SYSTEMS THINKING AND POLICY ANALYSIS FOR IWRM

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Excerpts from slides prepared for Water, Peace and Security tailor-made capacity development activities in Iraq. Please attribute authors when using materials.

What is systems thinking?

- Exploration of the characteristics of components within a system
- Exploration of how they interconnect
- Improve understanding of how outcomes emerge form these interactions

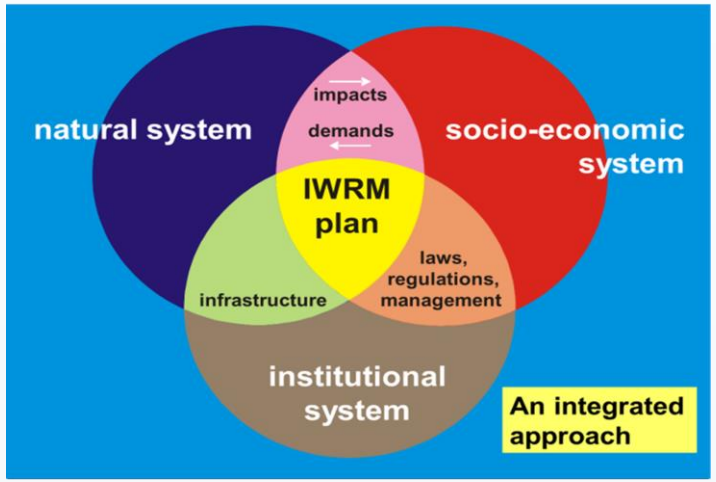
Why a system approach?

- Facilitates a holistic and integrated approach
- To research and understand incidents
- When designing improvement interventions

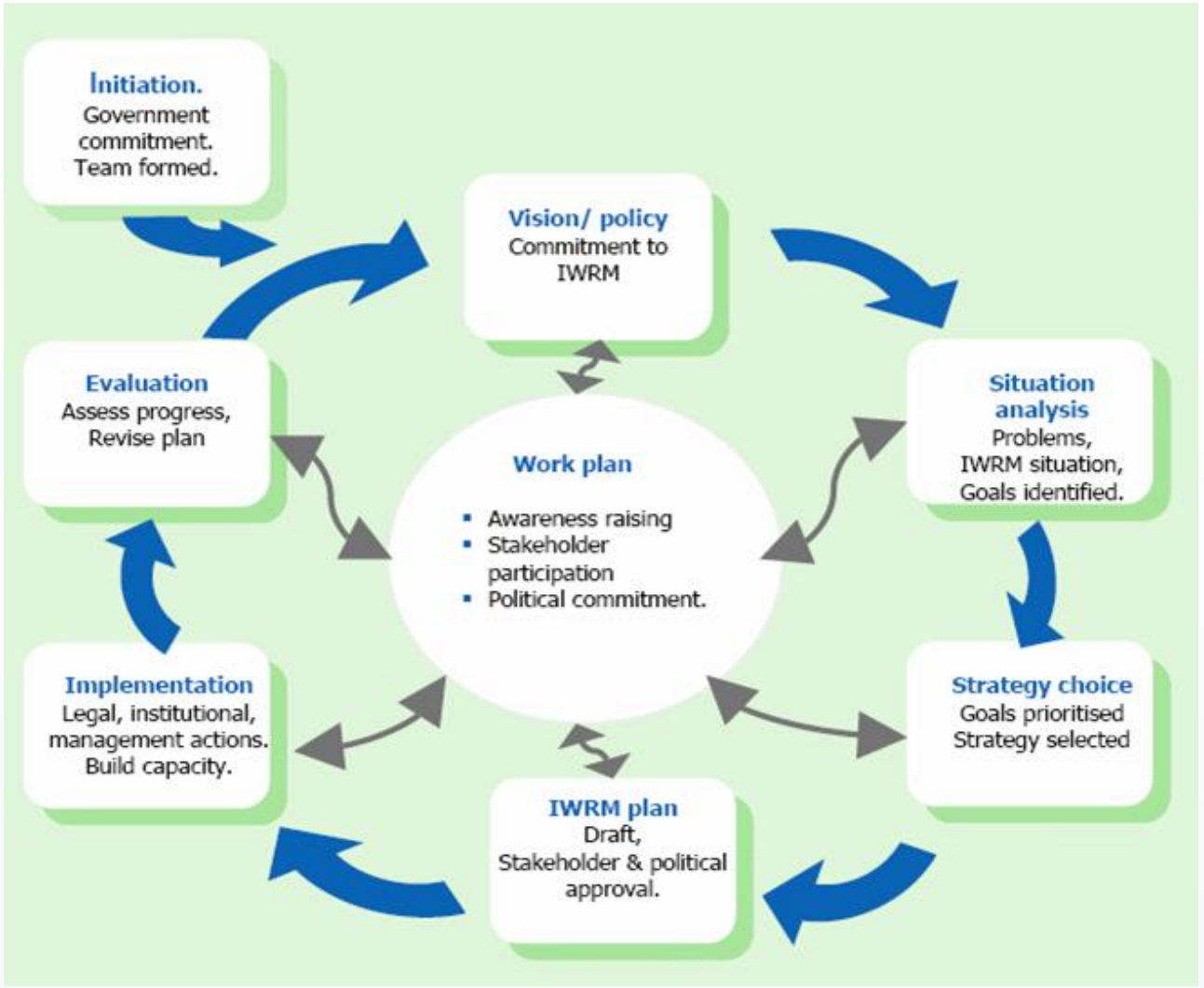
Integrated Water Resources Management

IWRM is a **process** which promotes the co-ordinated development and management of water, land and related resources, in order to maximise the resultant **economic and social welfare** in an **equitable** manner without compromising the **sustainability** of vital **ecosystems.**

(GWP, 2000)



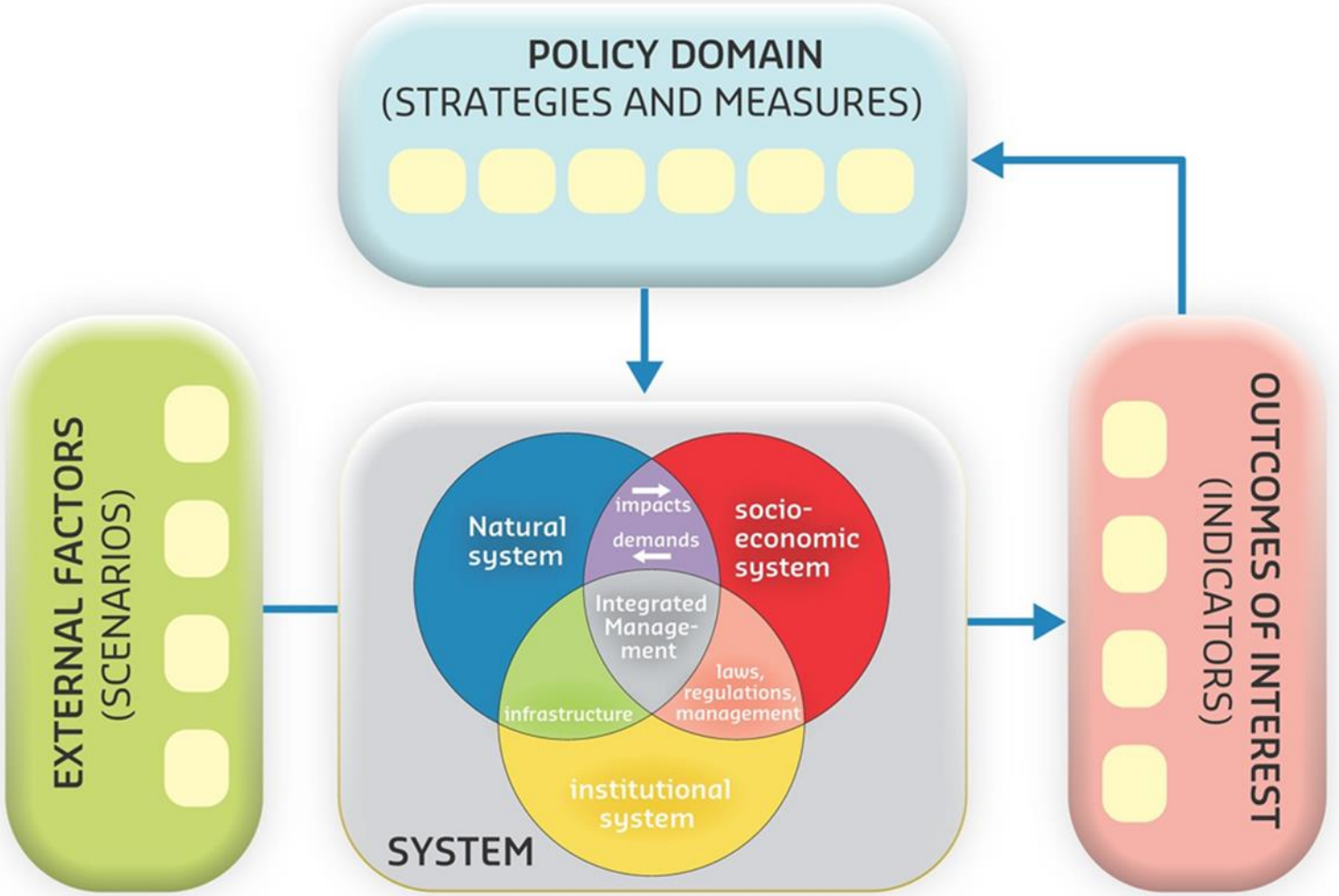
Planning cycle



Policy Analysis

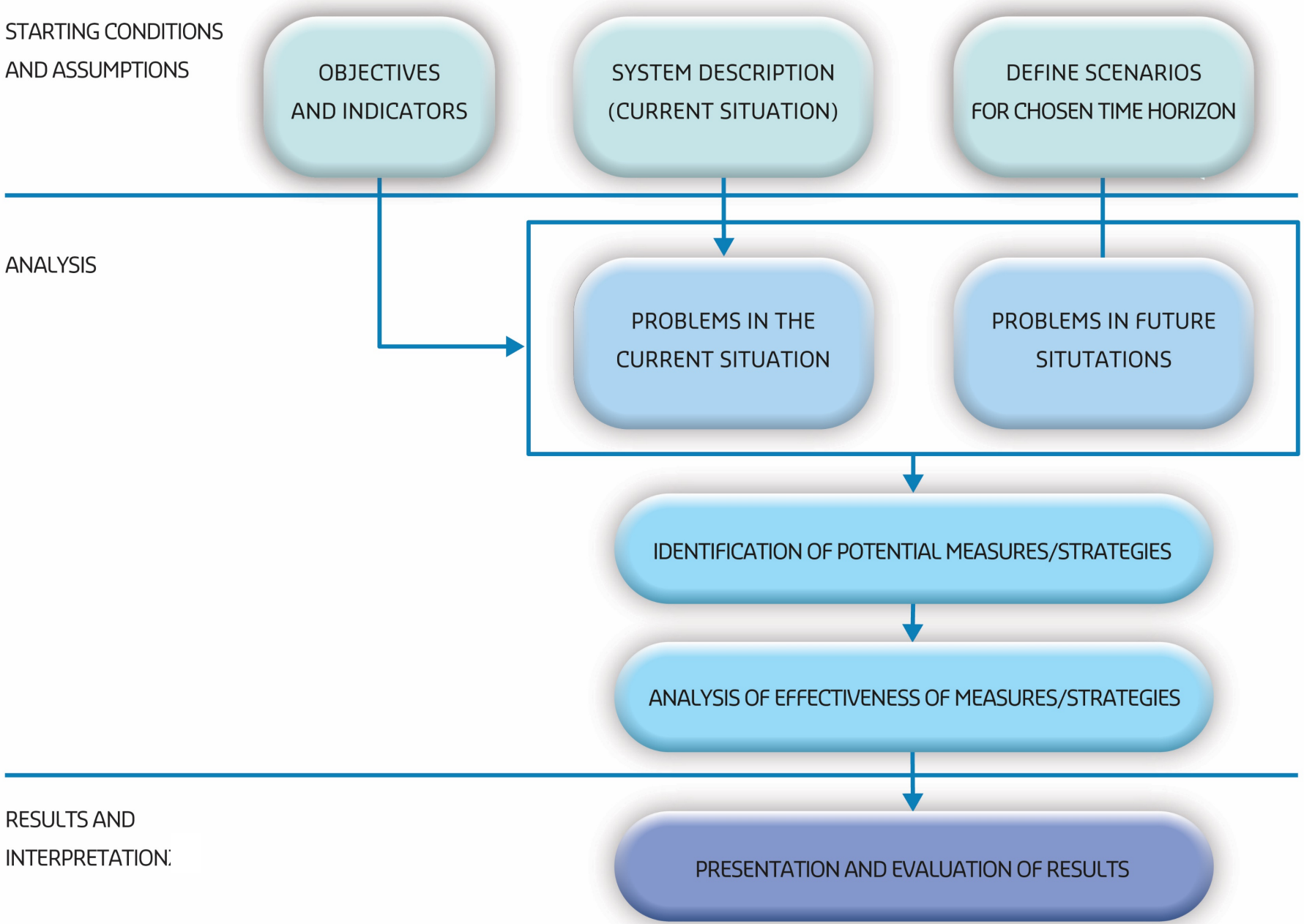
*Policy analysis is a **systematic process** to develop solutions for a **policy problem**, in which **alternative solutions** and their **impacts** are assessed and presented to support **well-informed decision-making***

System Analysis

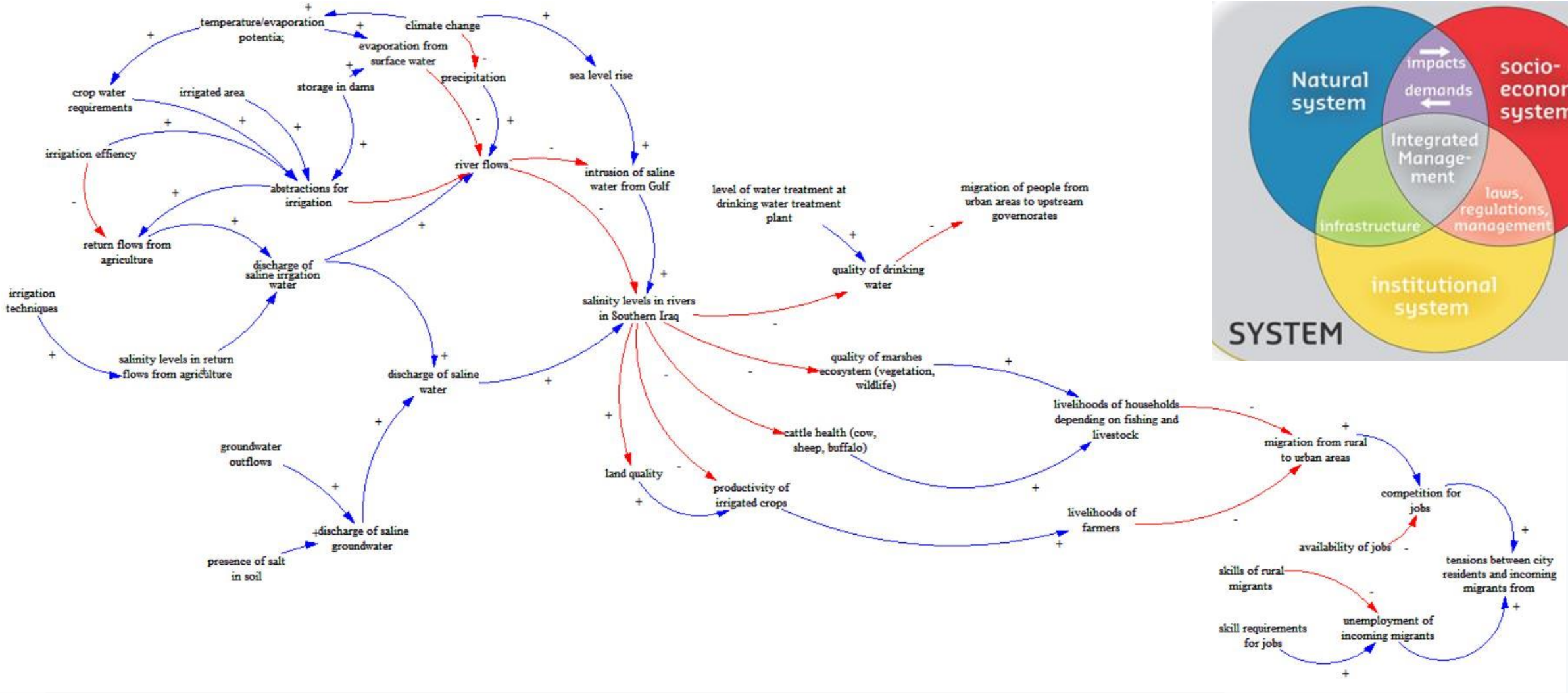


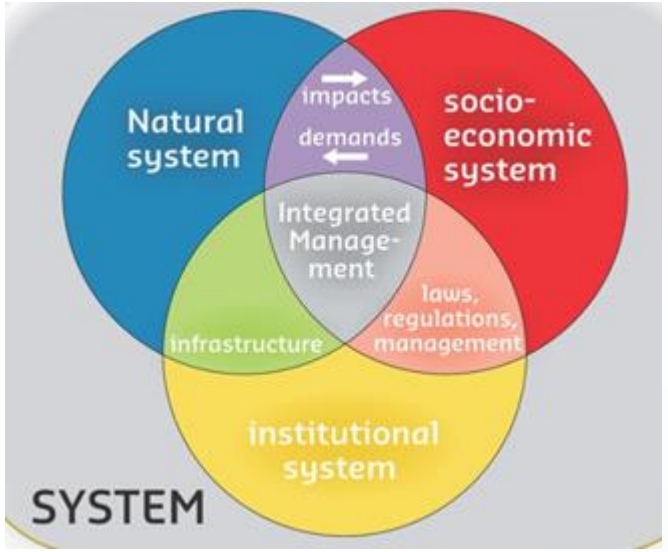
A problem?

POLICY OBJECTIVES

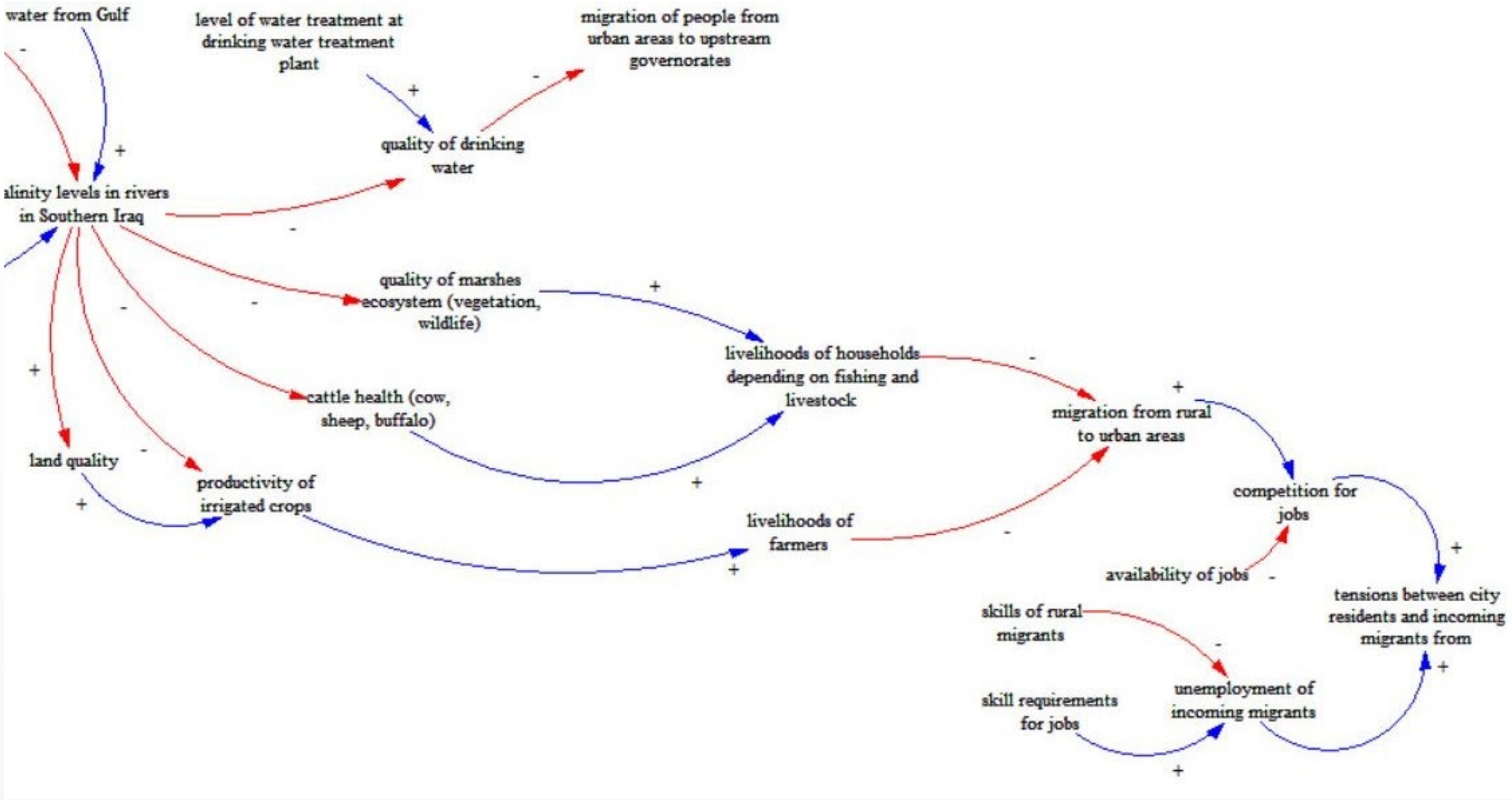

STARTING CONDITIONS
AND ASSUMPTIONS
OBJECTIVES
AND INDICATORS
SYSTEM DESCRIPTION
(CURRENT SITUATION)
DEFINE SCENARIOS
FOR CHOSEN TIME HORIZON
ANALYSIS
PROBLEMS IN THE
CURRENT SITUATION
PROBLEMS IN FUTURE
SITUTATIONS
IDENTIFICATION OF POTENTIAL MEASURES/STRATEGIES
ANALYSIS OF EFFECTIVENESS OF MEASURES/STRATEGIES
RESULTS AND
INTERPRETATION
PRESENTATION AND EVALUATION OF RESULTS

‘Causal loop diagram’





Consequences



Outcomes of interest and indicators

- Societal impacts
- Directly related to the interests of stakeholders

- Existing frameworks that can serve as guiding principle:
  - Sustainable development: economic efficiency, social equity and environmental sustainability aka people, planet, profit
  - SDGs
  - Water security
- Indicators to quantify outcomes of interests
  - Crop productivity (outcome of interest) -> tons/ha (indicator)
  - Drinking water quality → salinity level in parts per million (ppm)

Question

What type of social impacts, directly related to different type of stakeholders can you identify?

Outcomes of interest	Important to who/to which policy objective	indicator	Availability data
Good water quality	..	Xx mg/l	
Energy costs of pumping			

External factors/scenarios

- Factors beyond the sphere of influence of the stakeholders/decision-makers involved
- E.g. population growth, climate change, economic development, rural to urban migration

- Scenarios: a set of plausible representation of changes in external factors
- All are possible, one is not necessarily more probable than another
  - E.g. low, mid and high level population growth
- Scenarios can be a combination of different values for a number of external factors, e.g. low population growth and high climate change

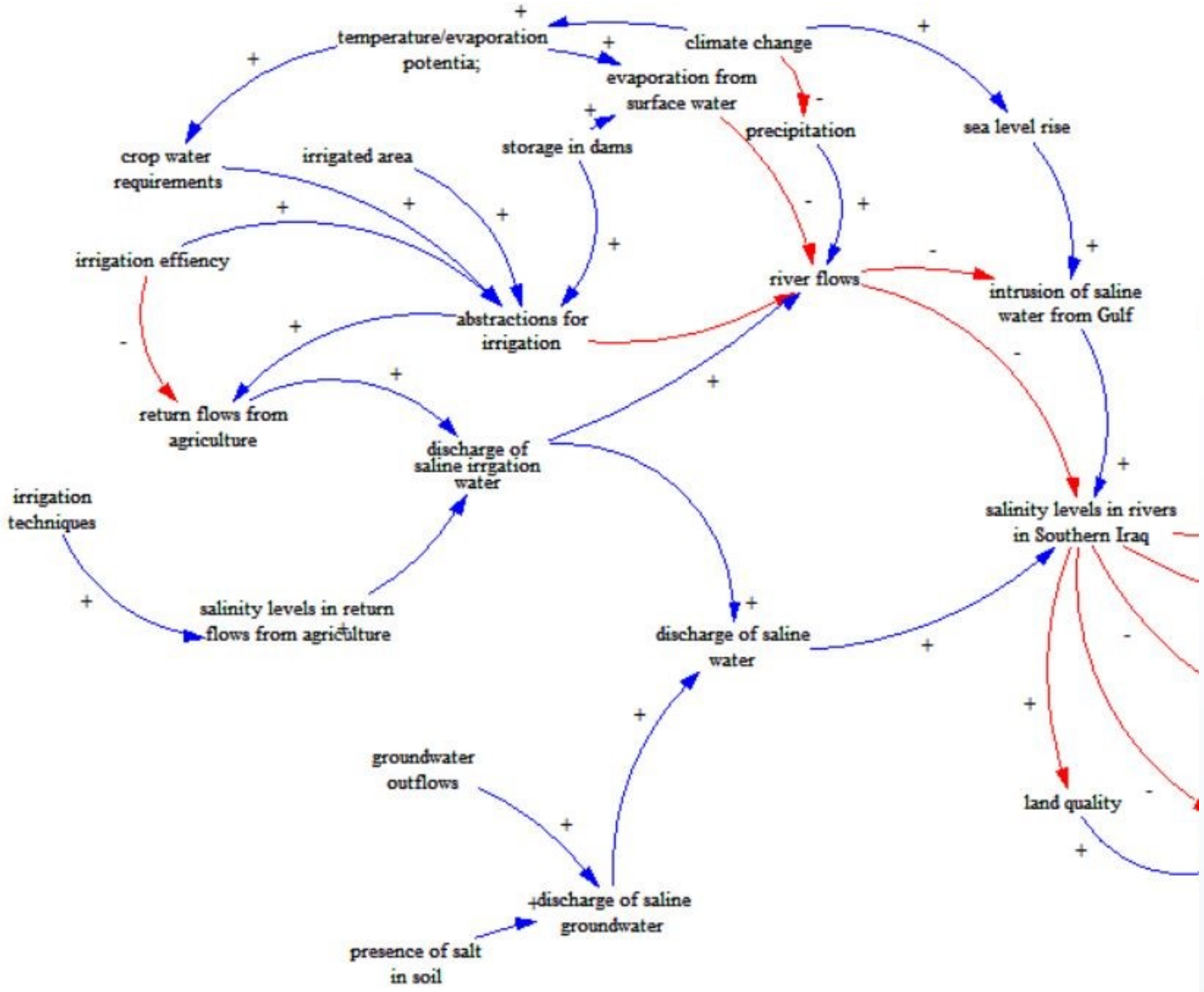
Question

What external factors (drivers) do you see as relevant for the system analysis in Iraq?

Drivers	Trend/range/horizon	indicator	Availability data
Population growth	High end scenario by 2050	No. of inhabitants % growth per year	

- Demand influencing measures
- Supply measures
- Technical measures
- Institutional measures
- Measures reducing the impacts

Causes


temperature/evaporation potentia;
climate change
evaporation from surface water
precipitation
sea level rise
storage in dams
crop water requirements
irrigated area
irrigation effiency
river flows
intrusion of saline water from Gulf
abstractions for irrigation
return flows from agriculture
discharge of saline irrgation water
irrigation techniques
salinity levels in rivers in Southern Iraq
salinity levels in return flows from agriculture
discharge of saline water
groundwater outflows
land quality
discharge of saline groundwater
presence of salt in soil

Question

What interventions could be included in our intervention analysis? Please name different types of measures based on the infomration provided today.

Analysis of current and future problems

- Are outcomes of interests within acceptable limits
  - At present?
  - Under various plausible scenarios

- Quantification
  - Water resources model (available, can be further refined)
  - Human responses model (under development)

- Data
  - Water resources: global data, supplemented with more detailed/more recent information and data
  - Human respones model: information from literature, experts, and results from household surveys
  - Other?

Group model building

- Make explicit mental models (how we see the world)
- Understand how others perceive the world
- Combine the understanding of the different actors on several subsystems

- Structured method:
  1. Decide on the key problem
  2. Draw how the key problem has changed over time
  3. Develop the causal loop diagram
  4. Draw conclusions

Causal loop diagrams (CLDs) for group model building

- as observed previously, a CLD is a visualization of the interconnections of the system that can be used in group model building
- which is fully open to whatever is considered an important factor that determines the functioning of the system
  - when a change in one factor has no influence on other factors, we can leave it out
- which make it possible to create interconnections between subsystems of different sectors
- which facilitates discussion of the exact mechanisms of how factors influence each other
- after developing the qualitative model, it can be decided which components should be quantified and with which tools / software