GLOBAL EVENT
JOHANNESBURG SOUTH AFRICA
Prioritizing research for development impact

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Knowledge gaps are everywhere

Weather data

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

Better development outcomes through better decisions

Development decisions

Decision-makers

Stakeholders

Participatory analysis

Transdisciplinary decision model

Recommendations

Plausible range of outcomes

Probabilistic simulation

Identify knowledge gaps

Supporting research

Decision analyst

Current state of knowledge

Risks

Uncertainties
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
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

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Some pieces of knowledge are more important than others?