The Development of Climate Change Impact Assessment Toolkit for Urban Policy Makers

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Objectives

An integrated impact assessment tool for urban policy makers to

GUIDE DECISION BY

- Combining analysis of climate and local impacts
- Developing “what if” scenarios to consider climate and disaster risk in macro decisions
- Proposing and evaluating costs and benefits of interventions by sector and across sectors

OBJECTIVES & GOALS

- Institution and capacity development
- Science-based policy making
- Regional cooperation
- Analysis of potential future mega projects
- Effective linking with disaster risk reduction

What is proposed

AN INTEGRATED ASSESSMENT TOOL WHICH IS

- Simple
- Flexible & utility oriented
- Easy to understand for urban policy makers
- Suited to evaluating the costs and benefits for abatement, adaptation, and risk reduction

A SYSTEMS APPROACH THAT

- Connects the various components of the urban system (economic, environmental, etc.)
- Captures interactions between components to improve environmental and human health, water security, and infrastructure

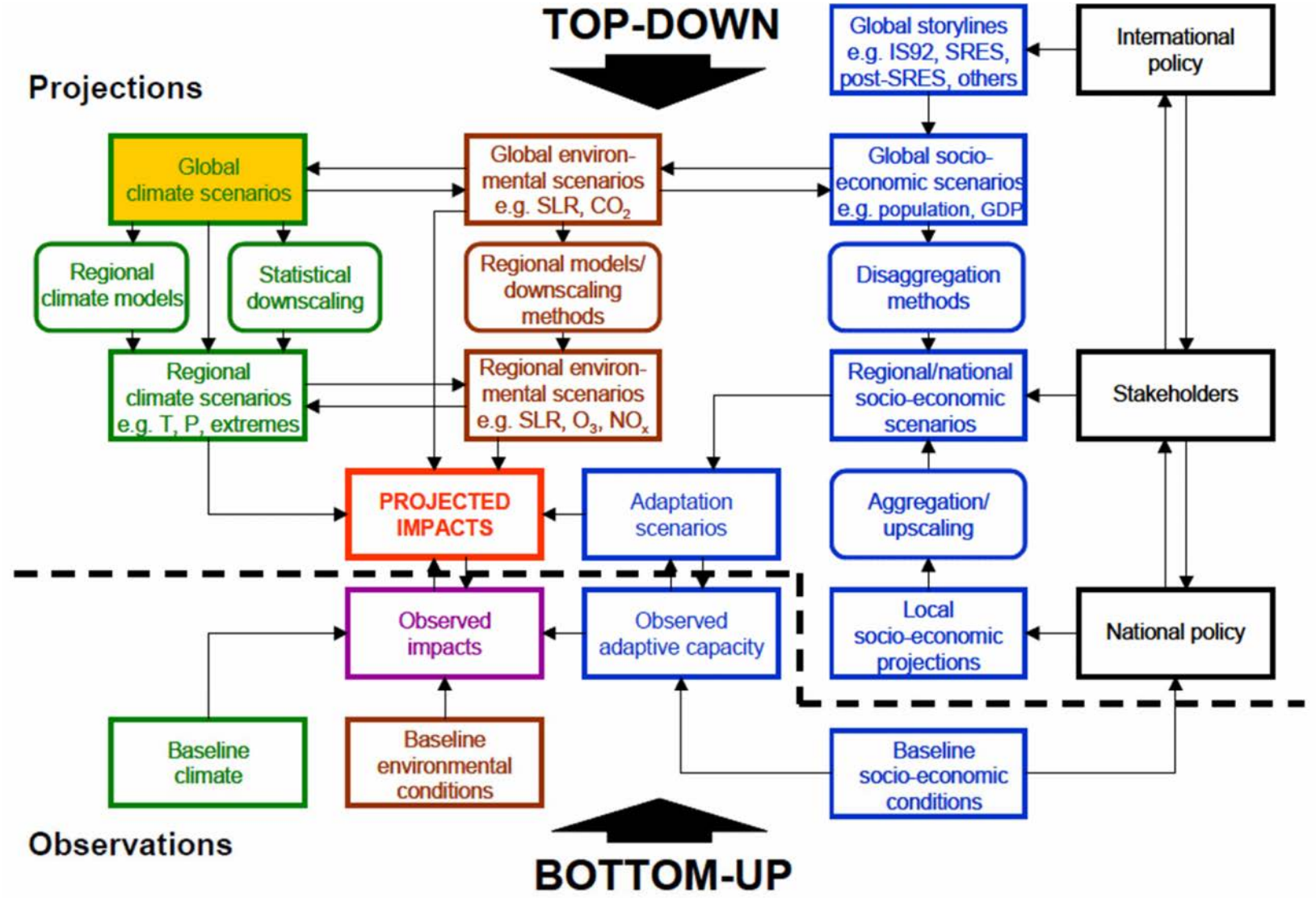
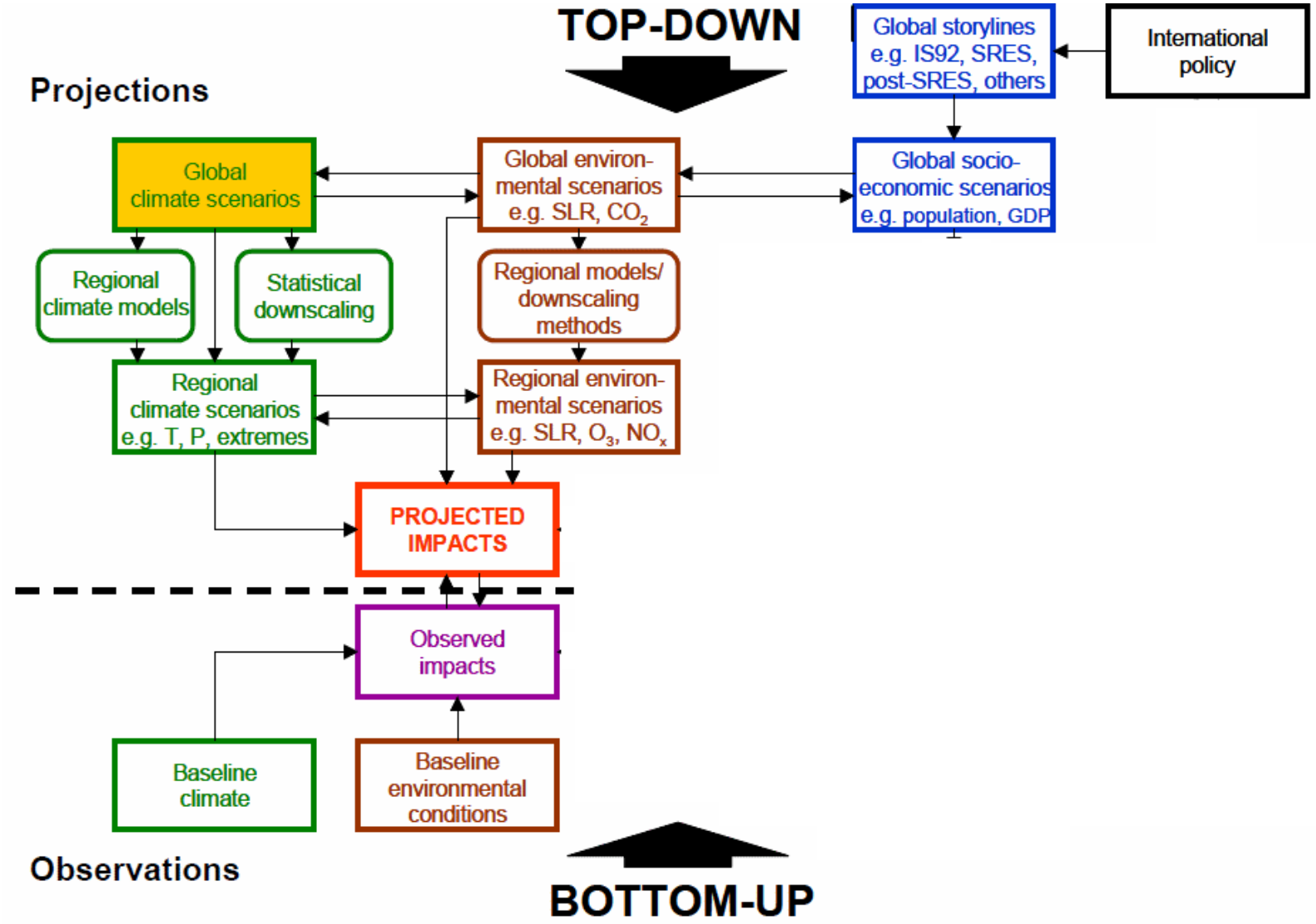


Figure 1. Schema of the main scenario elements and guidance material available from the IPCC Data Distribution Centre (DDC). Information above the dashed line comprises projections; below the line observations. For explanation, see text.



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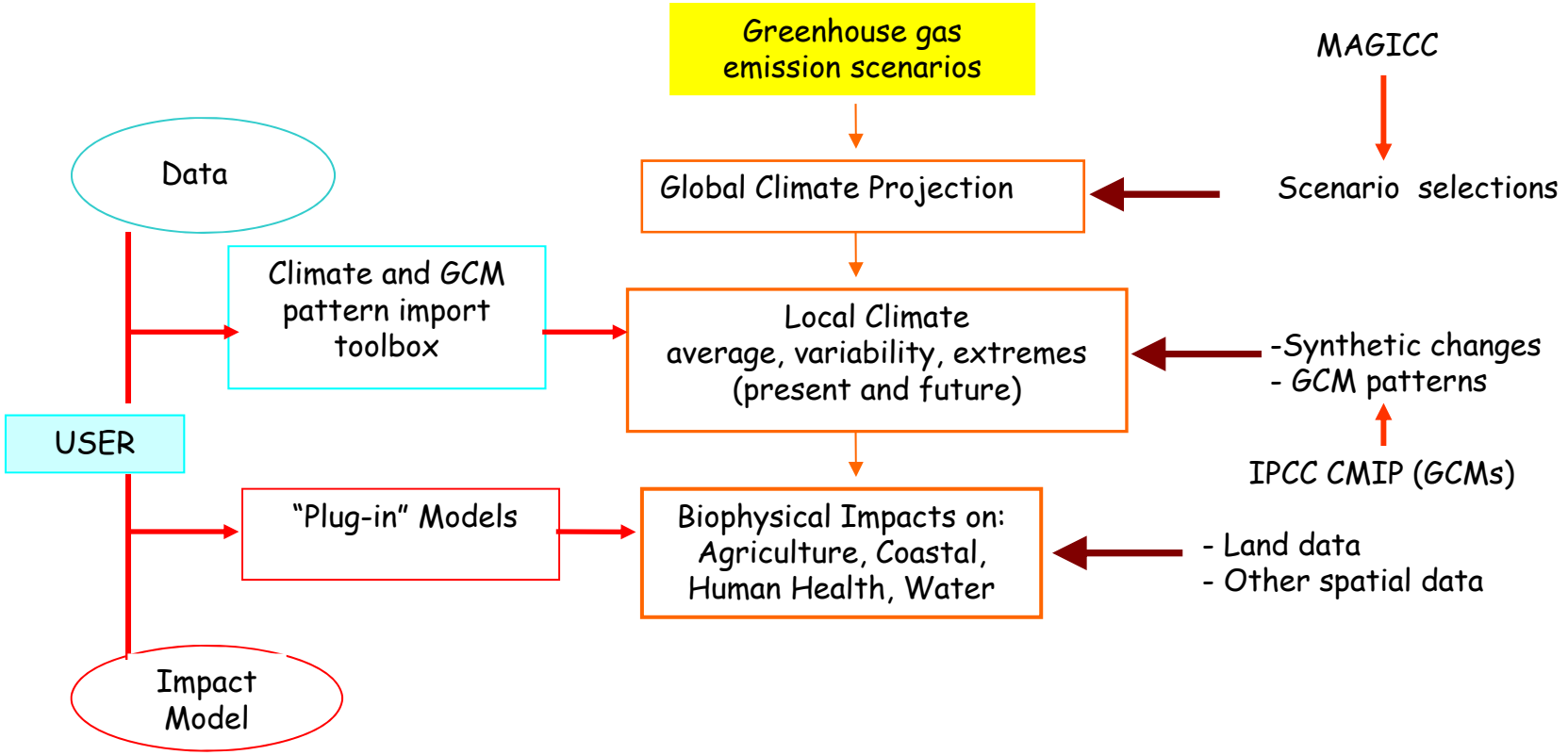
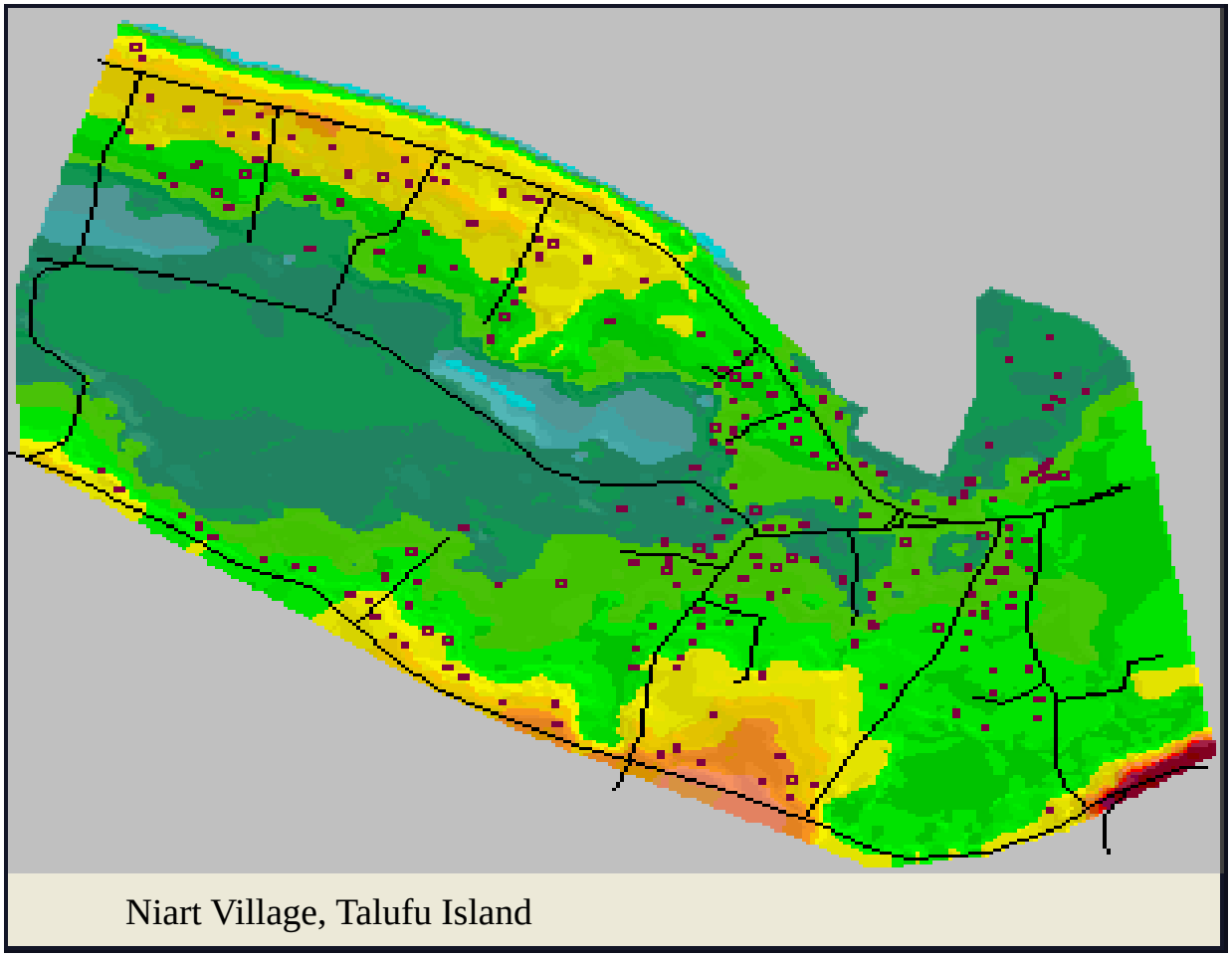
SimCLIM structure



Risk-based approach to adaptation – mainstreaming

SimCLIM demonstration

Community at risk



Niart Village, Talufu Island

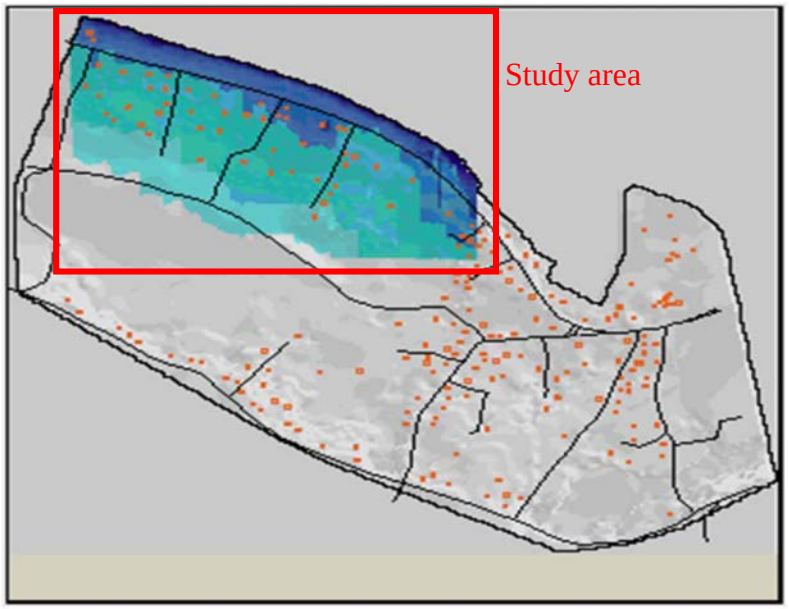
Risk-based approach to adaptation – mainstreaming

SimCLIM result

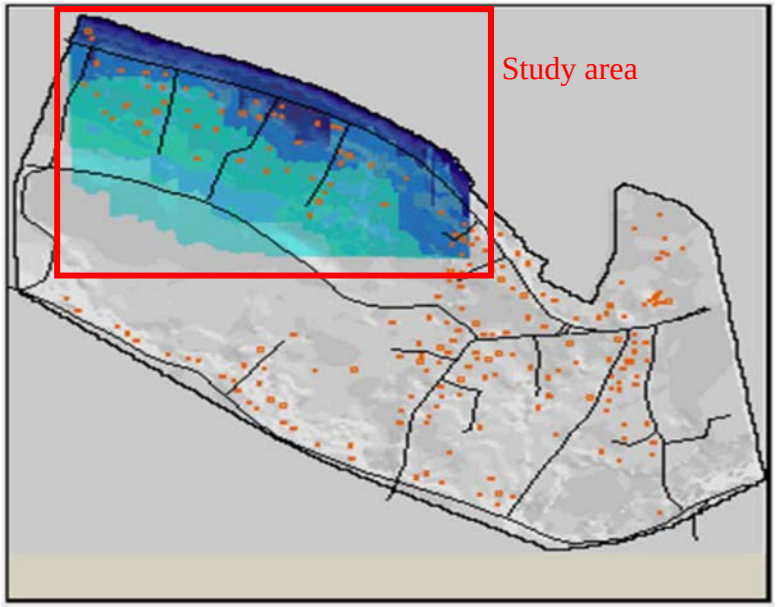
Coastal flooding impact model: Time-slice spatial analyses

50-YEAR EVENT

Current climate



2050



Risk-based approach to adaptation – mainstreaming

SimCLIM model

Economic tools

SIMULATE IMPACTS …

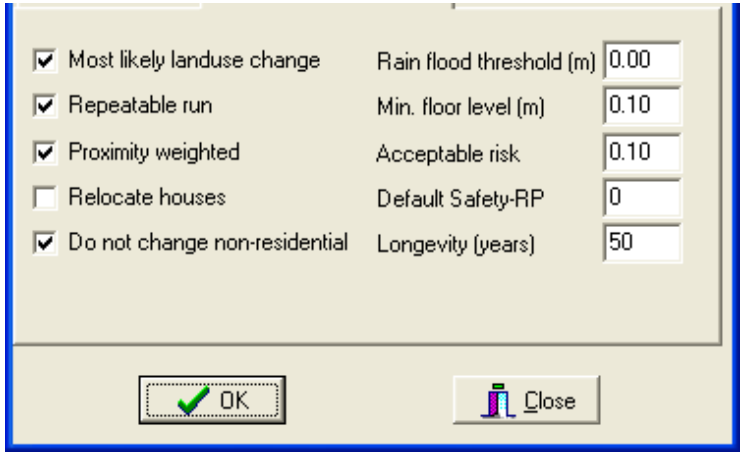
- Over study area
- Over distribution of flood events
- With and without climate change
- With and without adaptation
- In time steps (“transient” mode)
  - as climate changes
  - as land use changes
- Aggregate and discount to present value

Risk-based approach to adaptation – mainstreaming

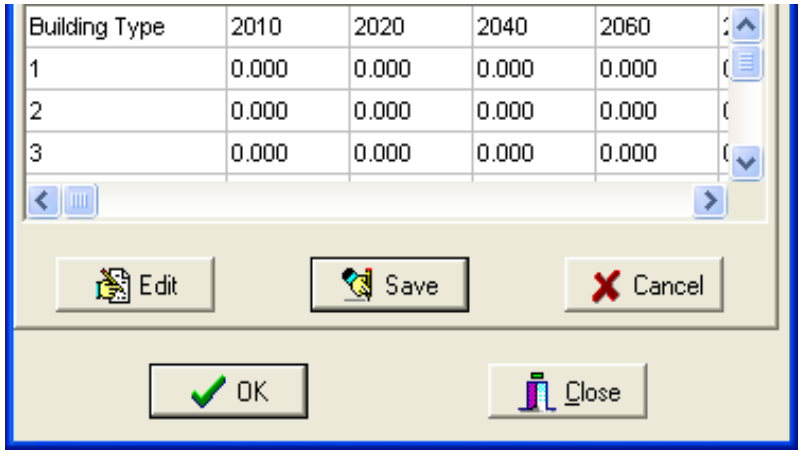
SimCLIM result

Scenarios of development and land use

Model rules and settings



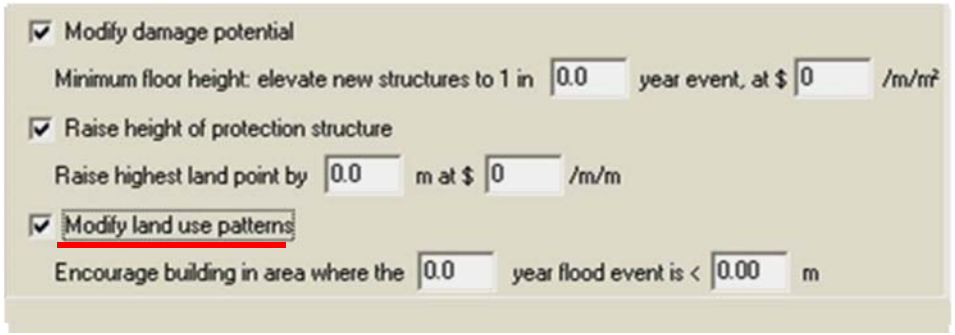
Fractional change (per year) of land use type



Risk-based approach to adaptation – mainstreaming

SimCLIM result

Adaptation analysis



Simulated individually or in combination

Risk-based approach to adaptation – mainstreaming

SimCLIM model

Economic tools

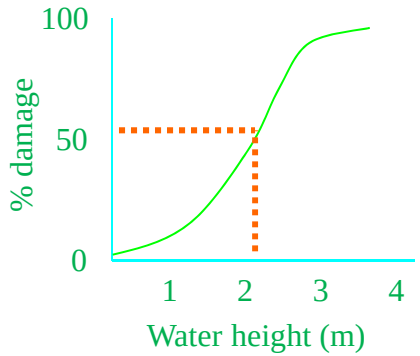
- Dollar damages
- Basic Benefit-Cost Analysis

Classify and survey structures by:
type (e.g. residential)
age (e.g. <10 yrs)
construction (e.g. woodframe)

→ Flood height-% damage function x Indicative $ value = $ Damage

For example…

Single family, new, woodframe →

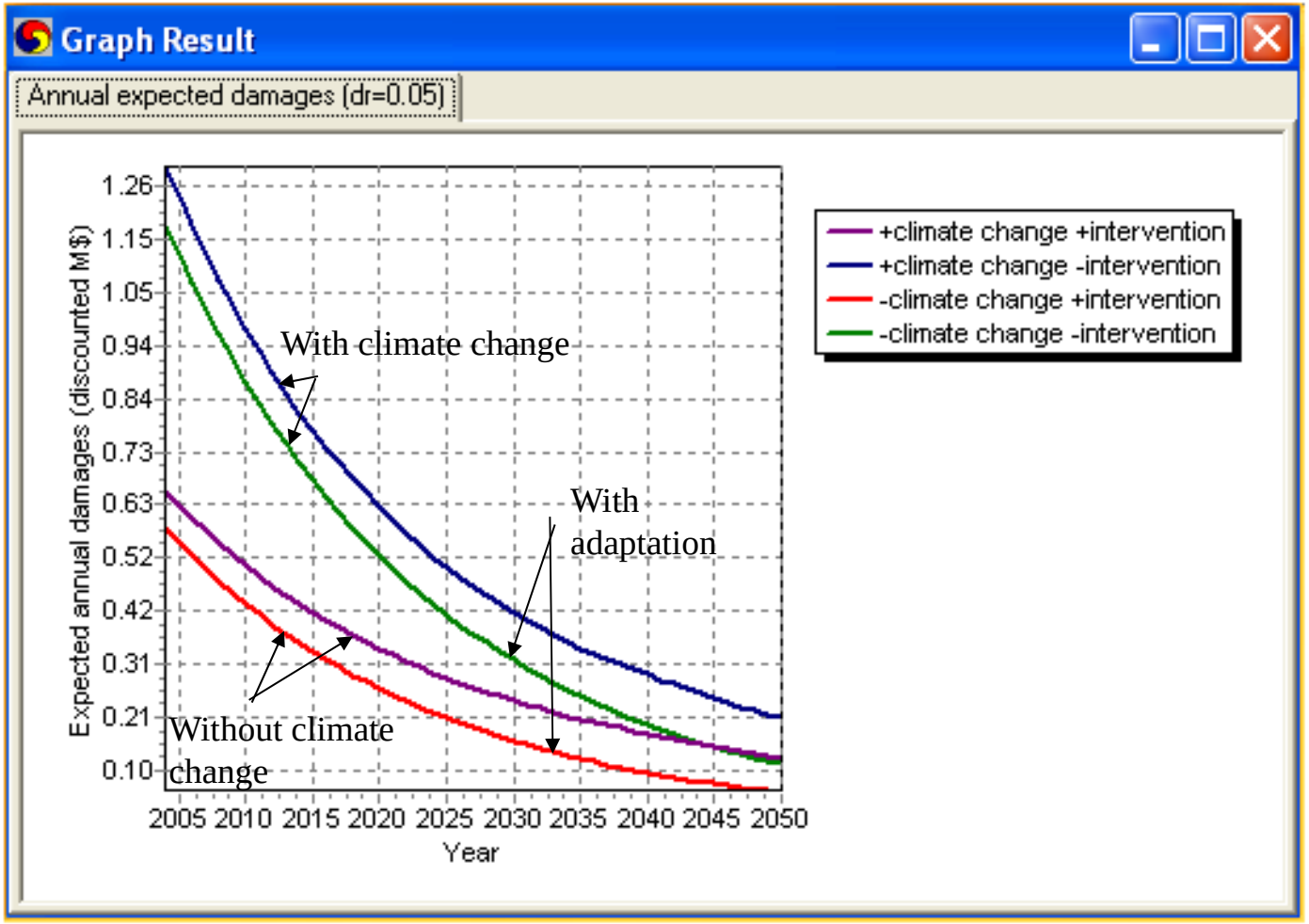


x $20k = $10k Damage

Risk-based approach to adaptation – mainstreaming

SimCLIM result

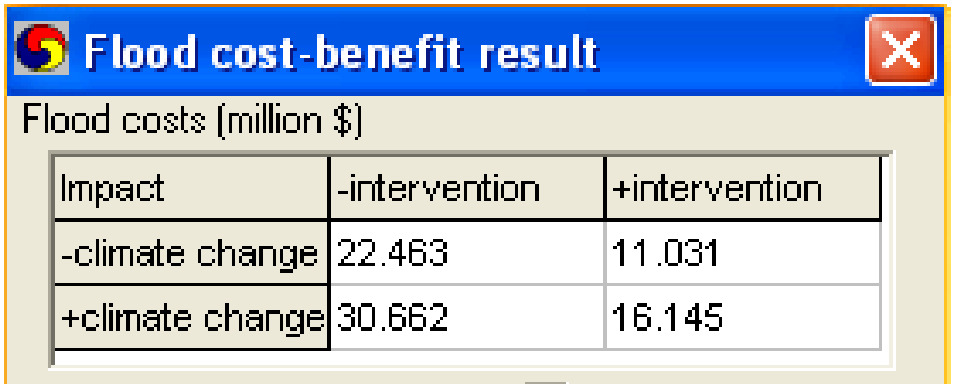
Economic tools



Risk-based approach to adaptation – mainstreaming

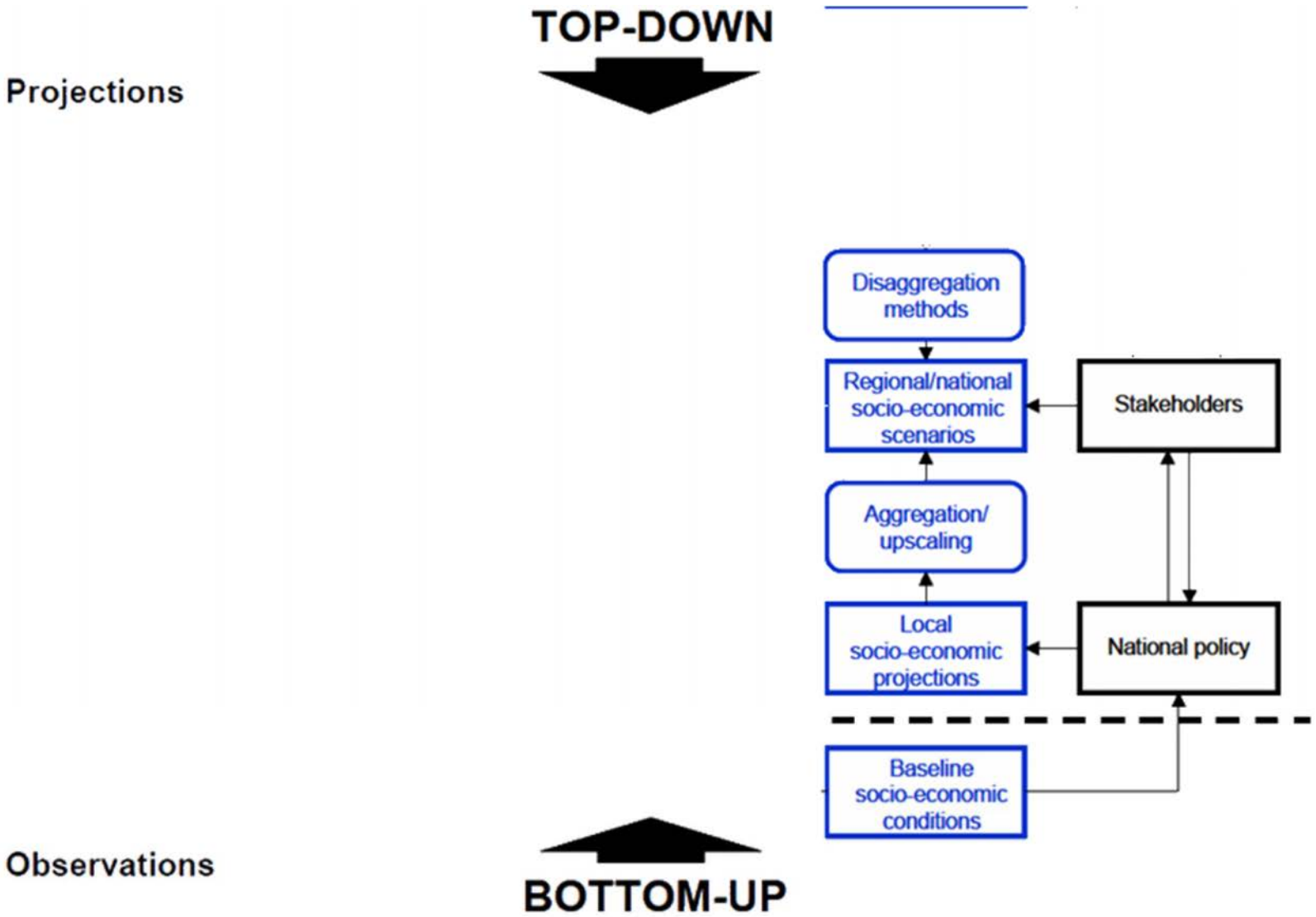
SimCLIM result

Economic tools



DAMAGES

ADAPTATION BENEFITS & COSTS



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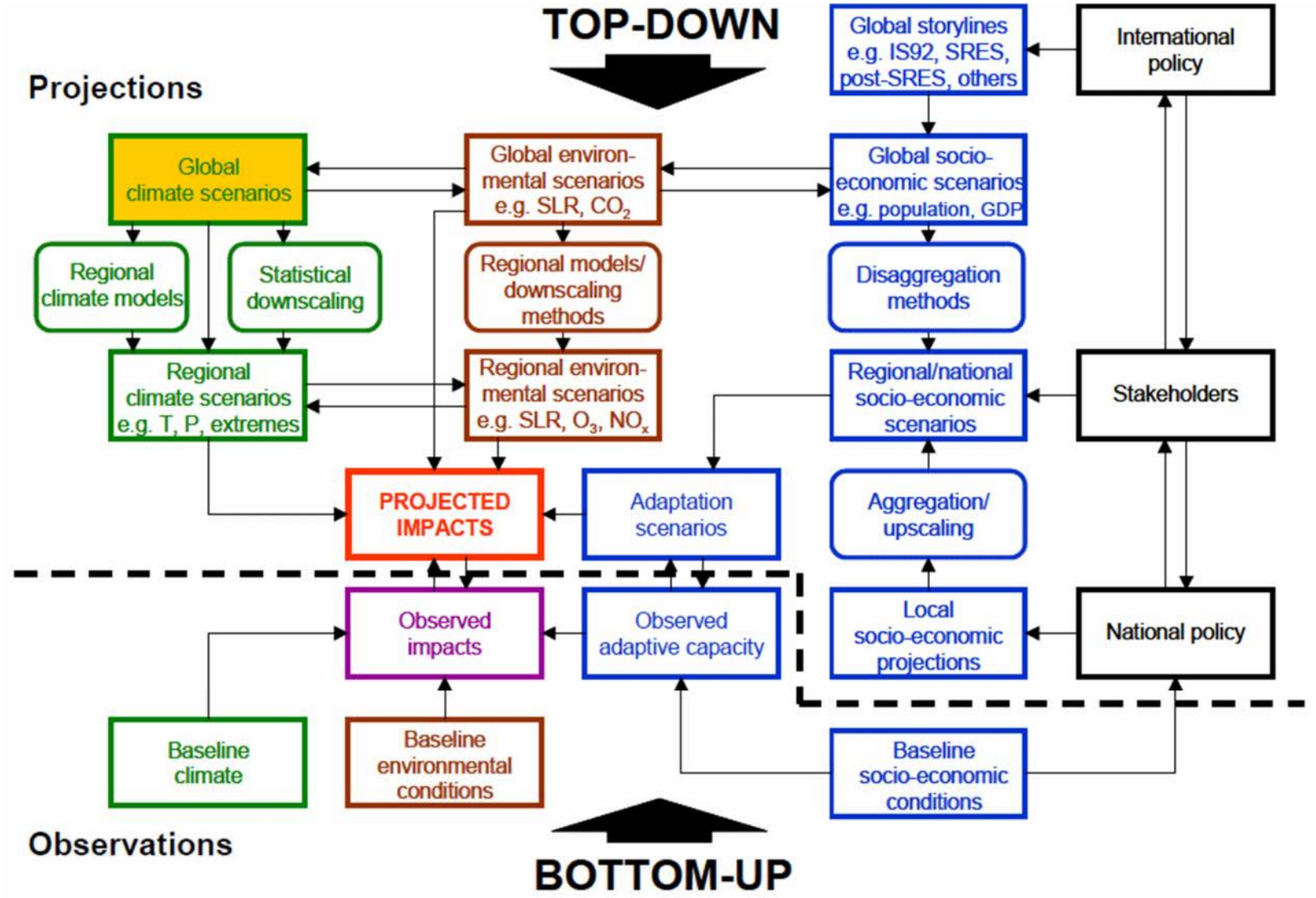

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Complex System

Training
- ✓ Technical
- ✓ Adaptation Planning
- ✓ Systems Approach
- ✓ Decision Making

Relationships
- ✓ IFI's
- ✓ City Govt.
- ✓ Provincial Govt.
- ✓ National Govt.
- ✓ NGO's
- ✓ Institutes

Communication
- ✓ Community of Practice
- ✓ Knowledge Sharing
- ✓ Media Strategy

Systems Approach
- ✓ Bringing it together
- ✓ Feedback Mechanisms
- ✓ Project Planning and reporting

Systems Thinking

Geophysical
- ✓ DEM
- ✓ hydrological network
- ✓ Soils
- ✓ geomorphology

Climate
- ✓ Observations
- ✓ GCM, RCM
- ✓ Projections
- ✓ Temperature
- ✓ Precipitation
- ✓ Sea level, storms.

Geospatial
- ✓ **Ecology/Habitat Surveys**
- ✓ **Road network**: Condition, surface category
- ✓ **Water**: system, type of material
- ✓ **Energy**: Services, system, location maintenance,
- ✓ **Health**: capacity, human resources.

Social & Economic
- ✓ **Demographic** – census, projections, Housing-quality materials, condition, etc
- ✓ **Welfare & human development** -income, distribution, poverty, education, human development, Production and investment, Metric area of housing, infrastructure, land value

Policy
- ✓ IPCC Guidelines
- ✓ Local & National Planning Laws
- ✓ National Comms.

Data & Information

Hydrology | Insurance | Economics | Social | Hydraulics | GIS

Health | Transport | Investment | Carbon | Energy | Meteorology

Ecology | Optimization/DSS | Cross-Sector Linkage Tools

Sector Themes, Tools & Methods

System Approach

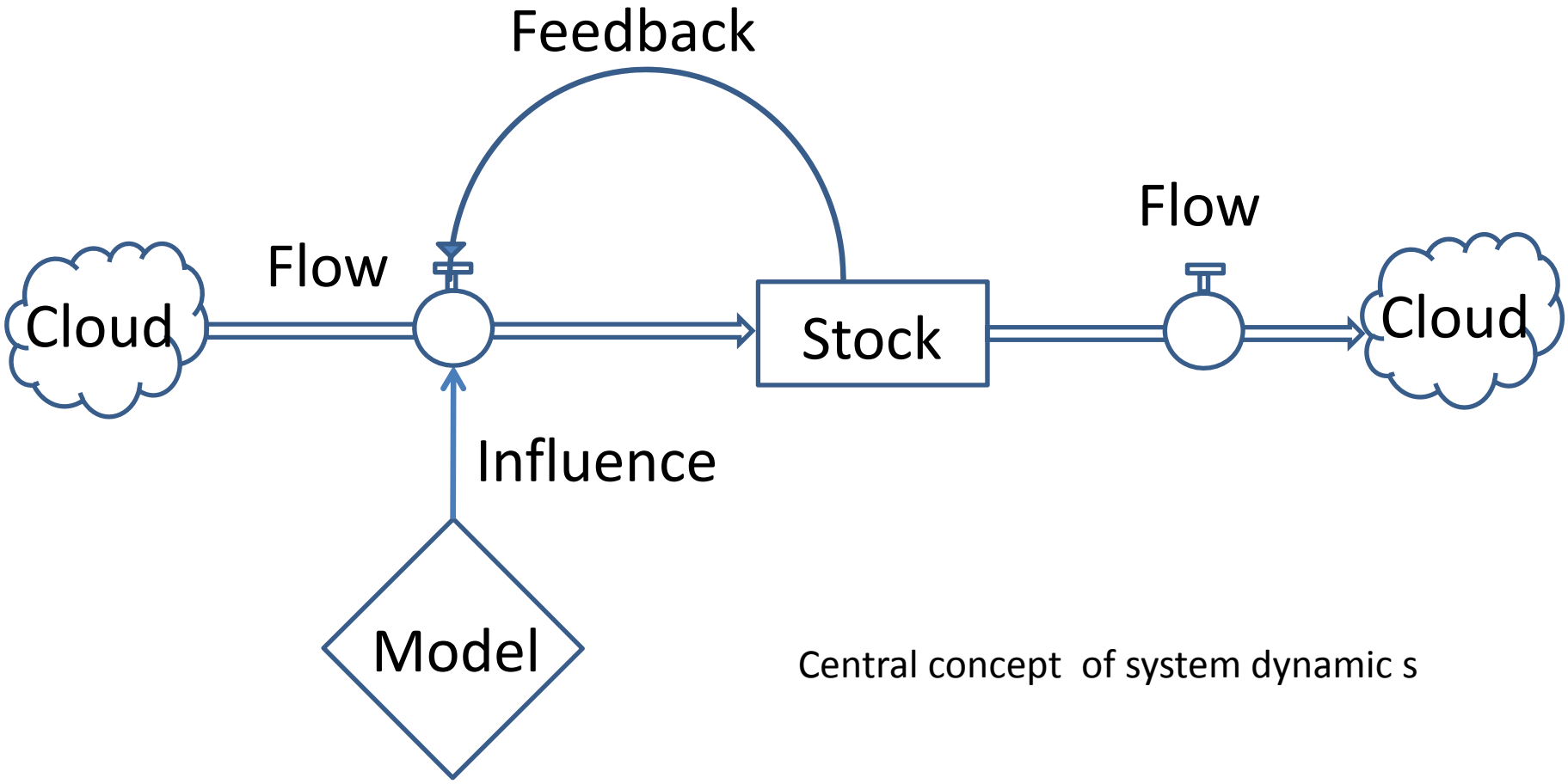
- Build on existing concepts
- Conceptual structure before mathematical detail
- Easy with computer

- Intuitive graphical user interface
- Support modular modeling
- High-efficient simulation

System Dynamics Concept

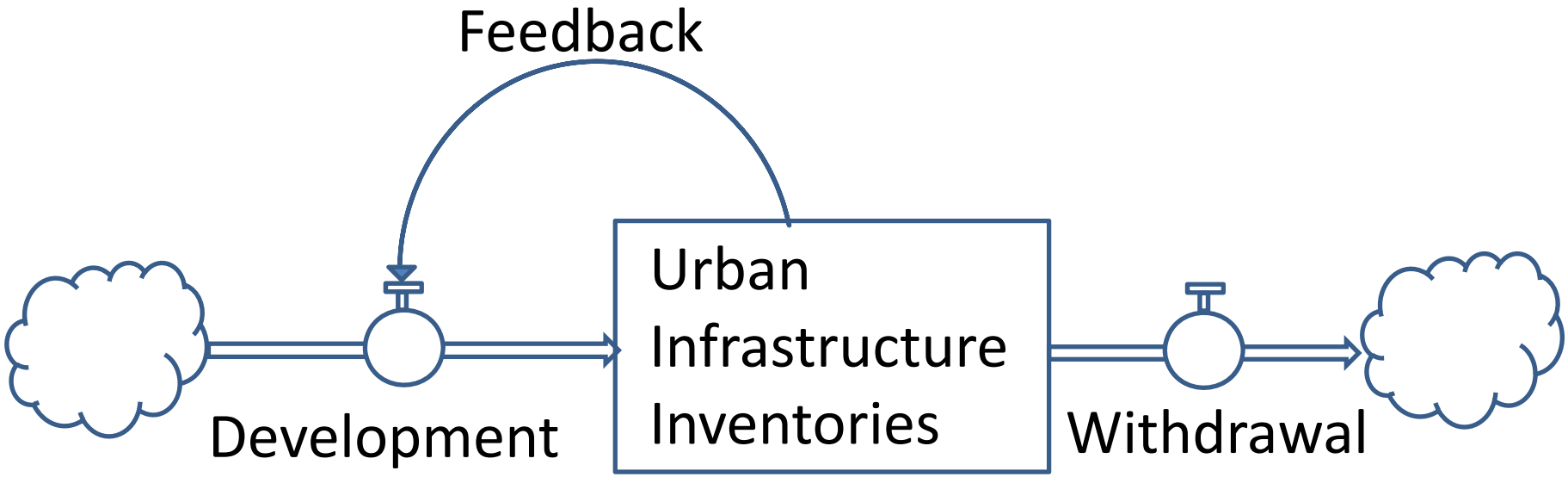
- **System dynamics** is an approach to understanding the behavior of complex systems over time. It deals with internal feedback loops and time delays that affect the behavior of the entire system. (MIT, System Dynamics in Education Project)
- What makes using system dynamics different from other approaches to studying complex systems is the use of feedback loops and stocks and flows. These elements help describe how even seemingly simple systems display baffling nonlinearity.

System Dynamics Concept



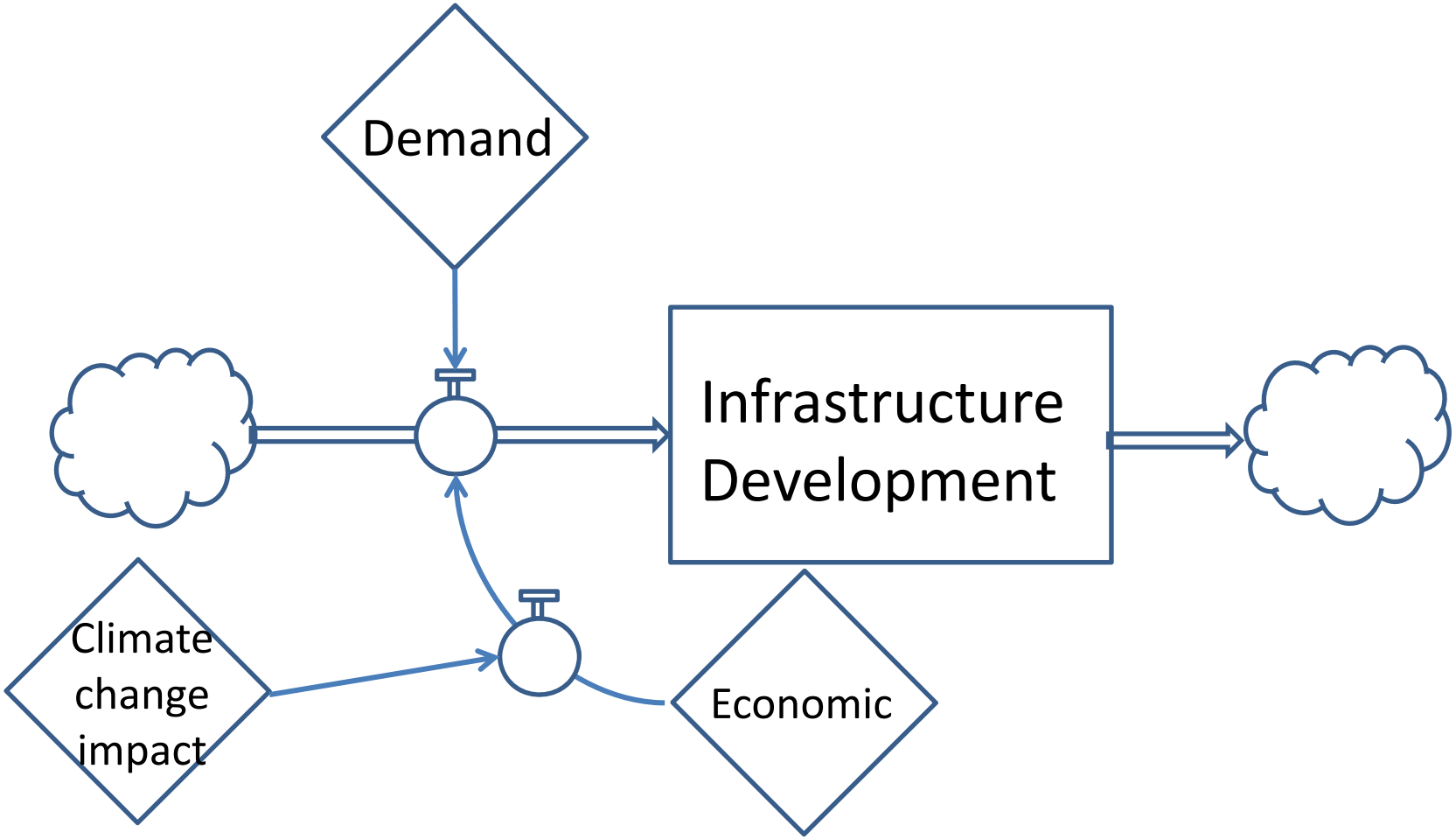
Central concept of system dynamic s

System Dynamics Concept



System dynamic s concept for urban planning

System Dynamics Concept



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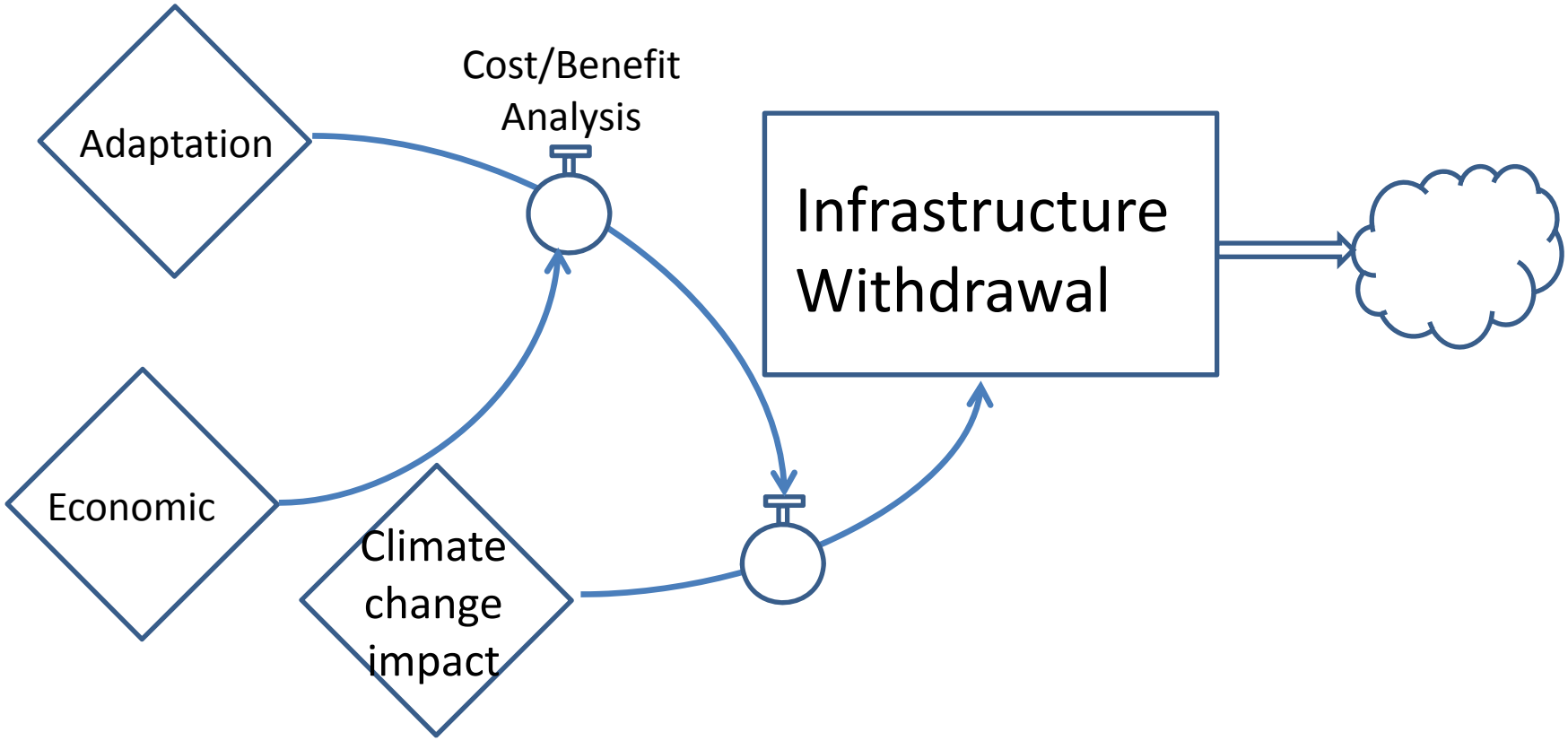

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System Dynamics Concept

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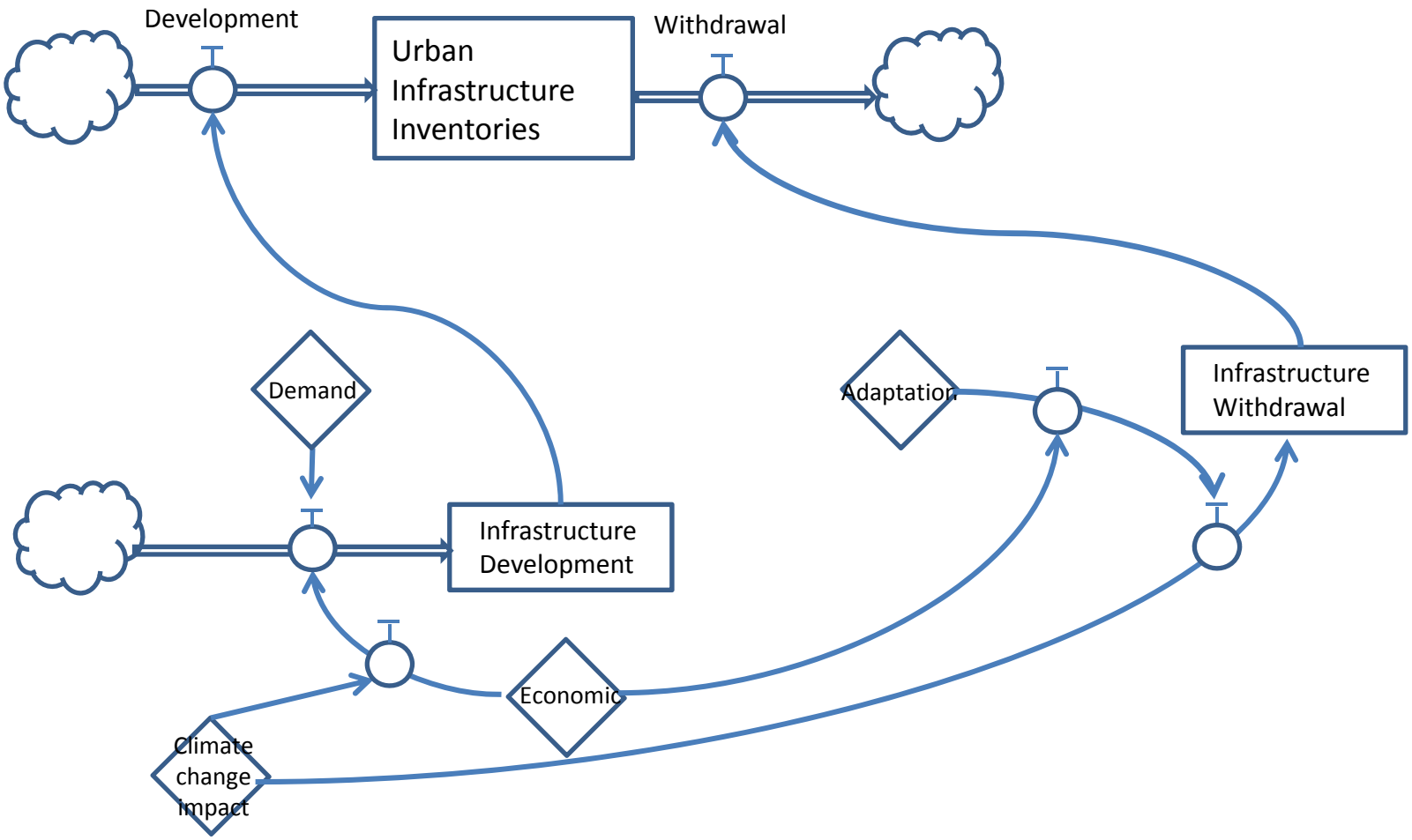
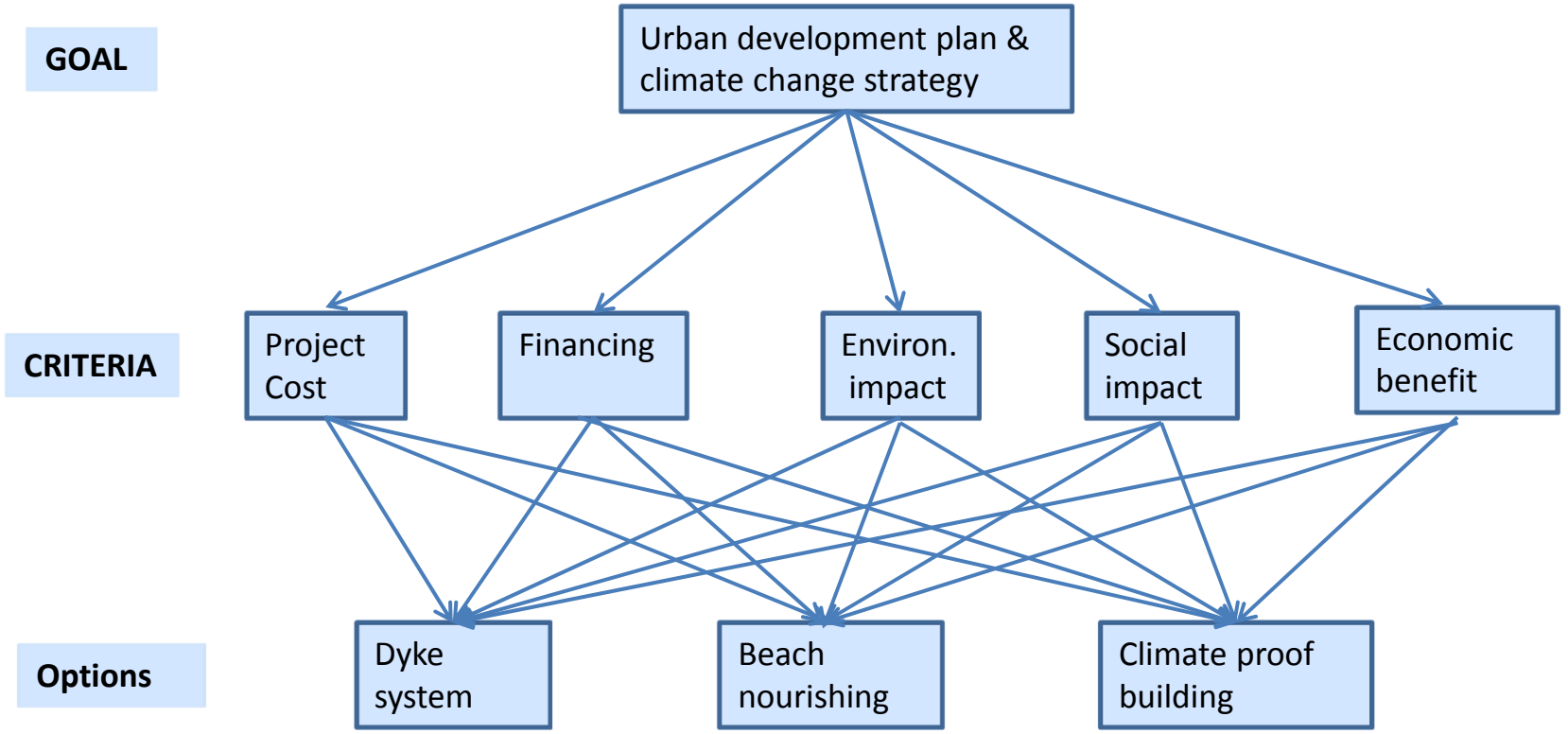
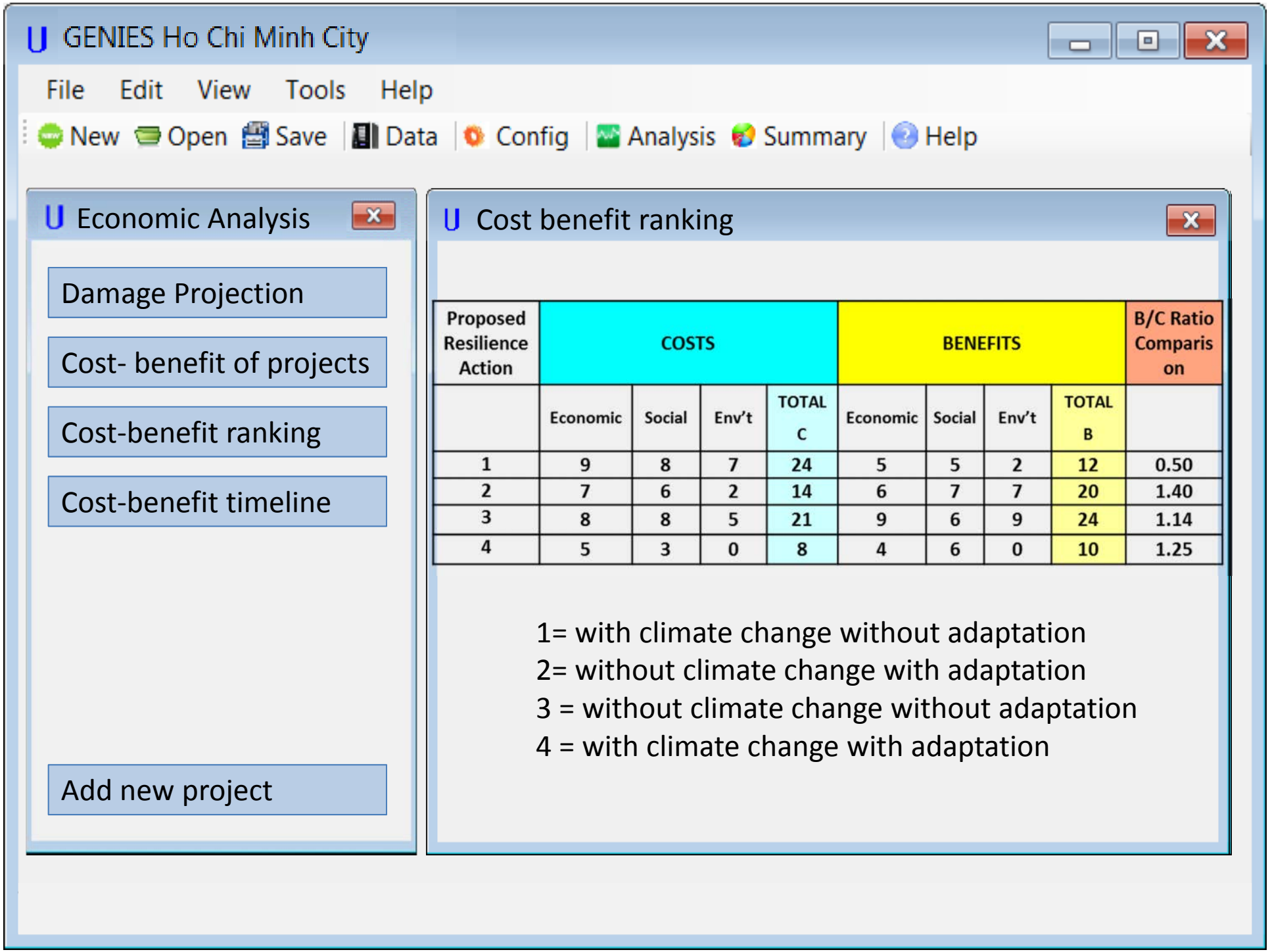


System Dynamics Concept

Multi criteria decision making support




GENIES Ho Chi Minh City
File
Edit
View
Tools
Help
New
Open
Save
Data
Config
Analysis
Summary
Help
Economic Analysis
Damage Projection
Cost- benefit of projects
Cost-benefit ranking
Cost-benefit timeline
Add new project
Cost benefit ranking
Proposed Resilience Action
COSTS
BENEFITS
B/C Ratio Comparison
Economic
Social
Env't
TOTAL C
Economic
Social
Env't
TOTAL B
1 9 8 7 24 5 5 2 12 0.50
2 7 6 2 14 6 7 7 20 1.40
3 8 8 5 21 9 6 9 24 1.14
4 5 3 0 8 4 6 0 10 1.25
1= with climate change without adaptation
2= without climate change with adaptation
3 = without climate change without adaptation
4 = with climate change with adaptation