GCARD3
2015|2016
GLOBAL CONFERENCE ON AGRICULTURAL RESEARCH FOR DEVELOPMENT

# GLOBAL EVENT

## JOHANNESBURG SOUTH AFRICA

Eike Luedeling, Keith Shepherd
World Agroforestry Centre (ICRAF)

# Prioritizing research for development impact

# Knowledge gaps are everywhere

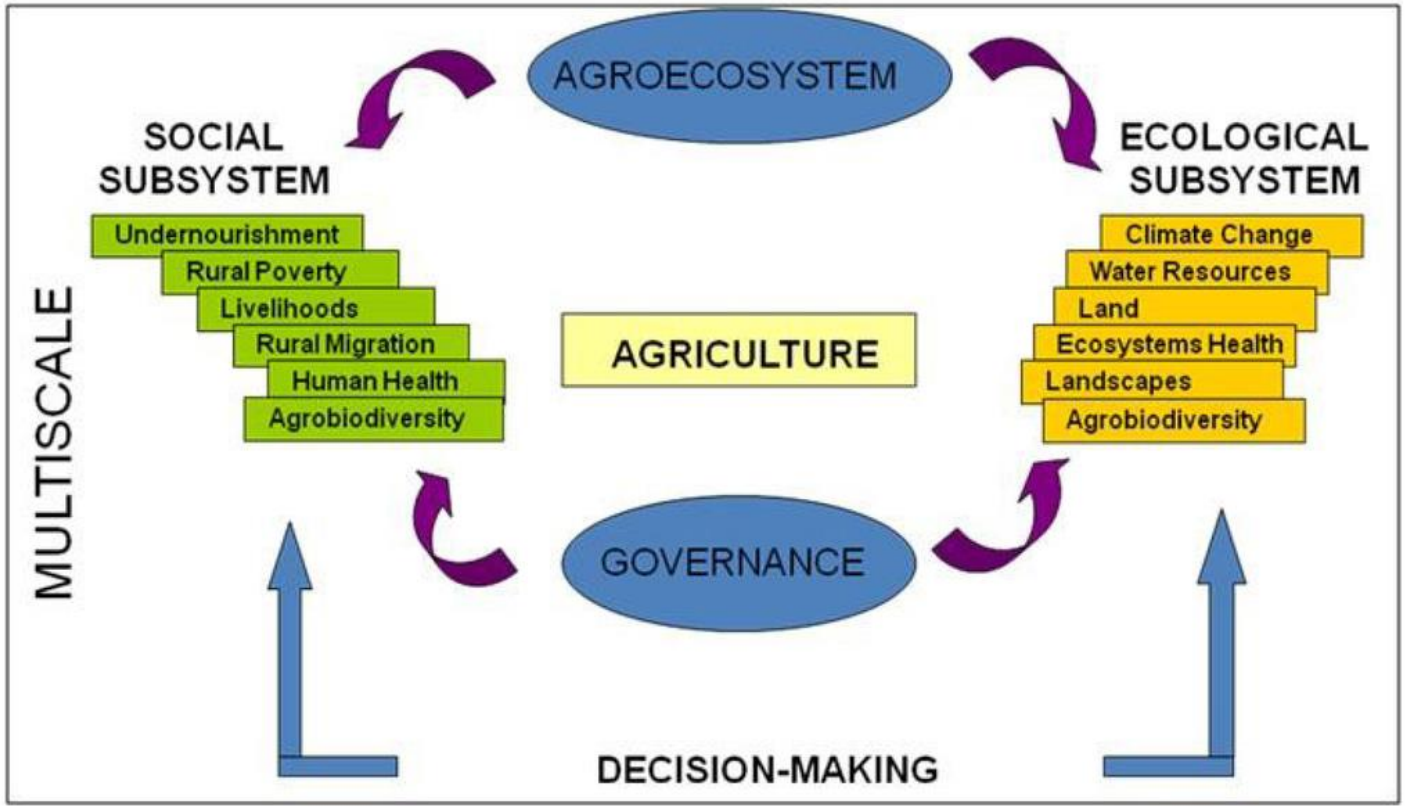
Weather data

WMO

A massive effort would be needed to close this, but this may be possible

# But agriculture is more complex

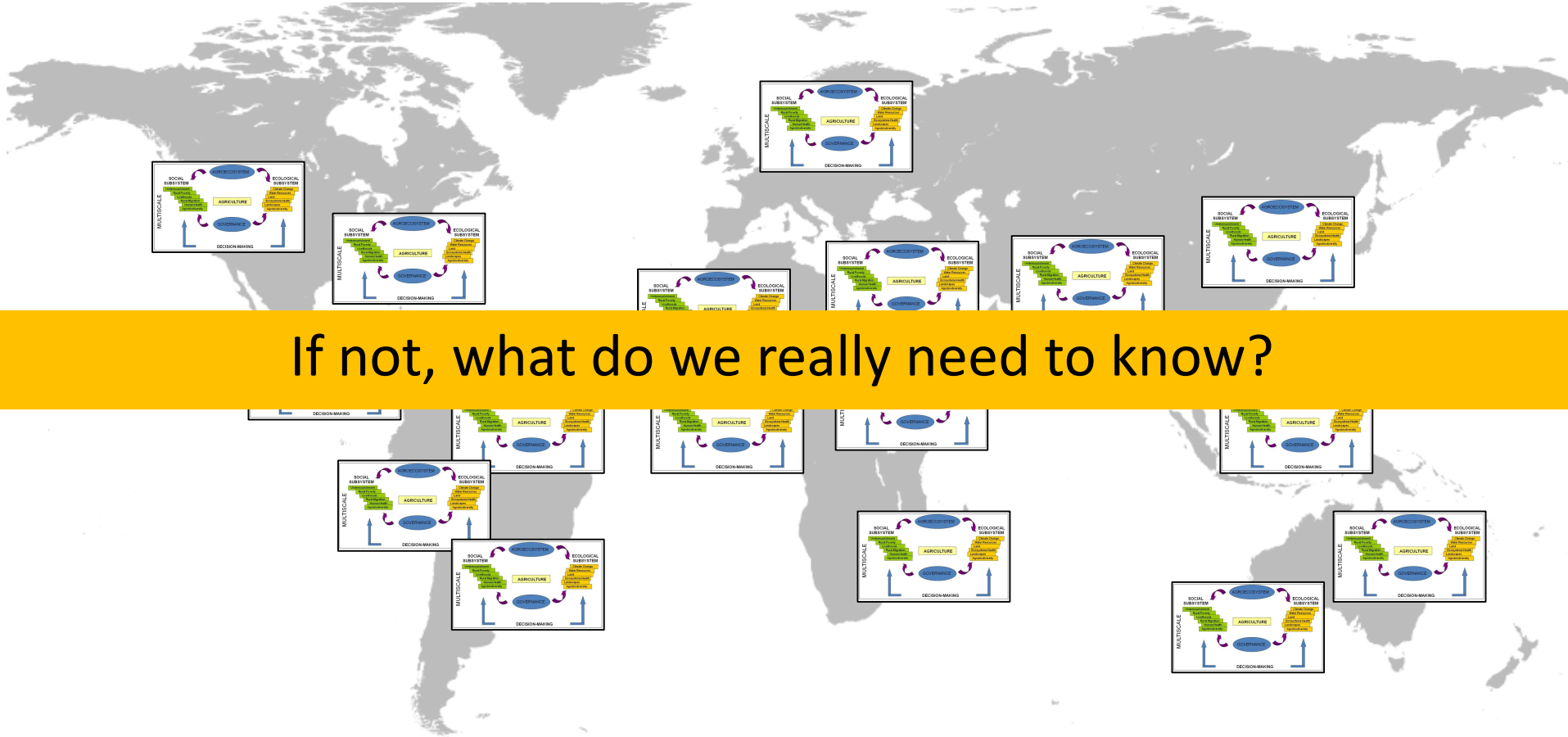
Some drivers of agricultural systems




Rivera-Ferre et al., 2013. Sustainability 5, 3858-3875

# But agriculture is more complex … and variable

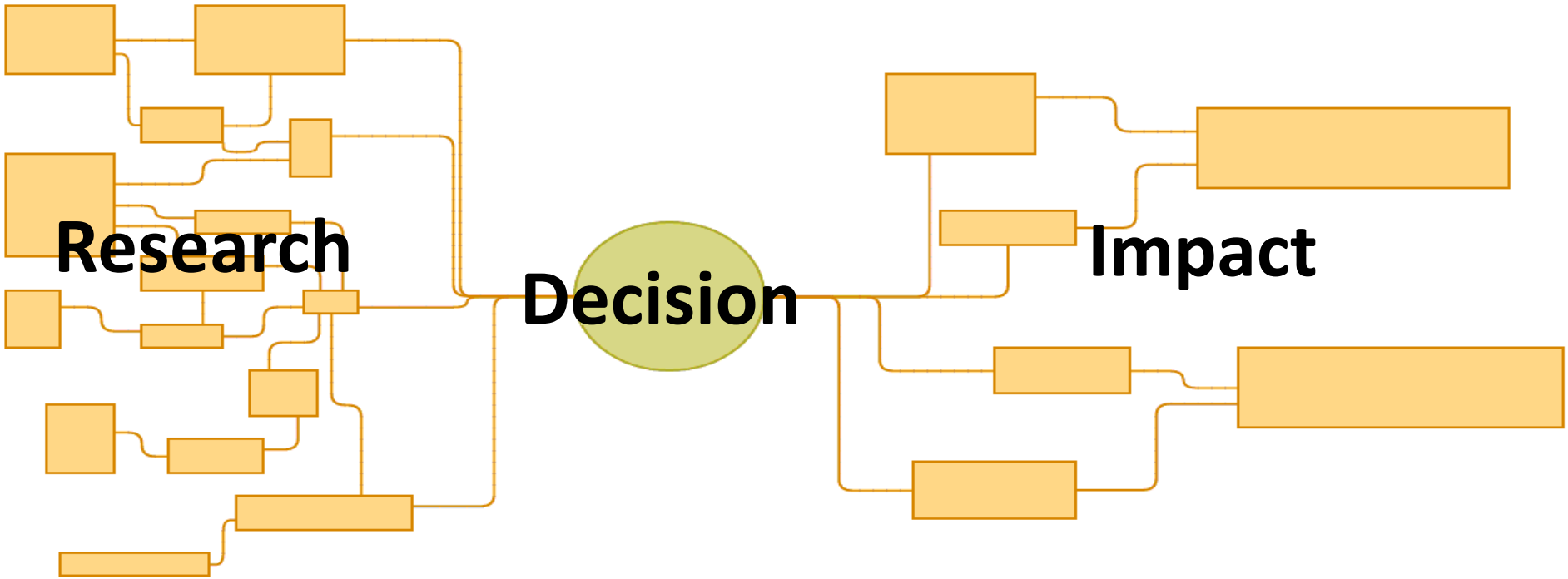
Can we close all knowledge gaps?



If not, what do we really need to know?

# Focus on decisions

Decisions are critical bottlenecks in most impact pathways




Information has little value, if it doesn't affect decisions

What knowledge would best support particular decisions?

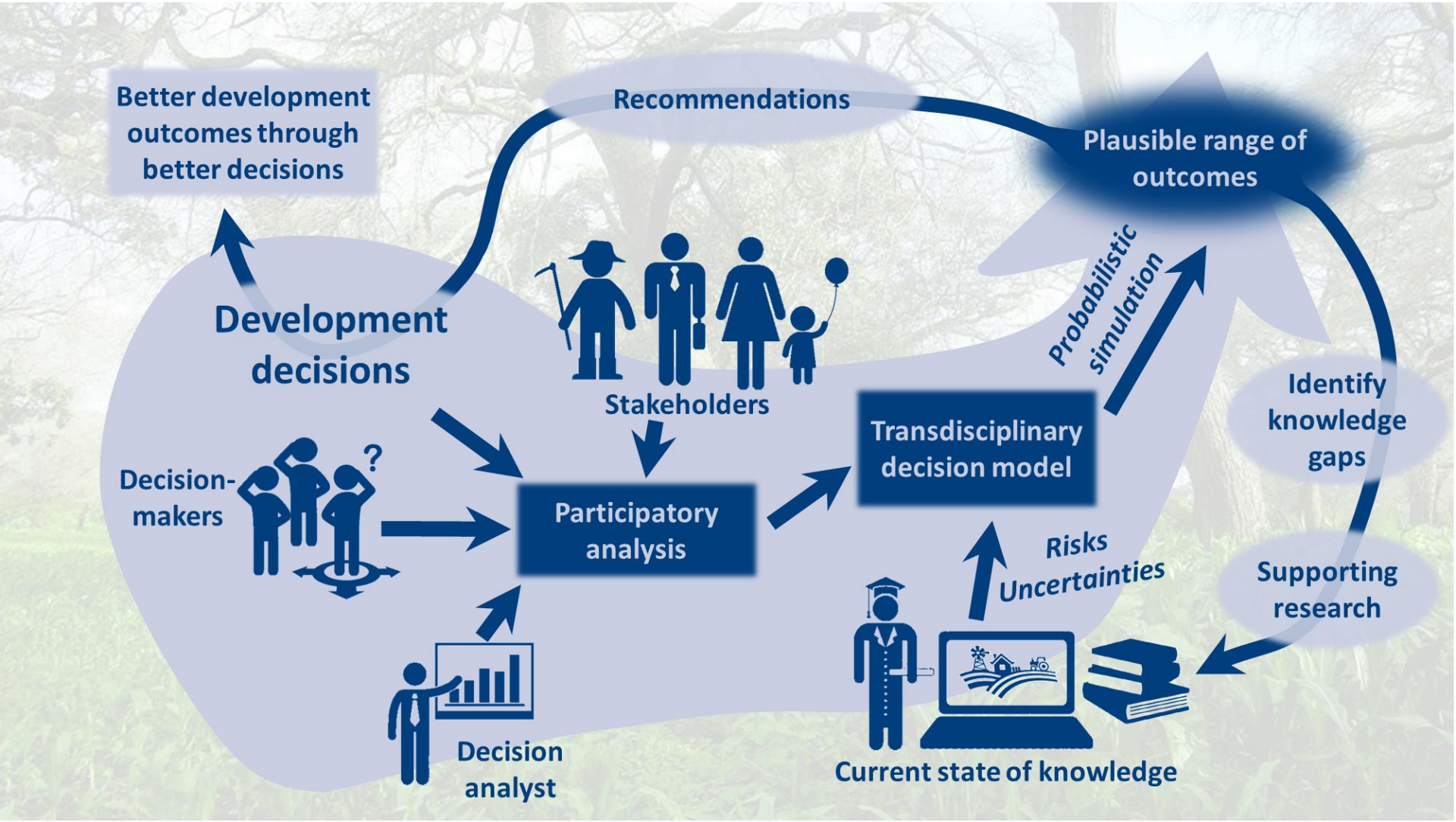
# Decision analysis

- Widely used for supporting risky decisions under uncertainty
- Focus on a specific decision
- Identify and arrange into model all factors that should be considered
- Determine the current state of knowledge about all of them
- Run a model with the full range of uncertainty
- Identify major knowledge gaps through Value of Information analysis

# How is this new?

- Start with the big picture
- Consider all available information, including expert knowledge, in making a causal decision model
- Accept that we cannot know everything and work with the knowledge we have (we rarely know nothing at all)
- Project ranges (probability distributions) of decision outcomes that acknowledge our uncertainties
- Quantify which knowledge gains would be most valuable for decision-makers
- Fill these gaps to improve decisions

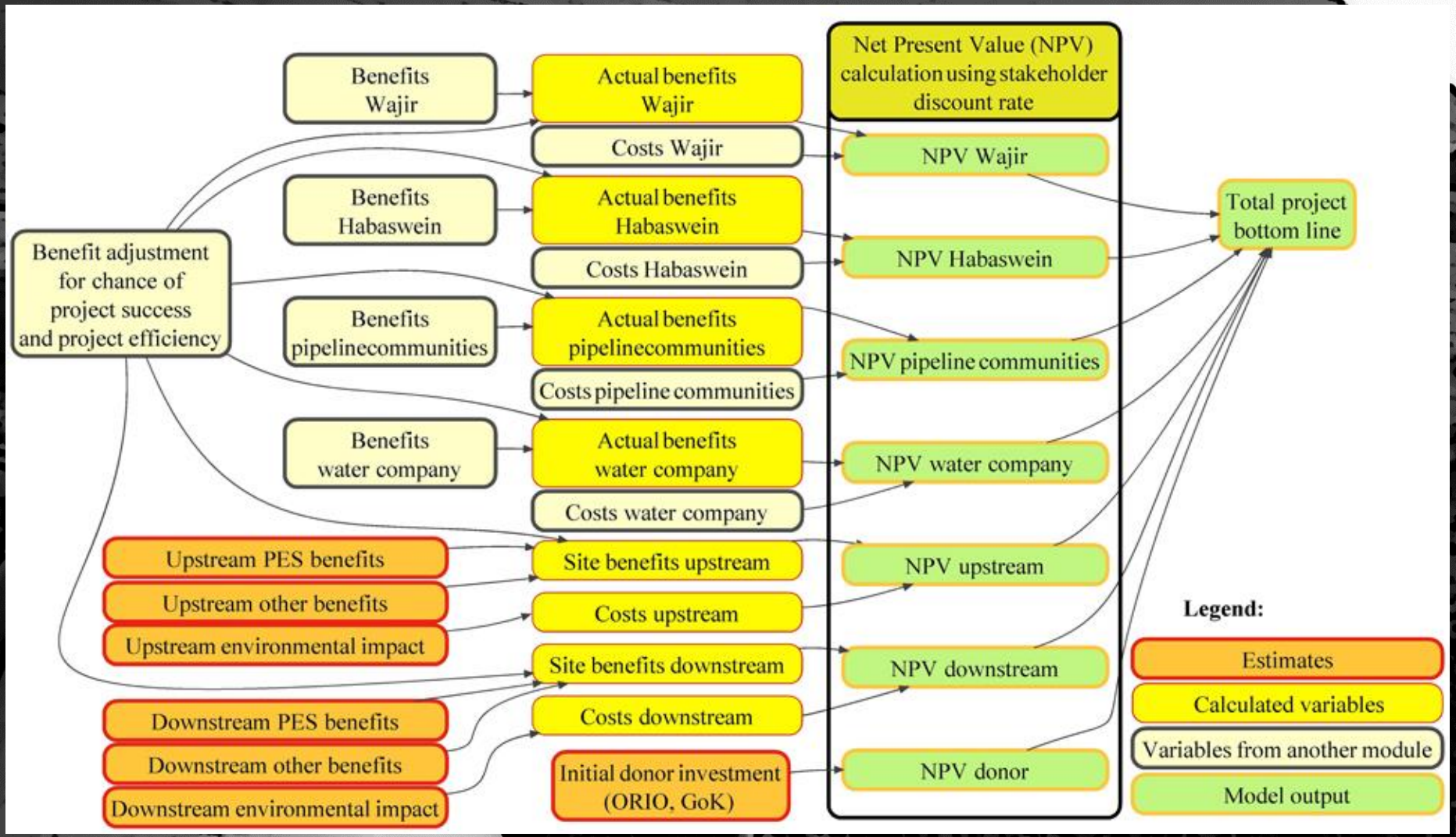
# Decision analysis



# Decision analysis for a water pipeline in Kenya

- Controversial decision on tapping an aquifer to supply the city of Wajir, 100 km away
- Stakeholder and expert-driven holistic decision model

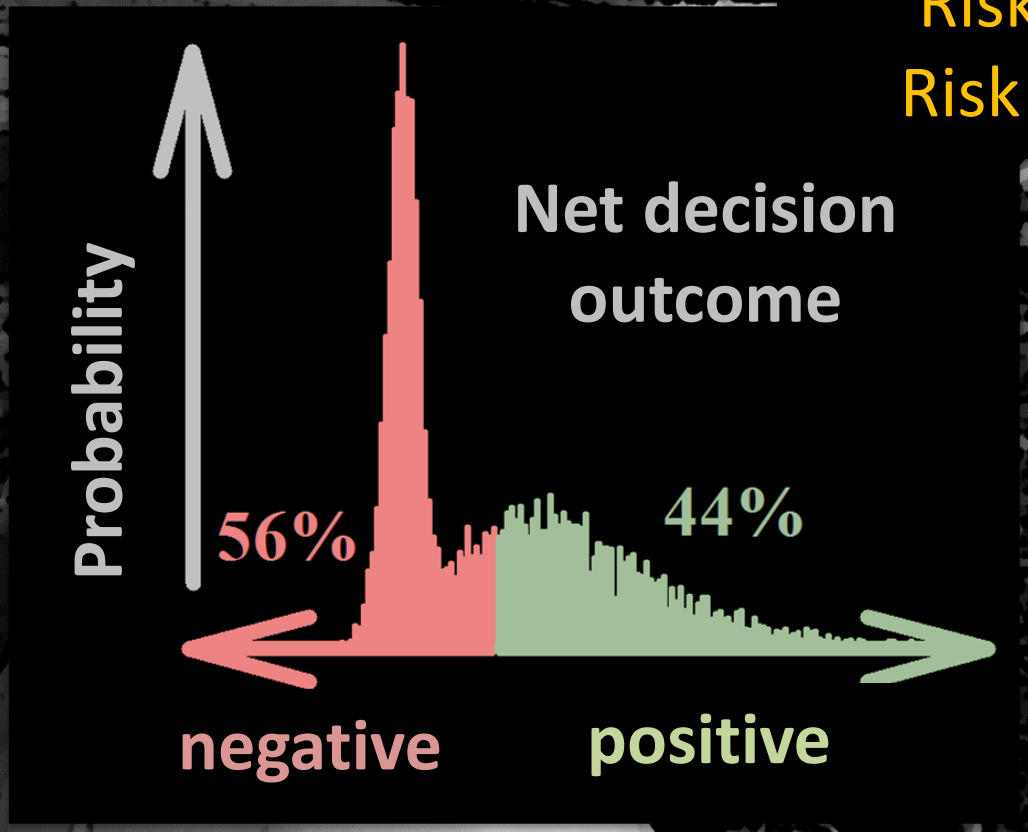
# Decision analysis for a water pipeline in Kenya



# Decision analysis for a water pipeline in Kenya

**Key uncertainties**

Value of reducing infant mortality
Risk of poor project design
Risk of political interference




Measurements that had been commissioned had little information value (e.g. hydrologic risks)

# Prioritizing research for development impact

- In setting research priorities, we should consider the decisions we want to support
- Research should fill key knowledge gaps affecting decisions
- These are hard to find without formal decision analysis
- Generate ‘big picture’ understanding first, and assess current state of knowledge, before deciding what to study
- R4D could greatly benefit from adopting decision analysis approaches, which are designed for supporting risky decisions on complex systems under uncertainty – exactly the challenge we often face

# Thanks for your attention!

More information at:

[Shepherd et al., 2015. Development goals should enable decision-making. Nature 523, 152-154]

[Shepherd, 2015. How Much Development Data Is Enough? Project Syndicate column, Dec 2015]

[Luedeling and Shepherd, 2016. Tackling the unknown: pragmatic ways to evaluate sustainability. Thrive blog]

[Luedeling et al., 2015. Fresh groundwater for Wajir. Frontiers in Environmental Science 3:16]

World Agroforestry Centre

**Eike Luedeling**
e.luedeling@cgiar.org

**Keith Shepherd**
k.shepherd@cigar.org

agriculture, forestry & fisheries
Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

ARC • LNR
Excellence in Agricultural Research and Development

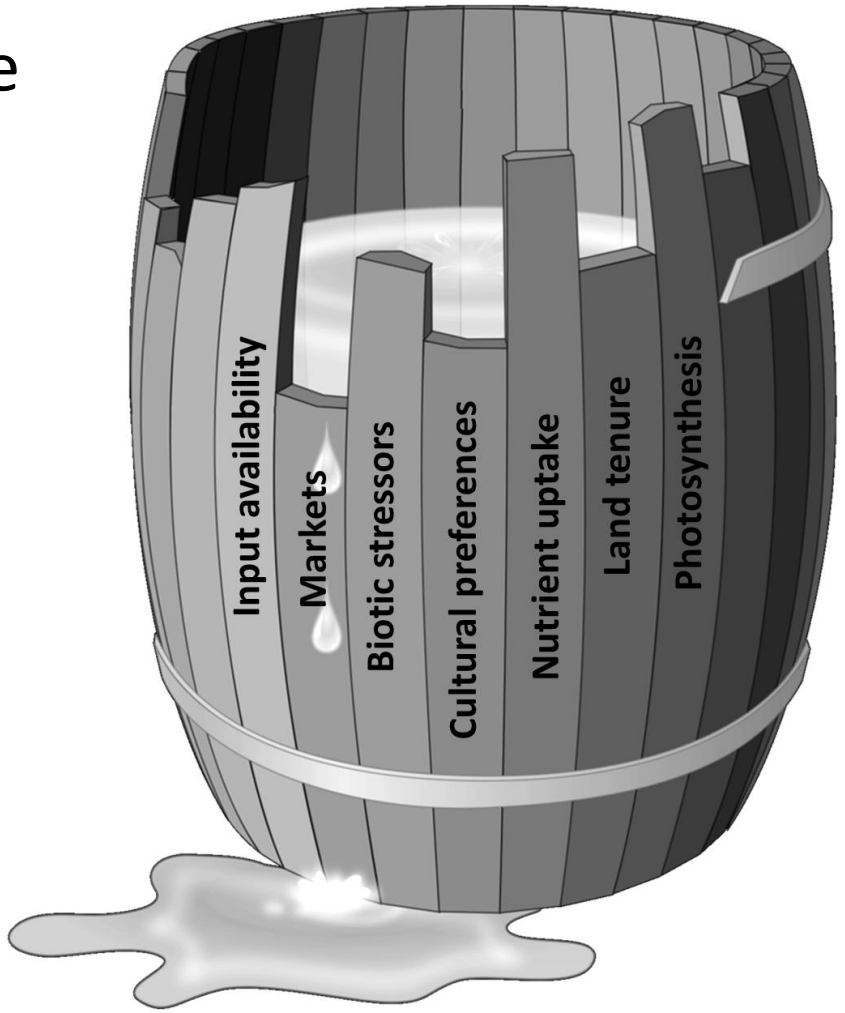
GCARD3 2015|2016
GLOBAL CONFERENCE ON AGRICULTURAL RESEARCH FOR DEVELOPMENT

CGIAR

GFAR

# But agriculture is more complex … and variable

Some pieces of knowledge are more important than others?




Luedeling and Shepherd, under review