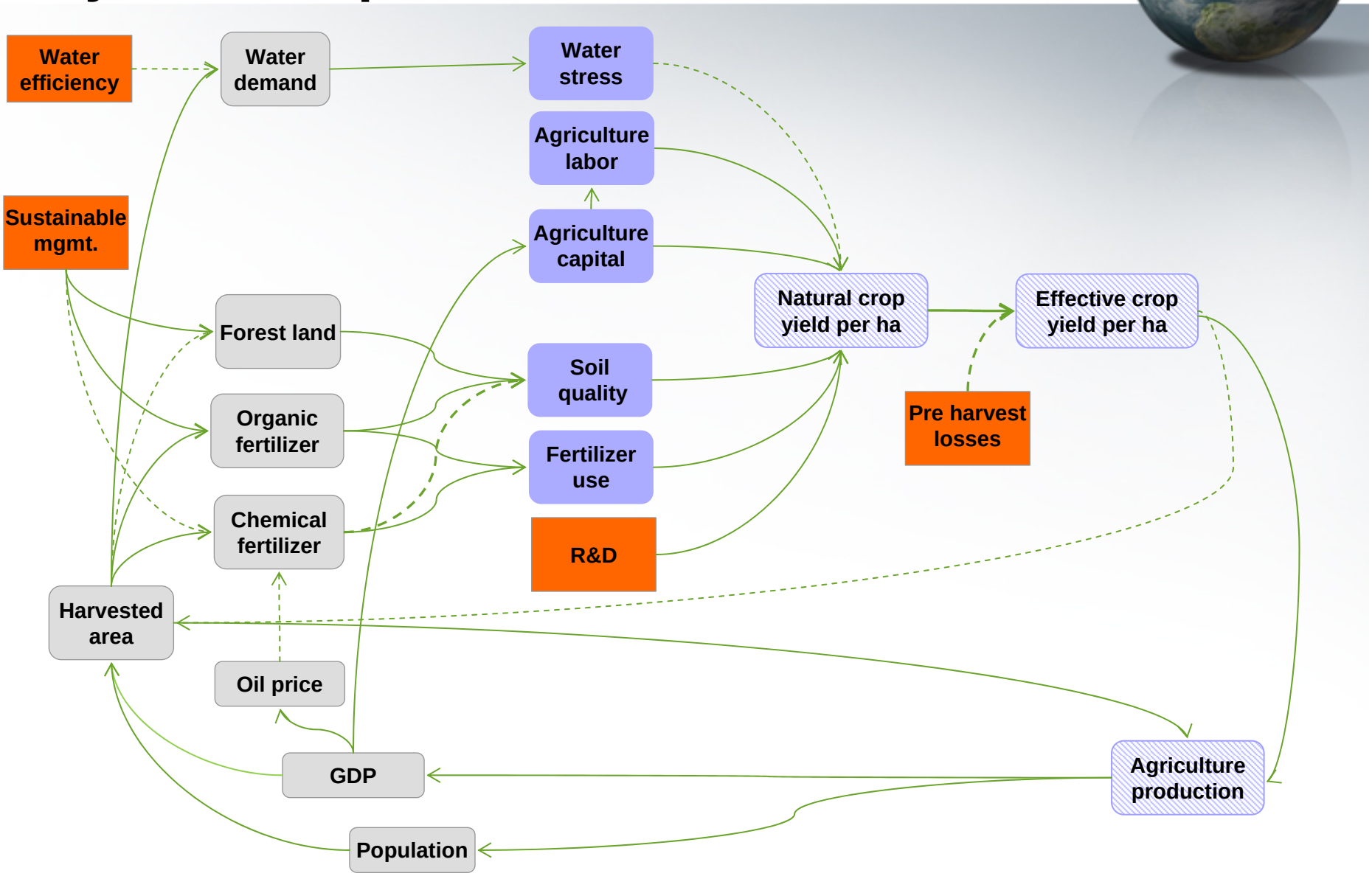
Approach – Methodology (2)

Merging economic and biophysical models

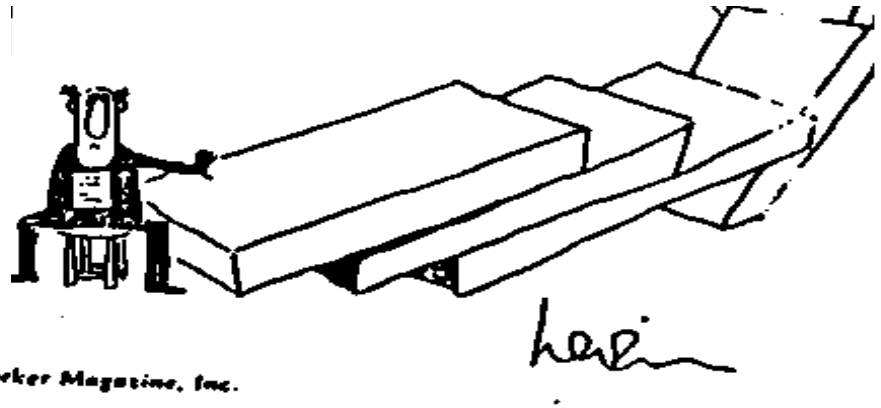


Approach – Methodology (3)

A systemic representation

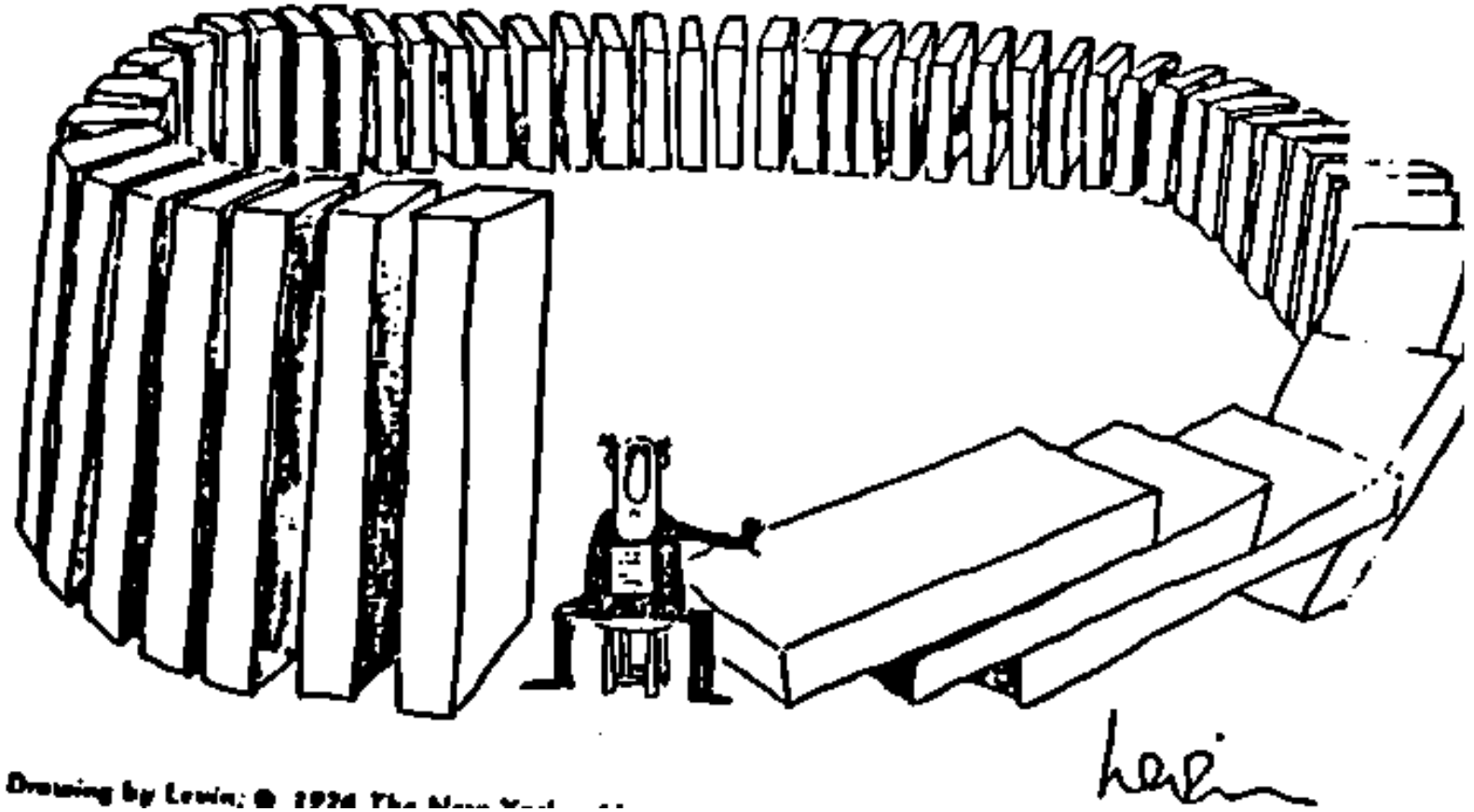


Why Take a Systemic View?



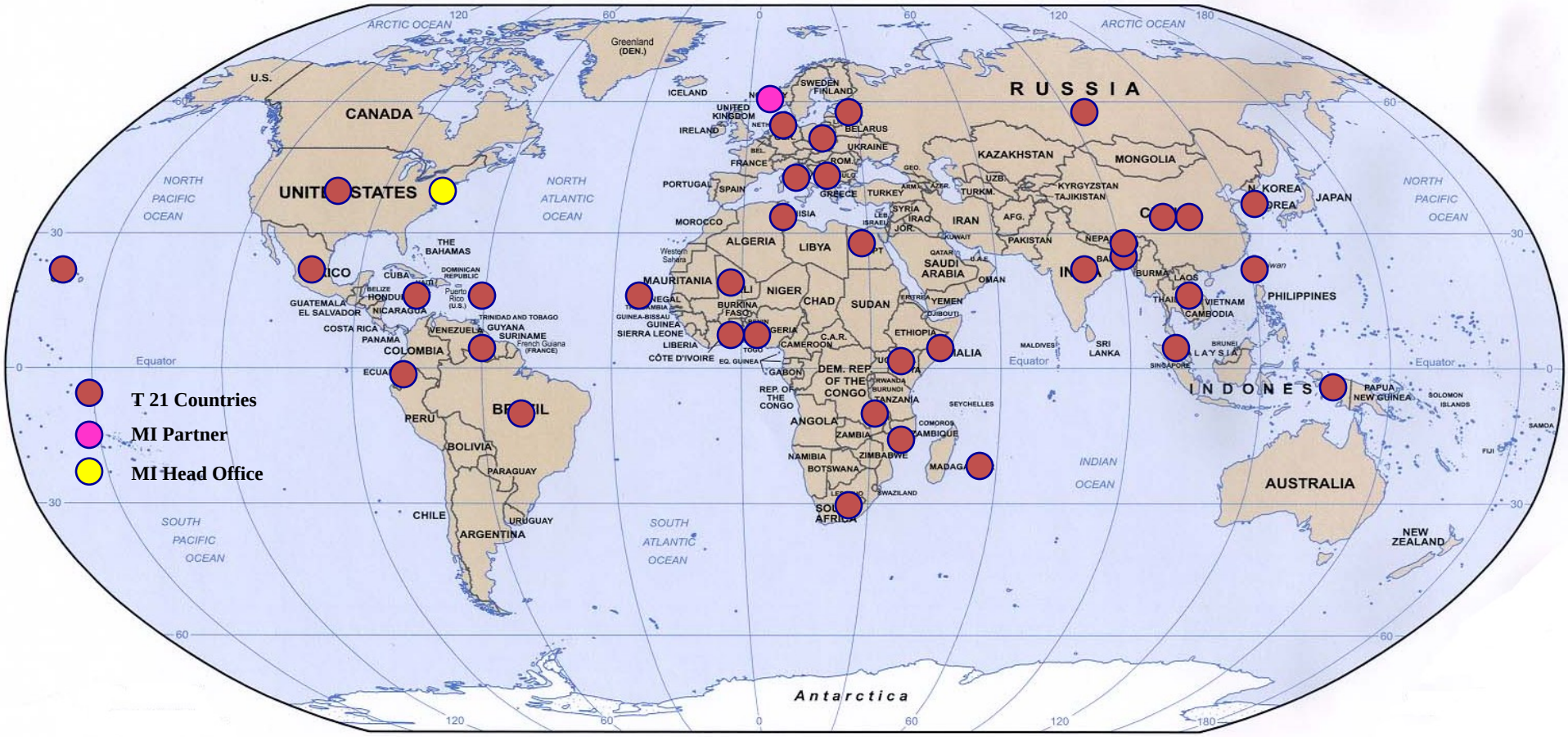
Drawing by Lorin; © 1978 The New Yorker Magazine, Inc.

To Avoid Unexpected Results!



Applications Worldwide

National models, plus several more regional country projects and reports



Role of scenarios

- **At the global level, how could scenarios support the progress of REDD+?**
- An integrated approach can support the evaluation of several sectoral and cross-sectoral potential medium and longer-term impacts of investments(including synergies and bottlenecks).
- REDD+, in the context of government accounts, can provide a valid alternative/complement to existing economic development and forestry management strategies.

T21 Fits into Planning Toolkits

- Macro models
  - Provide Macro Balances, MTEF, IFI discussions
  - Short term -- need longer-term, x-sector validation
- CGE Models
  - SAM, Detailed relations, Optimum effects
  - Comparative static -- need more transparent paths
- Optimization Models
  - Detailed relations, mostly linear, optimum effects
- Threshold 21
  - Long term, Cross sector links, Transparent results
  - Not as detailed, builds on local data and input from other tools

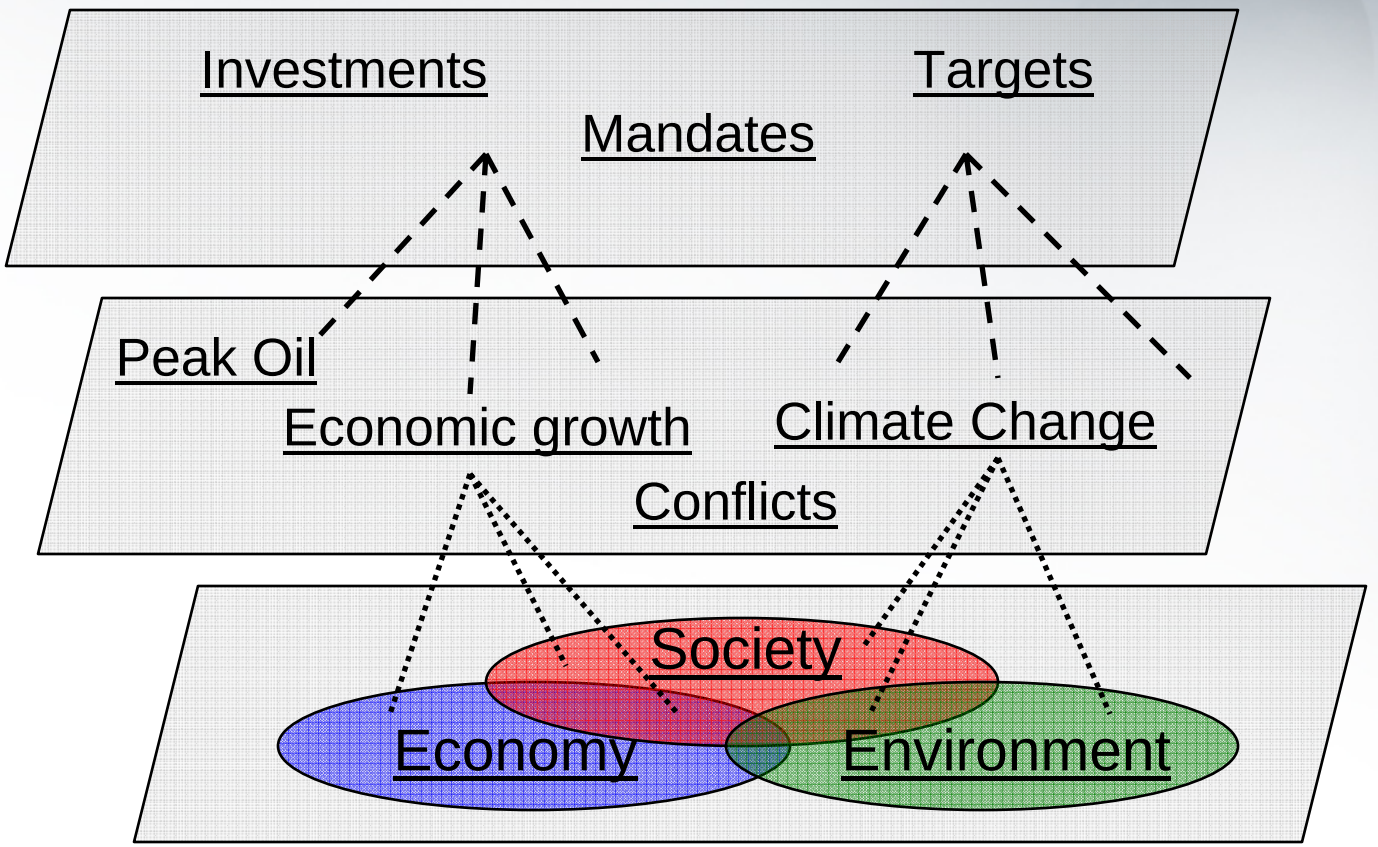
Planning goals: Kalimantan

- REDD+ finance used to incentivize the transition to a Green Economy in Kalimantan, to support:
  - Indonesia's targets of 7% GDP growth,
  - food security,
  - wise use of natural resources,
  - poverty alleviation, and
  - 41% carbon emission reduction by 2020 (of which 15% with international support),
- Also valuable to maintain Kalimantan's valuable biodiversity, ecosystem services and contribution to CO_2 emissions.

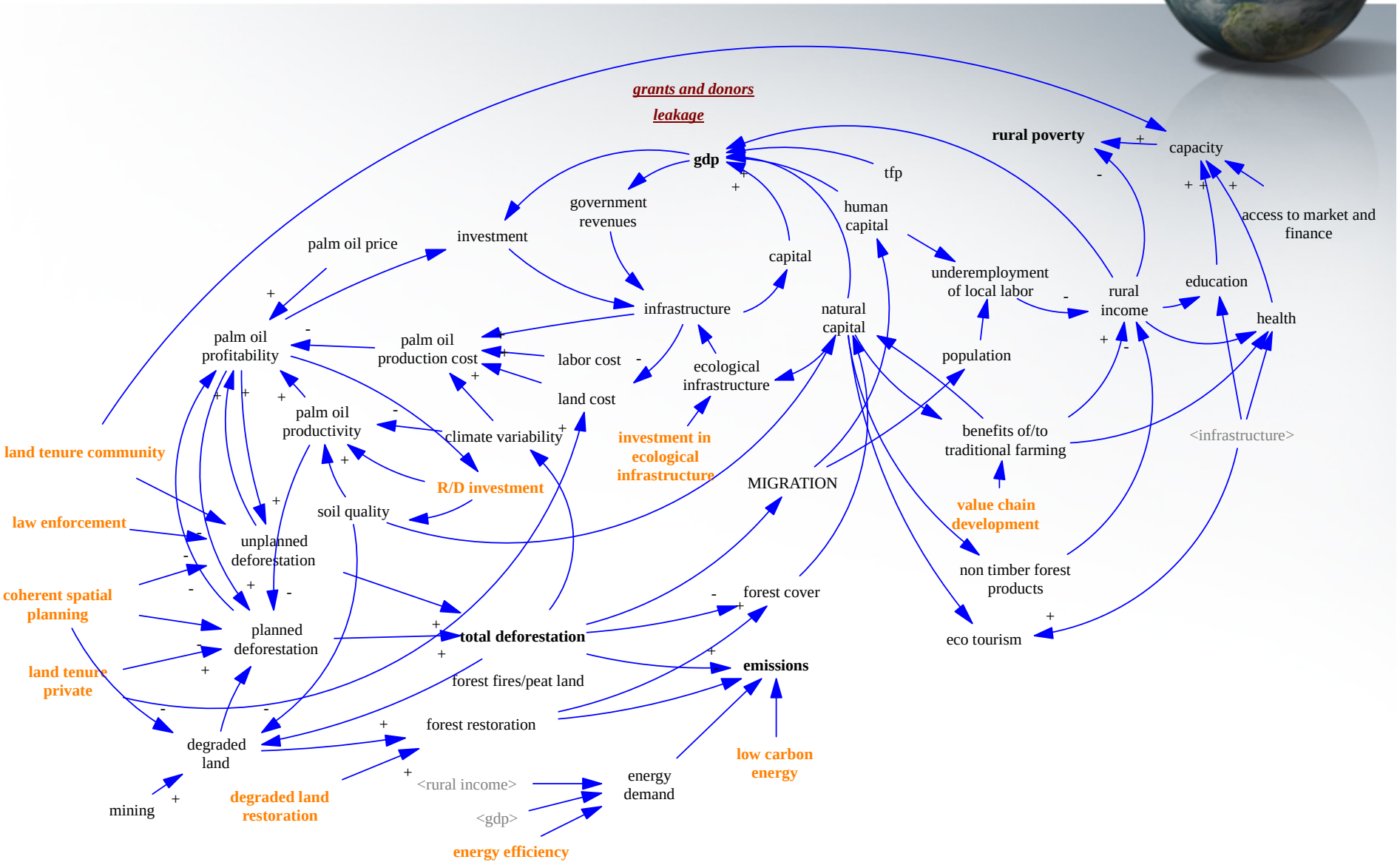
Role of scenarios (2)

- **How can scenarios help stakeholders plan a REDD programme?**
- Cross-sectoral, descriptive models can support both policy formulation and evaluation.
- Scenario definition is essential to highlight future possible paths and evaluate adequate frameworks for action.
- Mental models (understanding of the system analyzed) has to be share to maximize the usefulness and effectiveness of scenario exercises.

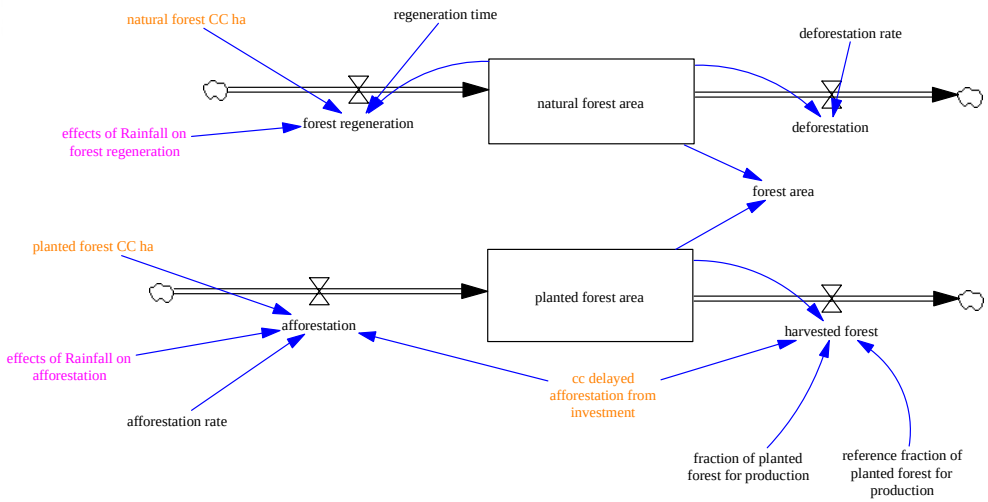
Analysis: three layers

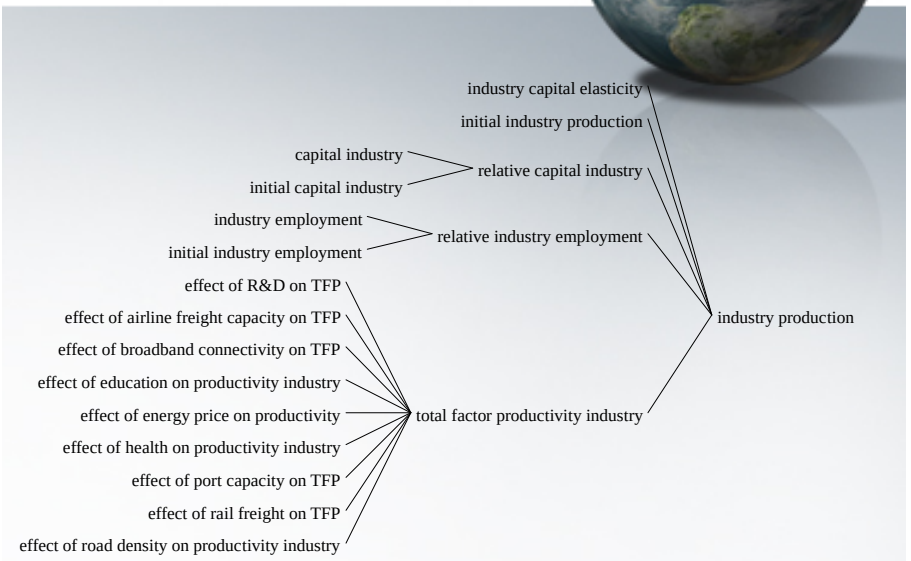


Causal diagrams: Kalimantan

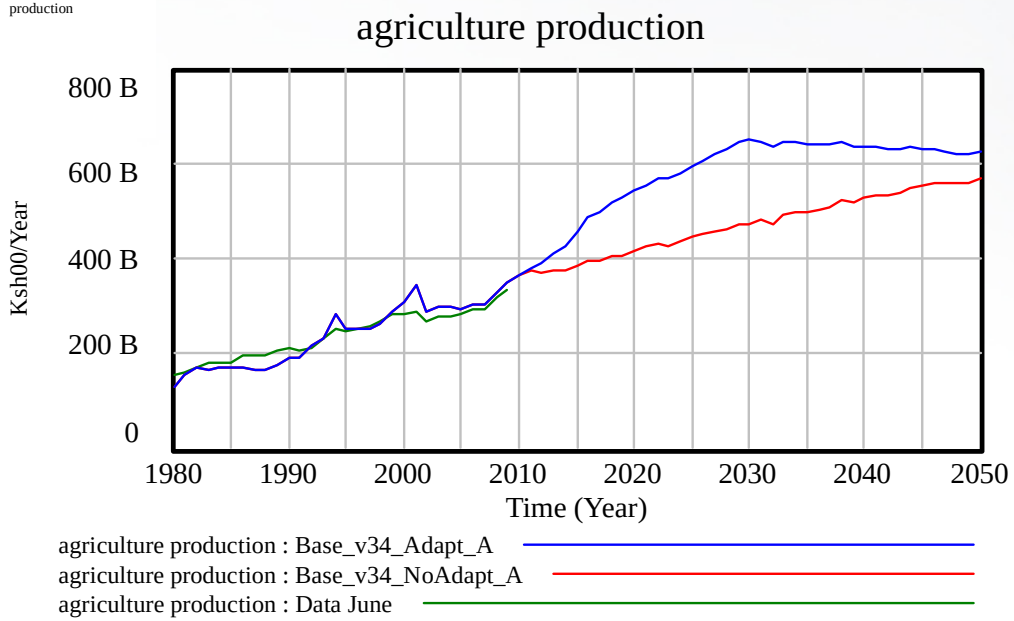


Simplified, sectoral model snapshot:
Kenya, Africa Adaptation Program (AAP)





Strengthening Institutional Capacity for Integrated Climate Change Adaptation
&
Comprehensive National Development Planning in Kenya

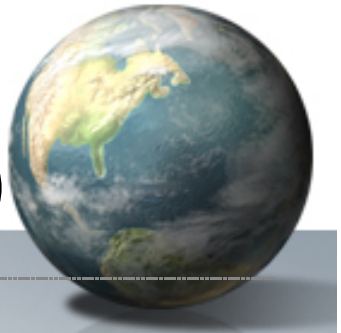


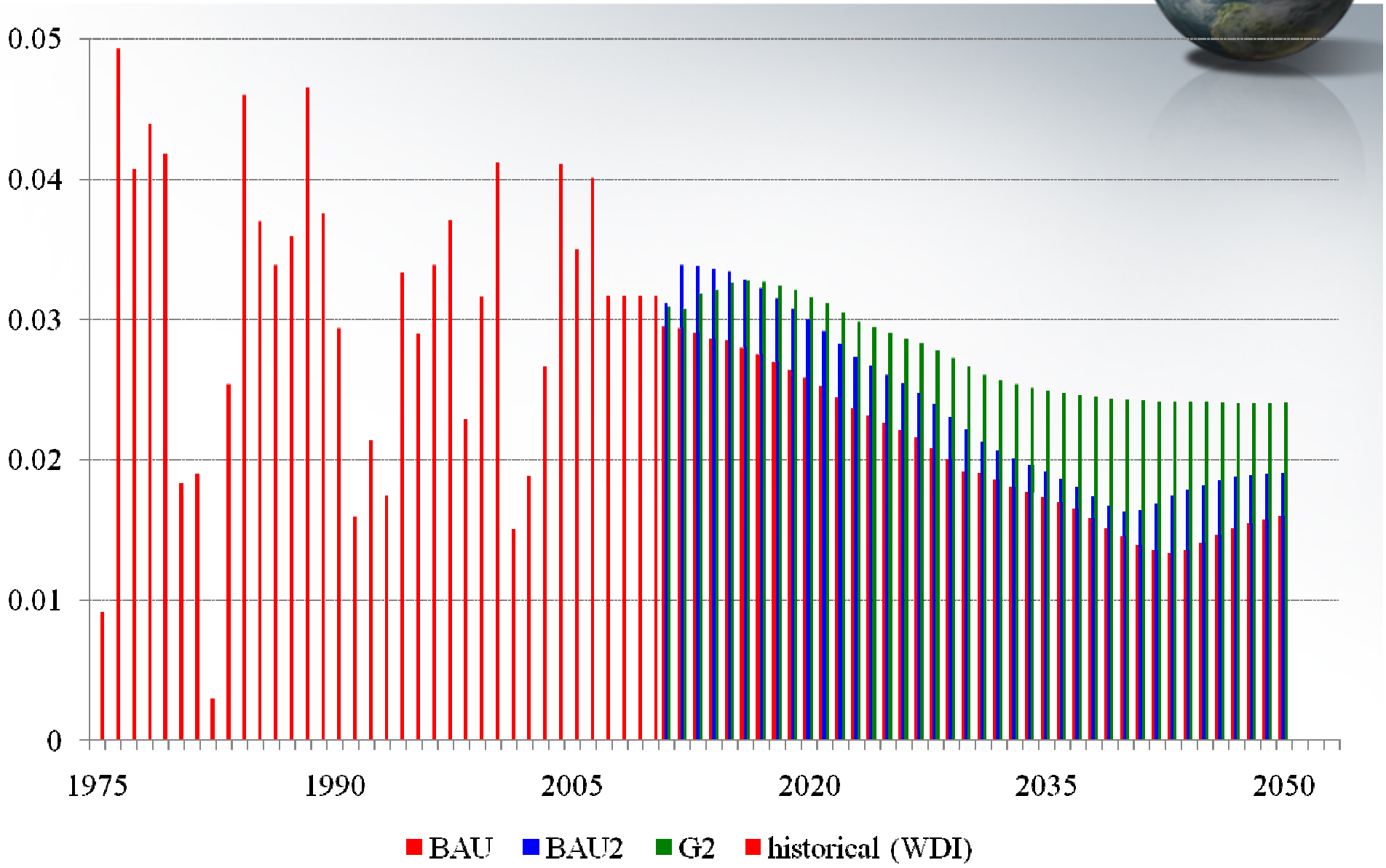
Role of scenarios (3)

- **How can scenarios help stakeholders analyze/visualize the benefits and impacts of a REDD program in a country?**
- Uniquely customized models able to represent the social, economic and environmental context in a transparent manner can provide information needed to design and evaluate policies.
- Key info include: population, employment, production/income, natural resources, land use and deforestation, carbon emissions and update, and and economic evaluation of ecosystem services.

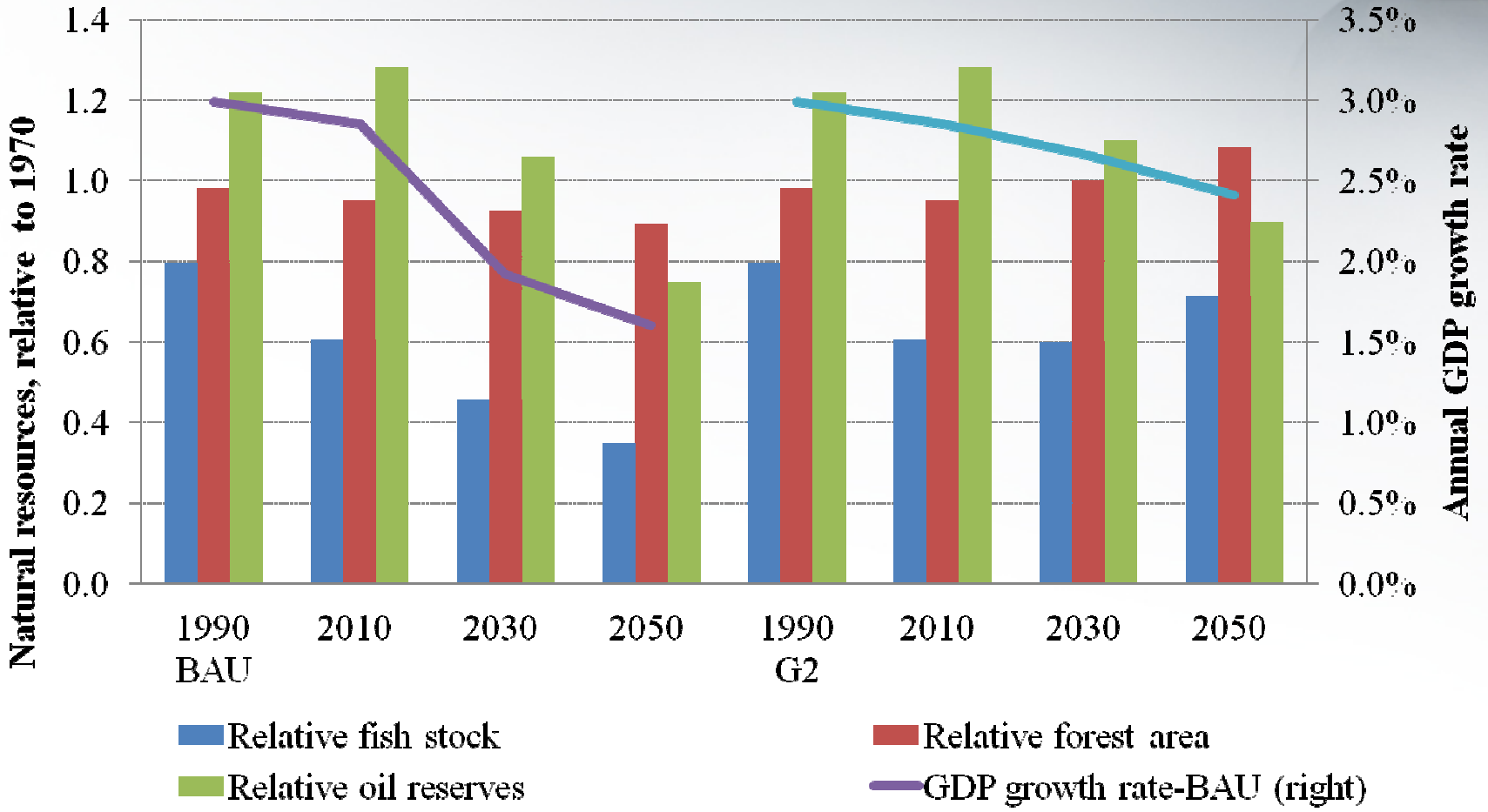
Results: GDP Growth

(CC-related costs are not included in this chart)





Results: Natural Resource Stocks and the Economy

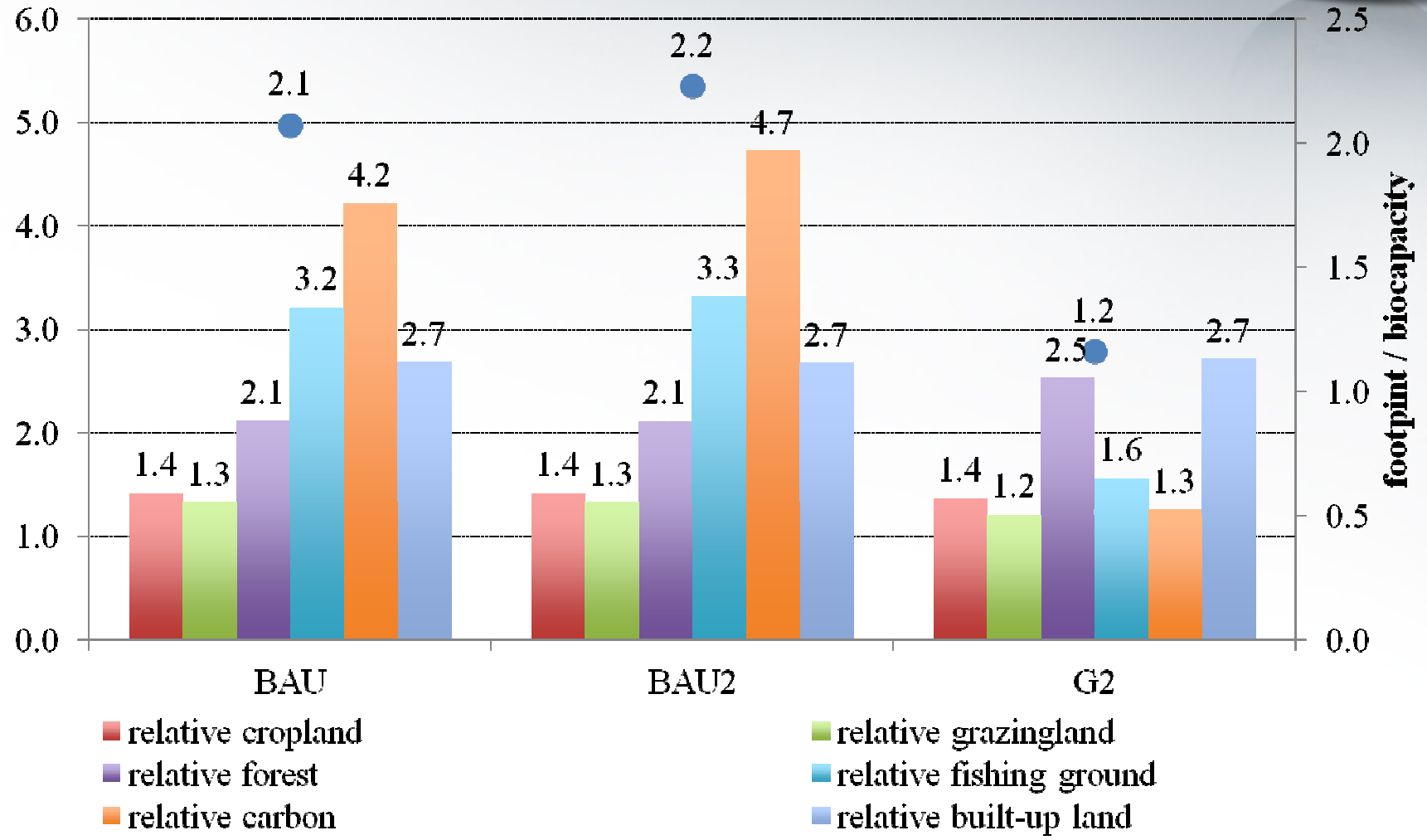


“Green” or “inclusive” … GDP

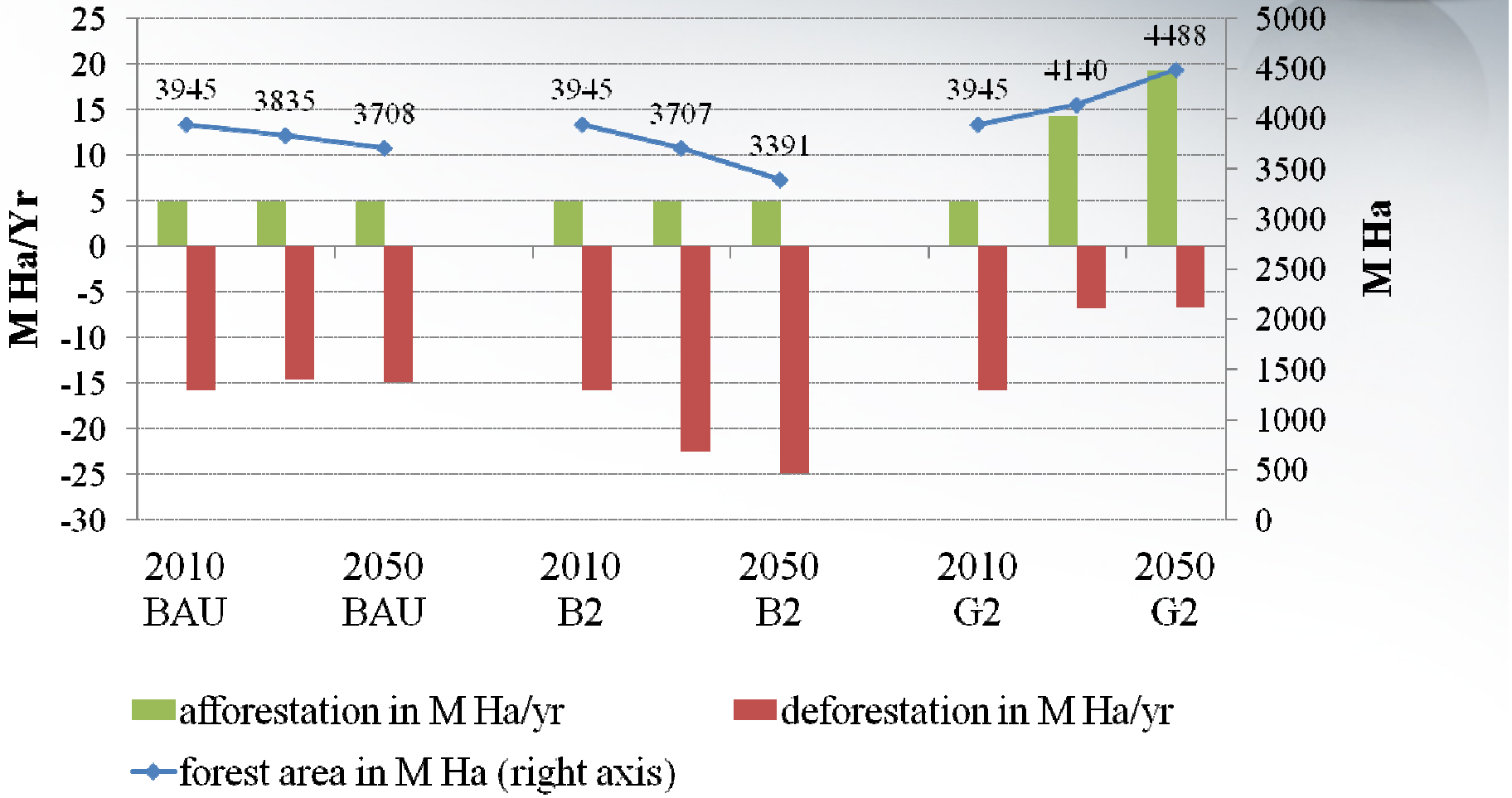
		2010	2030					2050				
	Unit		**BAU1**	**BAU2**	**BAU**	**G1**	**G2**	**BAU1**	**BAU2**	**BAU**	**G1**	**G2**
Real GDP	Bn $/Yr	69,334	116,100	119,307	110,642	117,739	122,582	164,484	172,049	151,322	174,890	199,141
Change in fossil fuel stocks	Bn $/Yr	-1,212	-2,616	-2,787	-2,373	-1,629	-1,127	-4,705	-4,972	-4,312	-2,306	-979
	ratio to GDP	-1.8%	-2.3%	-2.3%	-2.1%	-1.4%	-0.9%	-2.9%	-2.9%	-2.8%	-1.3%	-0.5%
Change in forest stocks												
Lower bound	Bn $/Yr	-3.9	-6.1	-7.7	-3.5	0.4	0.4	-7.5	-9.4	-3.9	1.2	1.2
Upper bound		-3,609	-5,698	-7,269	-3,279	448	447	-6,987	-8,884	-3,658	1,303	1,294
Lower bound	ratio to GDP	-0.01%	-0.01%	-0.01%	<0.01%	<0.01%	<0.01%	<0.01%	-0.01%	<0.01%	<0.01%	<0.01%
Upper bound		-5.2%	-4.9%	-6.1%	-3.0%	0.4%	0.4%	-4.2%	-5.2%	-2.4%	0.7%	0.7%
Change in fish stocks	Bn $/Yr	-160	-122	-122	-116	-9	52	-91	-91	-88	40	142
	ratio to GDP	-0.24%	-0.11%	-0.10%	-0.10%	-0.01%	0.04%	-0.06%	-0.05%	-0.06%	0.02%	0.07%

Results: Ecological Footprint

(2050 values, footprint components relative to 2010)



Results: Forestry



Main Objectives

Model development, a ***joint*** effort to:

- Identify key issues;
- Define model boundaries;
- Identify key variables and structural drivers;
- Evaluate data availability;
- Model building and validation;
- Identify key policy levers and interventions;
- Elaborate scenarios and carry out the analysis.

Benefits from using this approach

1. Consistency check of data and assumptions (structural and numerical)
2. Identification of future potential issues (within and across sectors)
3. Identification of alternative strategies to create synergies, avoid bottlenecks
4. Basis for monitoring and evaluation, especially of medium to long term impacts

All key factors to support a REDD+ analysis within the context of national development planning

Thank you for your attention

For more information please contact me at

ab@millennium-institute.org

Or visit

www.millennium-institute.org

Some publications

- Bassi, A.M., Z. Tan, A. Mbi, **"Estimating the Impact of Investing in a Resource Efficient, Resilient Global Energy-Intensive Manufacturing Industry"**. Technological Forecasting and Social Change, *In Press*. doi:10.1016/j.techfore.2011.05.011
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- Bassi, A.M., and J. S. Yudken, **"Potential Challenges Faced by the U.S. Chemicals Industry Under a Carbon Policy"**. Sustainability 1(2009)592-611. Special issue on "Energy Policy and Sustainability".
- Bassi, A.M., A. E. Baer, **"Quantifying Cross-Sectoral Impacts of Investments in Climate Change Mitigation in Ecuador"**. Energy for Sustainable Development 13(2009)116-123, doi:10.1016/j.esd.2009.05.003
- Bassi, A.M., Schoenberg, W., Powers, R., **An integrated approach to energy prospects for North America and the rest of the world**, Energy Economics 32 (2010) 30–42, doi:10.1016/j.eneco.2009.04.005
- Bassi, A.M., Yudken, J.S., Ruth, M., "**Climate policy impacts on the competitiveness of energy-intensive manufacturing sectors"**, Energy Policy 37(2009)3052–3060, http://dx.doi.org/10.1016/j.enpol.2009.03.055

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- Bassi, A.M., with C. Wang'ombe, G. Kirui, L. N. Njaramba, D. O. Barasa, J. N. Muema, S. N.Ngugi, N. Mathenge, R. Gakuru, L. Omullo, J. M. Katumo, G. O. Ojwang, J. G. Mungai, P. Deenapanray and Z. Than, "**Strengthening Institutional Capacity for Integrated Climate Change Adaptation & Comprehensive National Development Planning in Kenya".** Millennium Institute and Government of Kenya, July 2011. Report prepared for UNDP, AAP program.
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- Bassi, A.M. with M. Pedercini, J.P. Ansah, Z. Tan, **"Modelling Global Green Investment Scenarios. Supporting the Transition to a Global Green Economy"**. UNEP, February 2011. Nairobi, Kenya. Chapter included in UNEP's Green Economy Report.
- Bassi, A.M., Z. Tan, **"Review of The Impacts of Climate Change in Africa: Kenya, Lesotho, Malawi, Mozambique, Namibia"**. Millennium Institute, January 2011.
- Bassi, A.M., M. Pedercini, Z. Tan, H.R. Herren, **"Toolkit for Greening the Agriculture and Food System"**. Millennium Institute, November 2010. Prepared for the United Nations Food and Agriculture Organization, FAO, Rome, Italy.
- Bassi, A.M. and Prakash N. K. Deenapanray, **"Simulating the Cross-Sectoral Impacts of Green Investments - The Mauritius Case Study"**. 2010. Millennium Institute, Washington DC, USA
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- De Rego, F., A.M. Bassi, **"Education and STEM-related opportunities on Maui County and the State of Hawai'i"**. Maui Economic Development Board, November 2010. MEDB Issue Brief November 2010, MEDB Sponsors Education Summit Focusing on STEM Education and Graduation Rates.
- Yudken, J.S. and A. M. Bassi, **"Climate Policy and Energy-Intensive Manufacturing: Alternative Policies and Effectiveness of Cost Mitigation Provisions in the American Energy and Security Act of 2009"**. High Road Strategies and Millennium Institute, September 2010, Washington DC, USA. Prepared for the Environmental Defense Fund (EDF), National Commission on Energy Policy (NCEP) and AFL-CIO Working for America Institute (WAI).
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- Herren, H.R. and A.M. Bassi, M. Pedercini, **"How an Integrated Scenario Approach Supports the Case for a Transition to Sustainable Agriculture"**. Essay included in State of the World 2011: Innovations the Nourish the Planet, WorldWatch Institute, Washington, DC, USA. Prepared by Millennium Institute, July 2010, Arlington, VA, USA.
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