POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

P I K

# Towards assessing societal interventions to stay within safe socio-ecological boundaries

Computer simulations greatly enhance our ability to understand complex relations between climate mitigation, adaptation and sustainable development.

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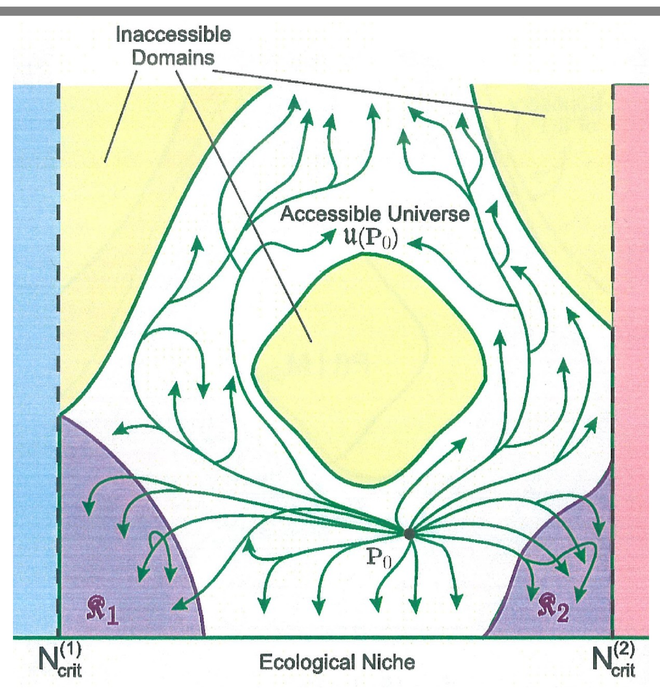
## The Idea

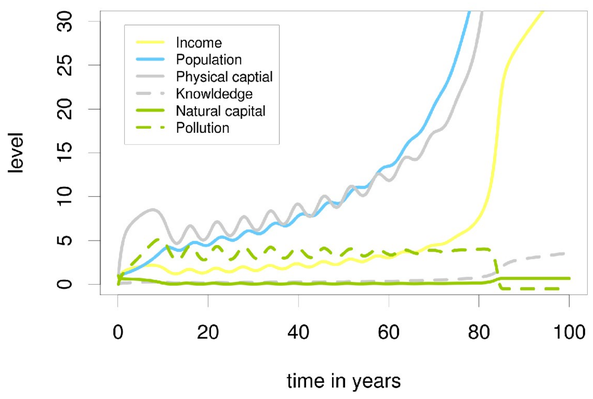
- Develop a reduced-form approach to adaptation, mitigation and sustainable development pathways (for countries)
- Use two complementary approaches
- Determine central key variables and and critical thresholds describing transition pathways
- Derive steering options for countries



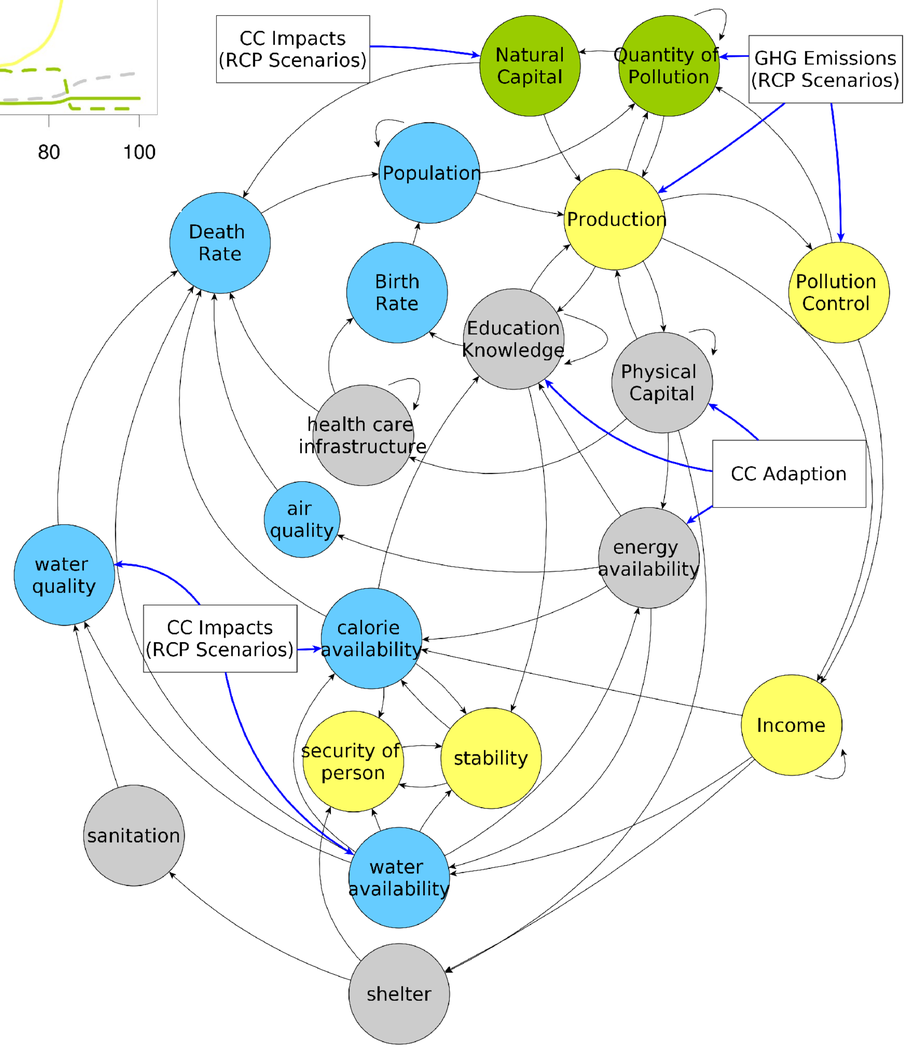

Toy world to illustrate development pathways within desired boundaries. Besides the accessible (and desirable) universe of pathways, there exist catastrophic pathways and also inaccessible domains [Schellnhuber and Kropp 1998].

## Literature/theory based approach:

Exemplary dynamics observed from the WONDERLAND MODEL [after Leeves and Herbert 2002]

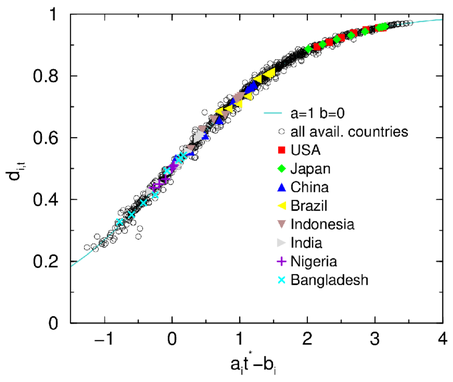



Models can describe the core dynamics in a country in a simplified way. An example is this extension of the wonderland model, including additional livelihood factors.
With non-linear interactions, such models mimic transition processes.

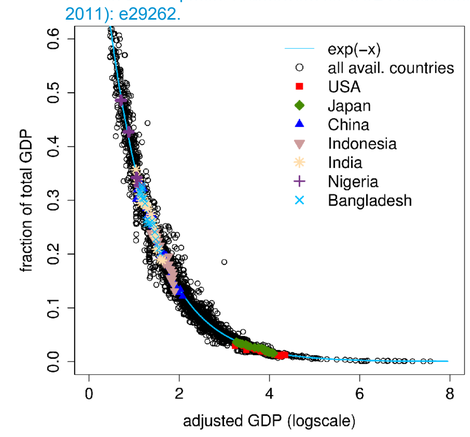



## Data based approach:

In a number of variables, countries generally follow a certain functional form. This is the basis for our “reduced-form” approach.




HDI versus time Source: Costa, Luis, Diego Rybski, and Jürgen P. Kropp. A Human Development Framework for CO2 Reductions. PLoS ONE 6, no. 12 (December 21, 2011): e29262.




Share of agriculture as function of GDP

## Further steps

- Identify final set of key variables
- Relations between key variables
- Derive dynamics
- Calculate various scenarios

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