

Climate Information for Adaptation Science in Agriculture and Natural Resource Management

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“One of the core responsibilities of each government should be to ensure the access of scientifically credible and adequate information on climate prediction and climate change.”

Mr Michel Jarraud,
Secretary-General, WMO
at UNFCCC COP 14, Poznan, Poland
December 2008



Climate Risk Management in Agriculture – who destroyed the sand castle, the wave or the tide?

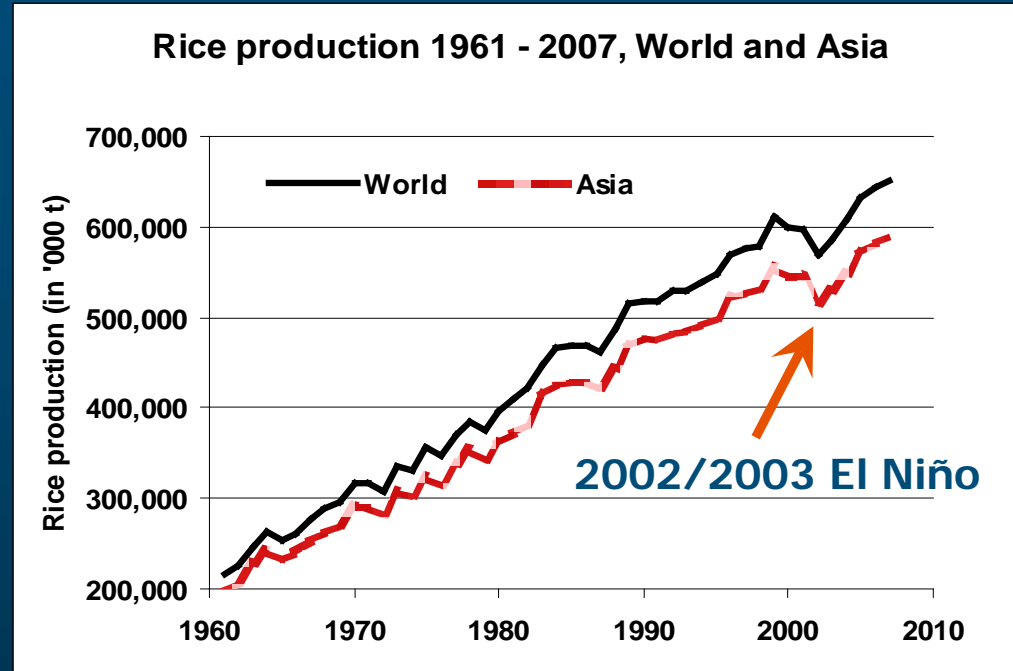
- Emphasis on context
- While CC might be the cause, people need to manage CV
- Climate disruptions / shocks
- Probability blindness (impact x probability)



photo: D Gallery

Global and regional rice production since 1961

- Since 1960 strong, near-linear trend in rice production → 3-fold increase in annual global production volume, made possible by the green revolution.
- The 2002/2003 El Niño event lead to the largest annual production decline ever (29 Mt or 5% less than in 2001).
- Mounting concern that future production increases are very limited, especially in Asia.



World Water Week 2009 in Stockholm showed that demand for food and animal feed will double during the next 50 years with little scope for expanding arable land. In most places there are now clear limits on the amount of additional water that can be used for agriculture.

Managing uncertainty



Impacts Assessments

Adaptation Science



Traditional risk
management



Creating adaptive
capacity & resilience



Adapt to maintain
existing activities



Transformative
change to create new
options

...derived from Holling (1978)

Adaptation Science

- ... is a process of assessing threats, risks, uncertainties and opportunities. It **generates the information, knowledge and insight required to effect changes** to increase adaptive capacity and performance of systems;
- ... differs from *science for adaptation* by focusing on **testing alternative solutions** and **developing adaptation pathways** as opposed to generating more data.
- ... is a scientific approach that helps practitioners to determine the **best mix of technical options**, including when, where and how to use enabling and transformational technologies;
- ... is designed to allow practitioners and policy makers to negotiate better aligned **policy by management** responses.
- ... is the **knowledge component** behind the enabling and transformational technologies necessary for effective adaptation

The issue



- Decision makers are exposed to an avalanche of largely unfiltered, irrelevant data disguised as 'information'.
- Climate service providers lack a broad, inclusive mandate and ability to create effective engagement mechanisms.
- Climate-related problems are complex and often require only 'basic' climate science.
- A lack of engagement mechanisms leads to failure to create much needed local & regional adaptive capacity.
- This resulted in a disconnect between the trans-disciplinary issue of climate risk management and the highly disciplinary & institutionalised climate science community.
- Maladaptation caused by providing single-disciplinary answers to transdisciplinary problems leads to a loss of credibility.

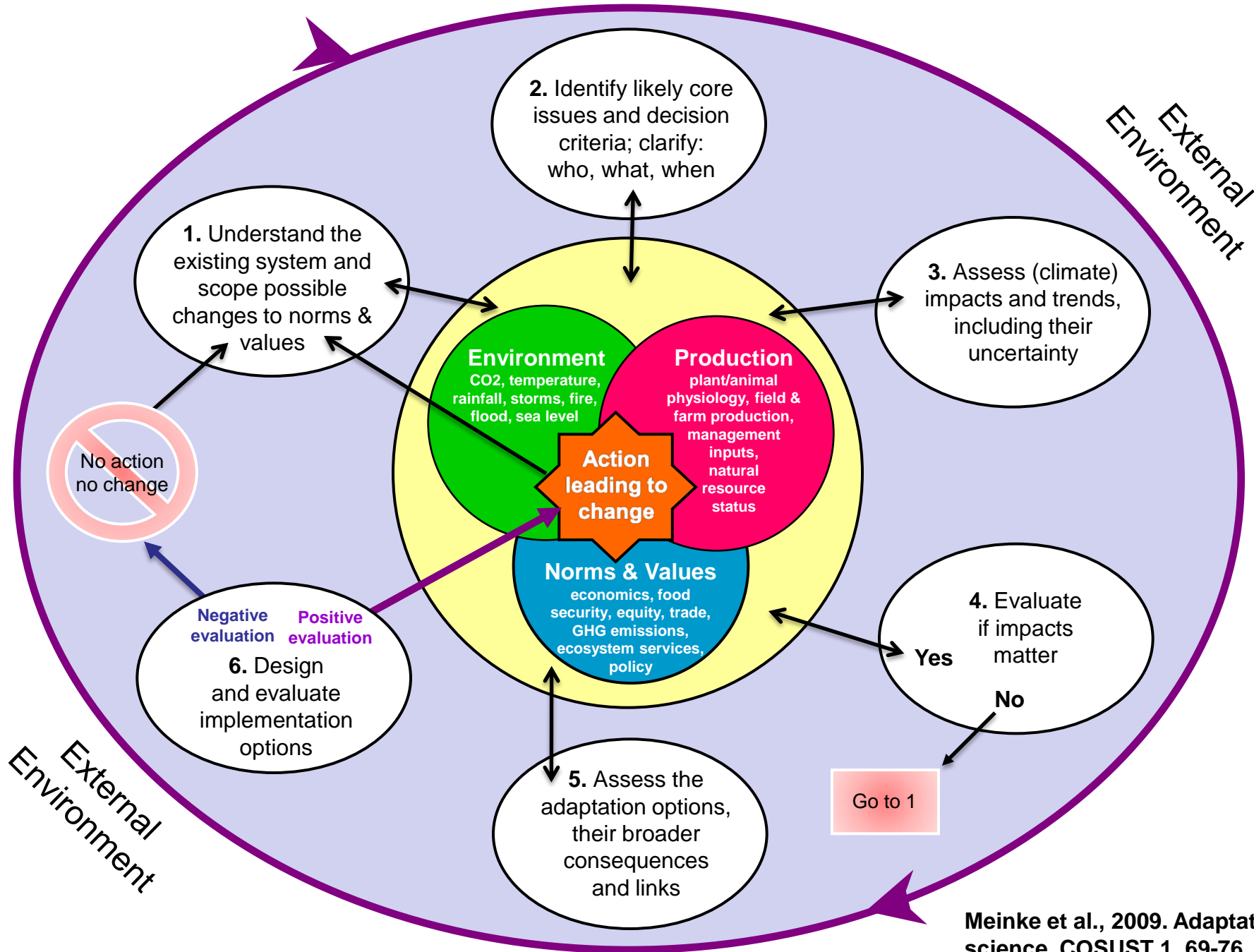


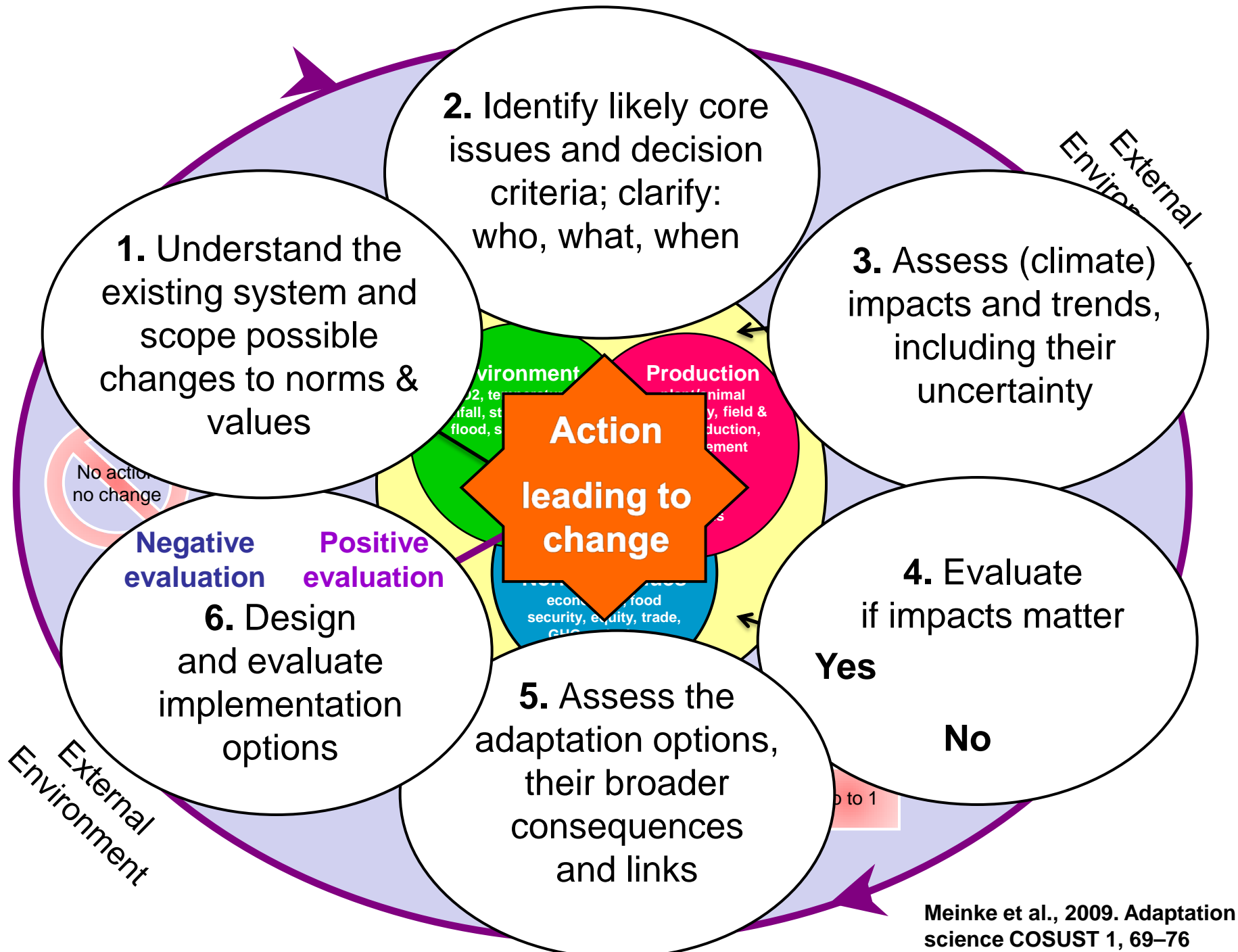
The way forward

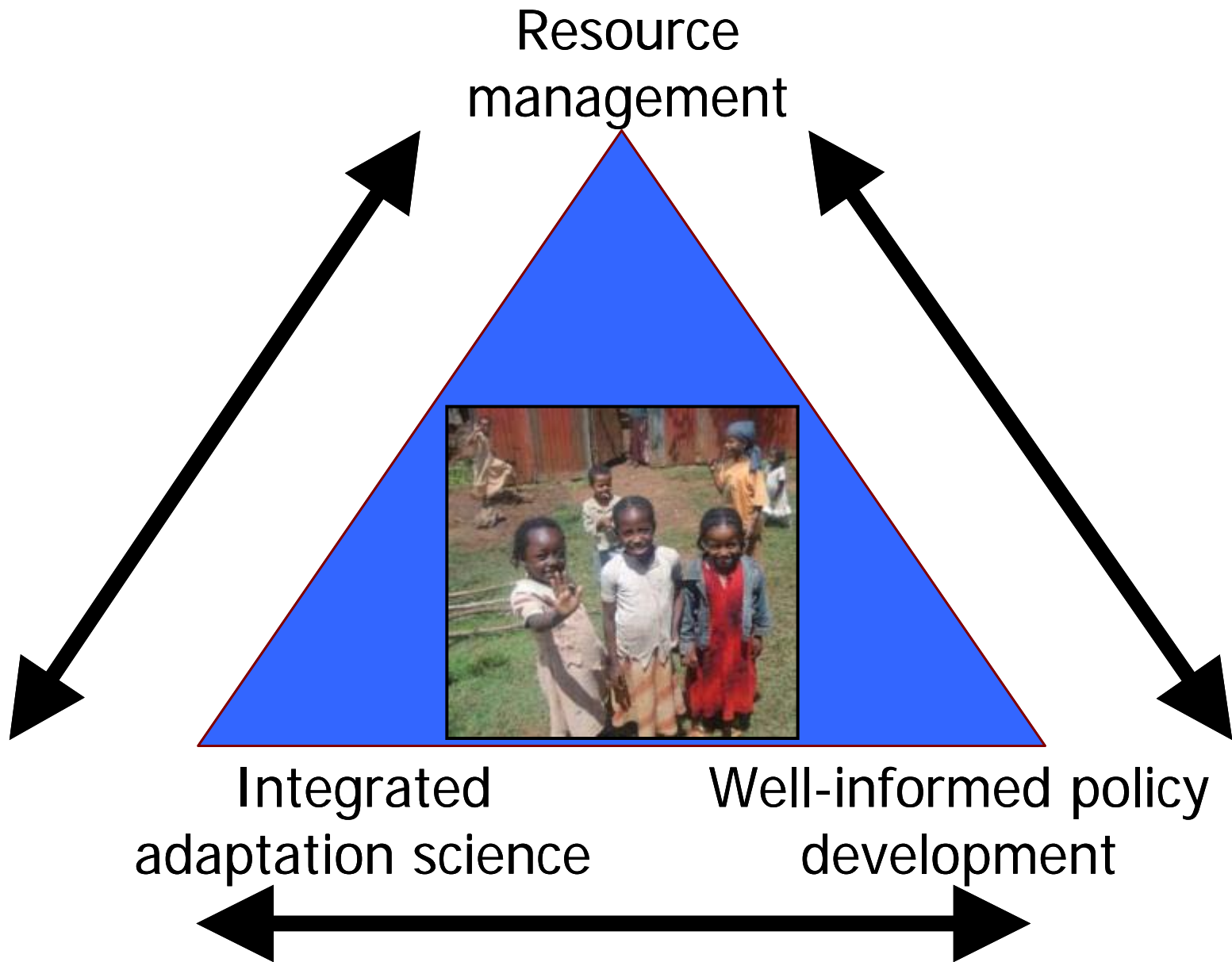


- **Salience**: don't provide a 'data dump' – critically assess information in terms of relevance for the decision maker; we don't need 'downscaling', we need 'rightscaling';
- **Credibility**: establishment of relationships and trust; services embedded within communities
- **Legitimacy**: no undeclared interests; long-term funding commitment independent of politics; leadership in coordination (e.g. portals, clearinghouse)
- Let us focus on defining and answering the right questions. This requires shared problem definitions that can be achieved way an 'adaptation cycle'



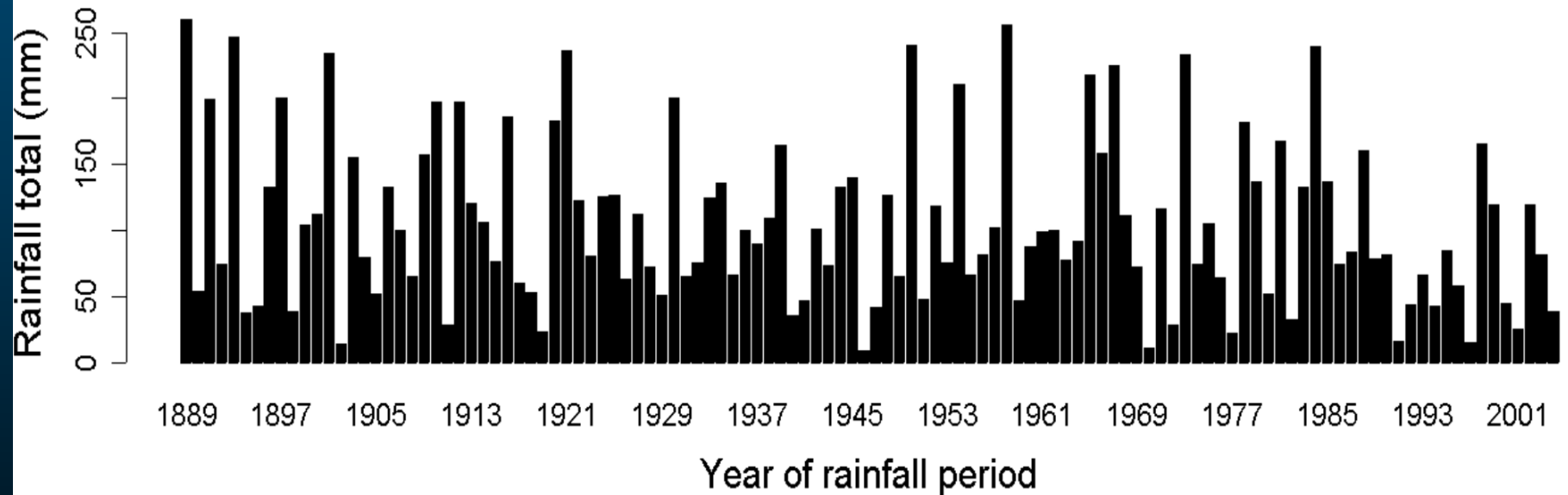




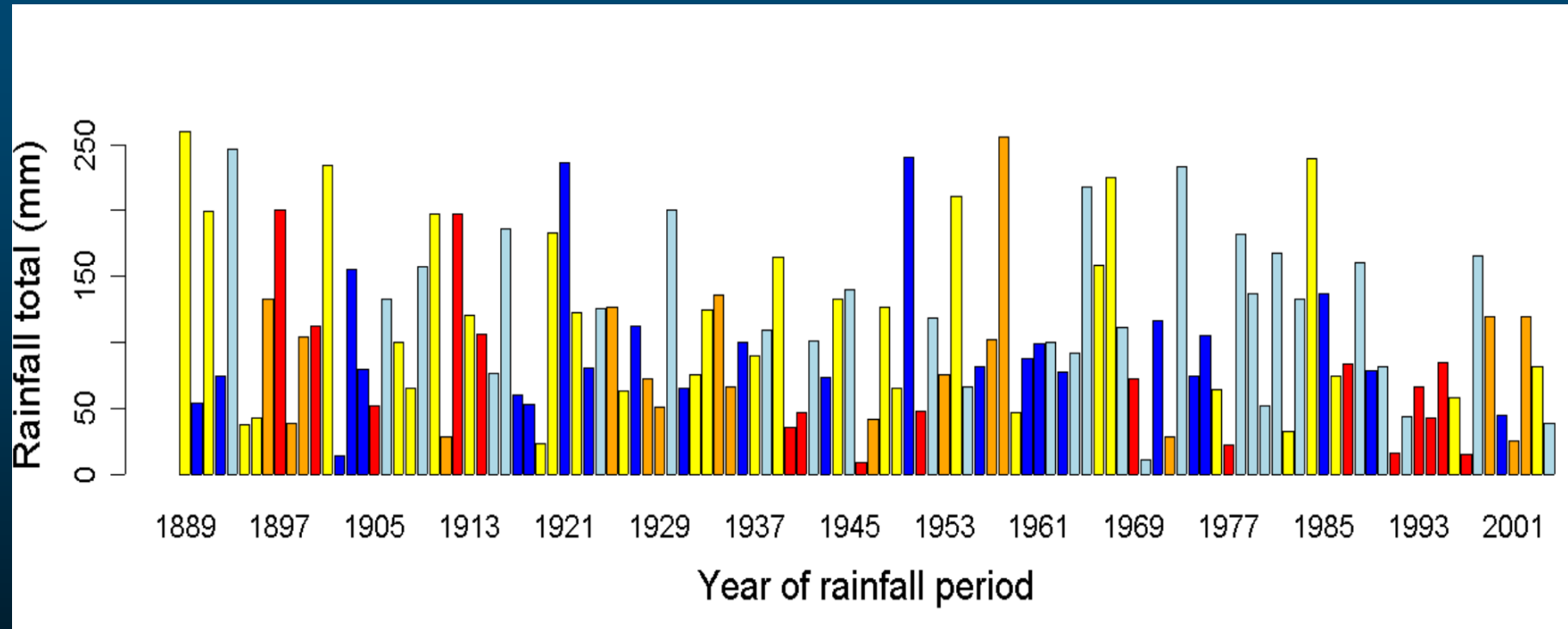


The first step: understanding rainfall

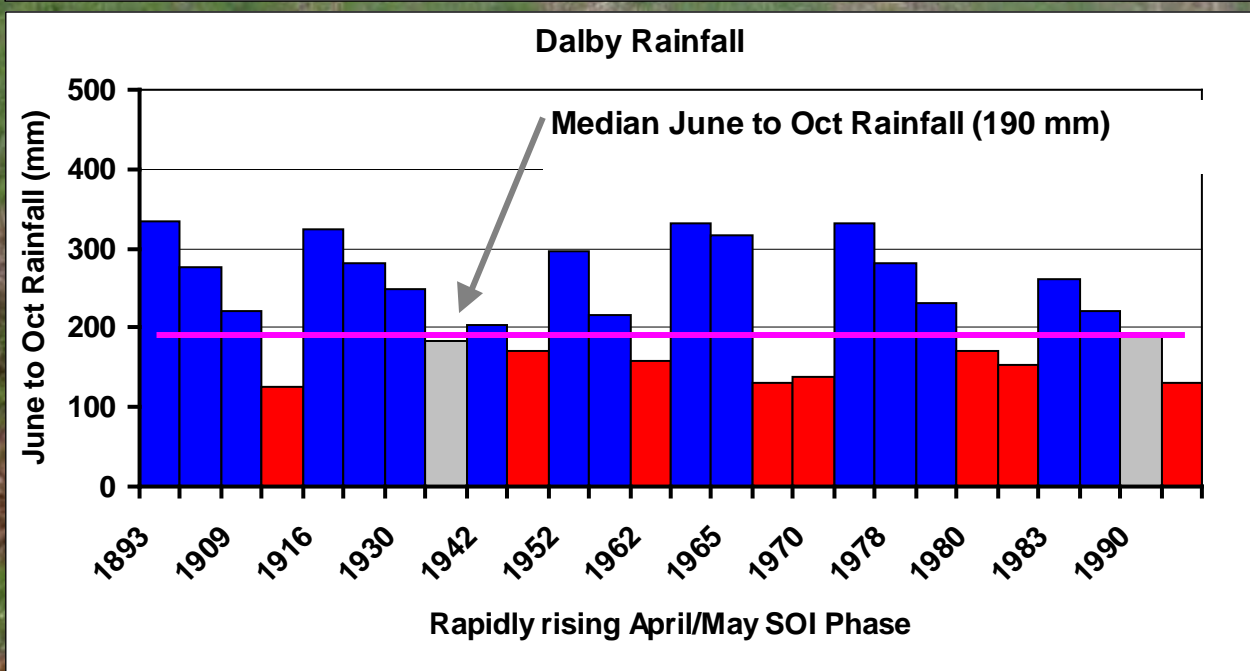
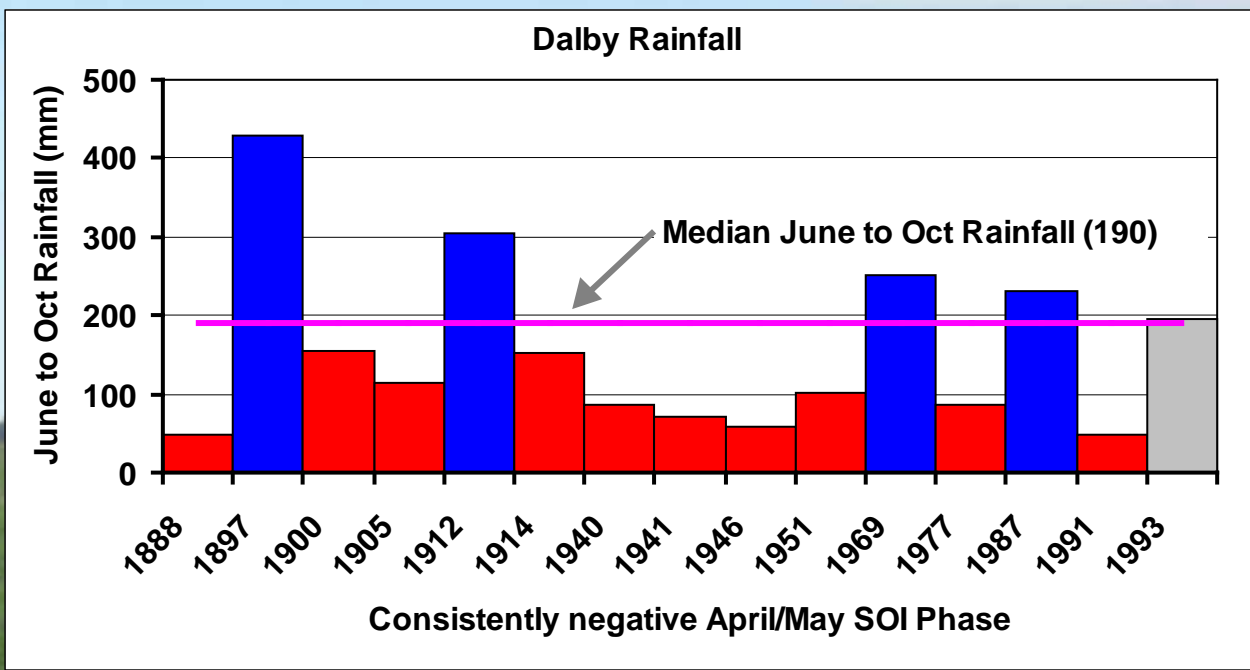
El Niño / Southern Oscillation (ENSO)



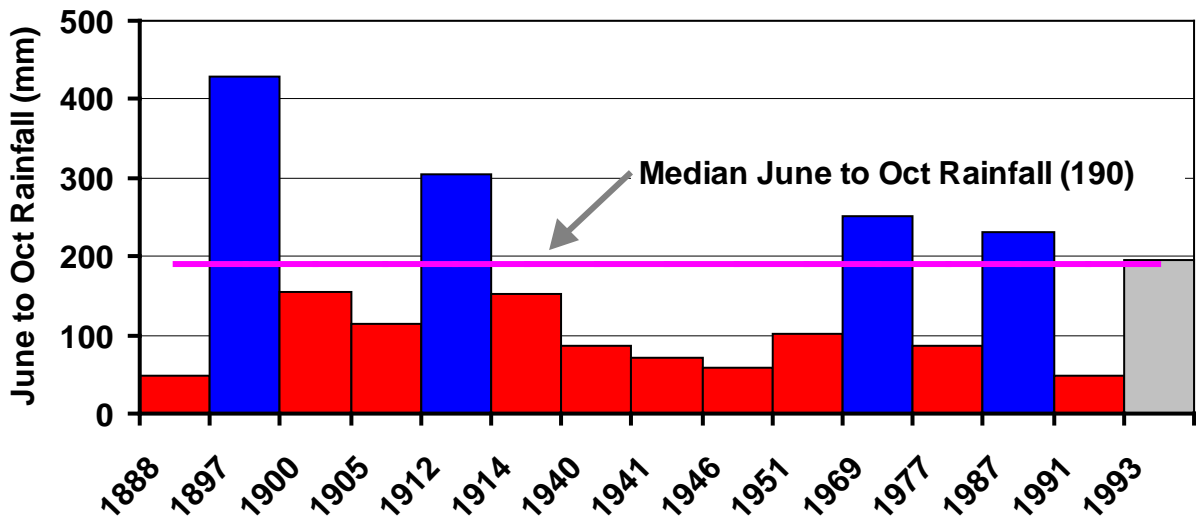
The first step: understanding rainfall



■ Negative ■ Positive ■ Falling ■ Rising ■ Neutral

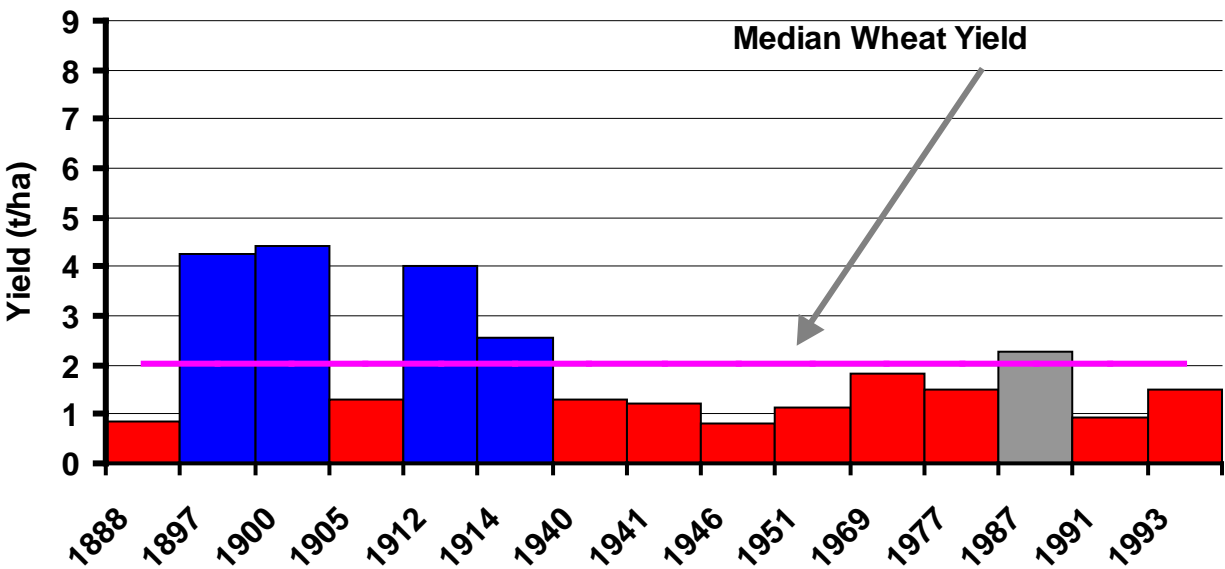


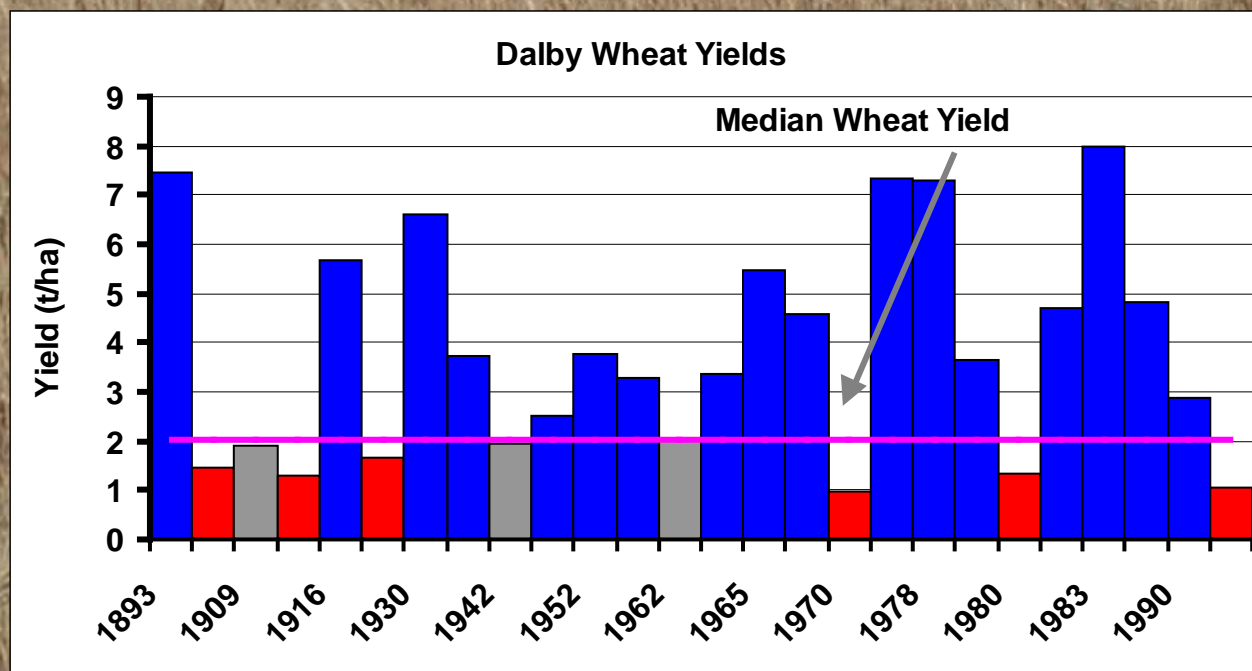
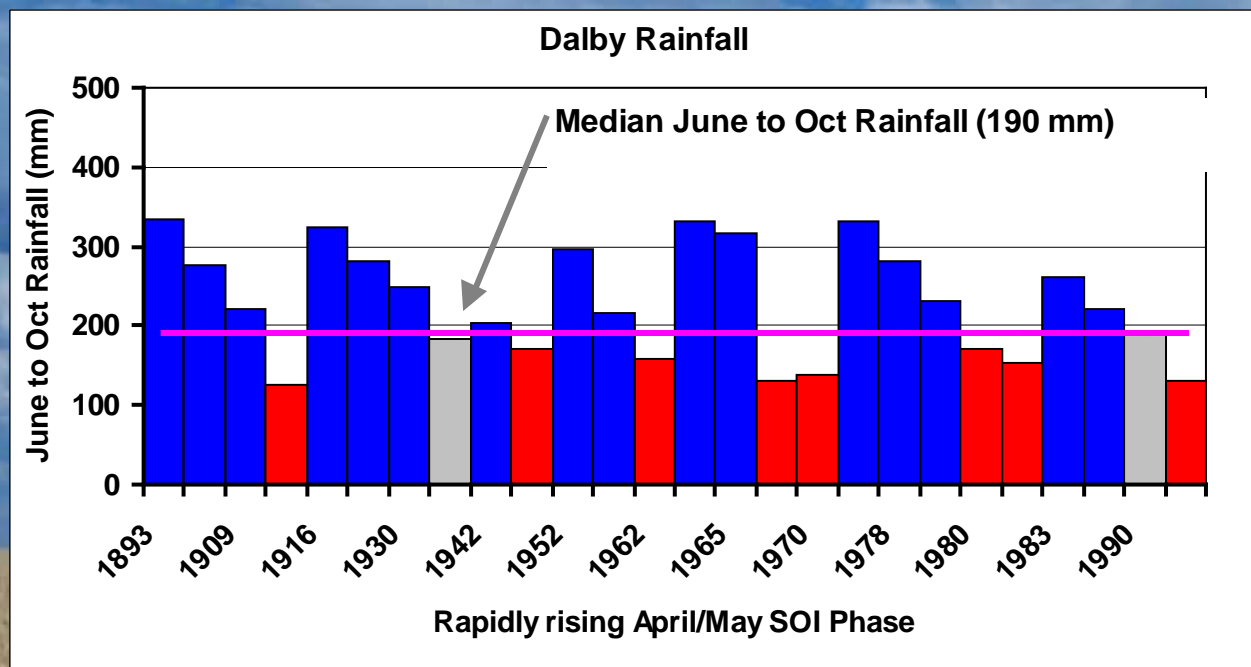
Dalby Rainfall



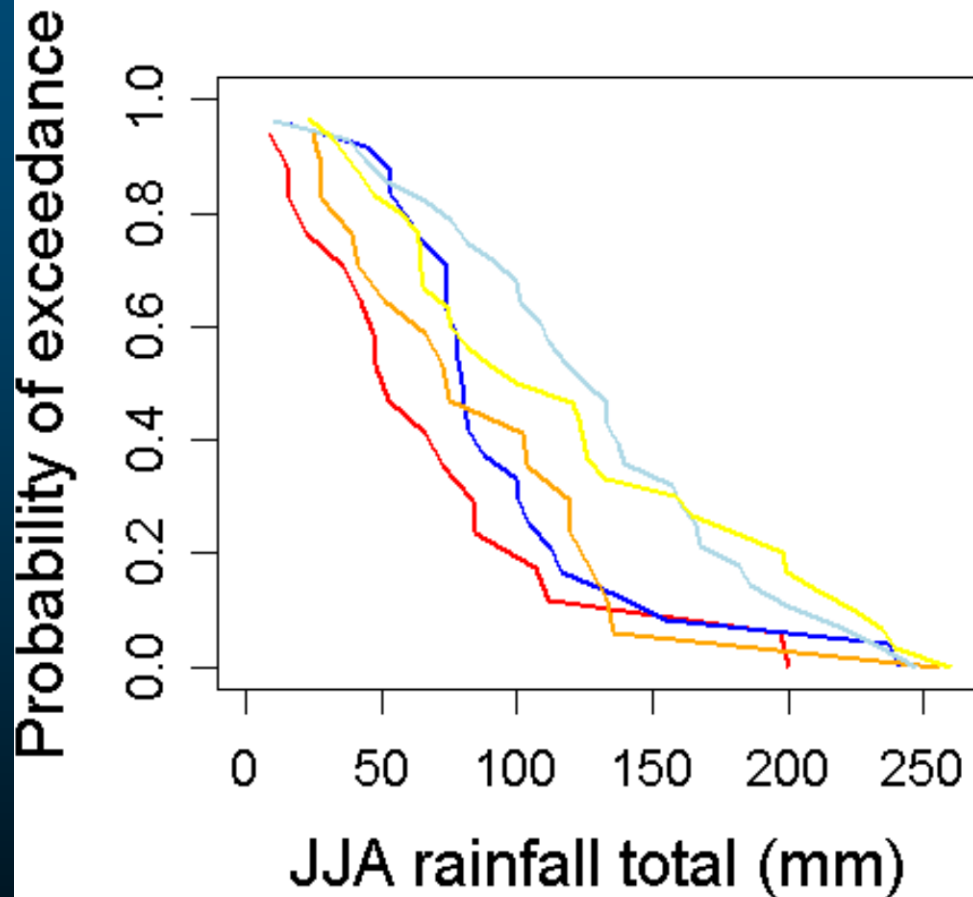
Consistently negative April/May SOI Phase

Dalby Wheat Yields





The first step: understanding rainfall



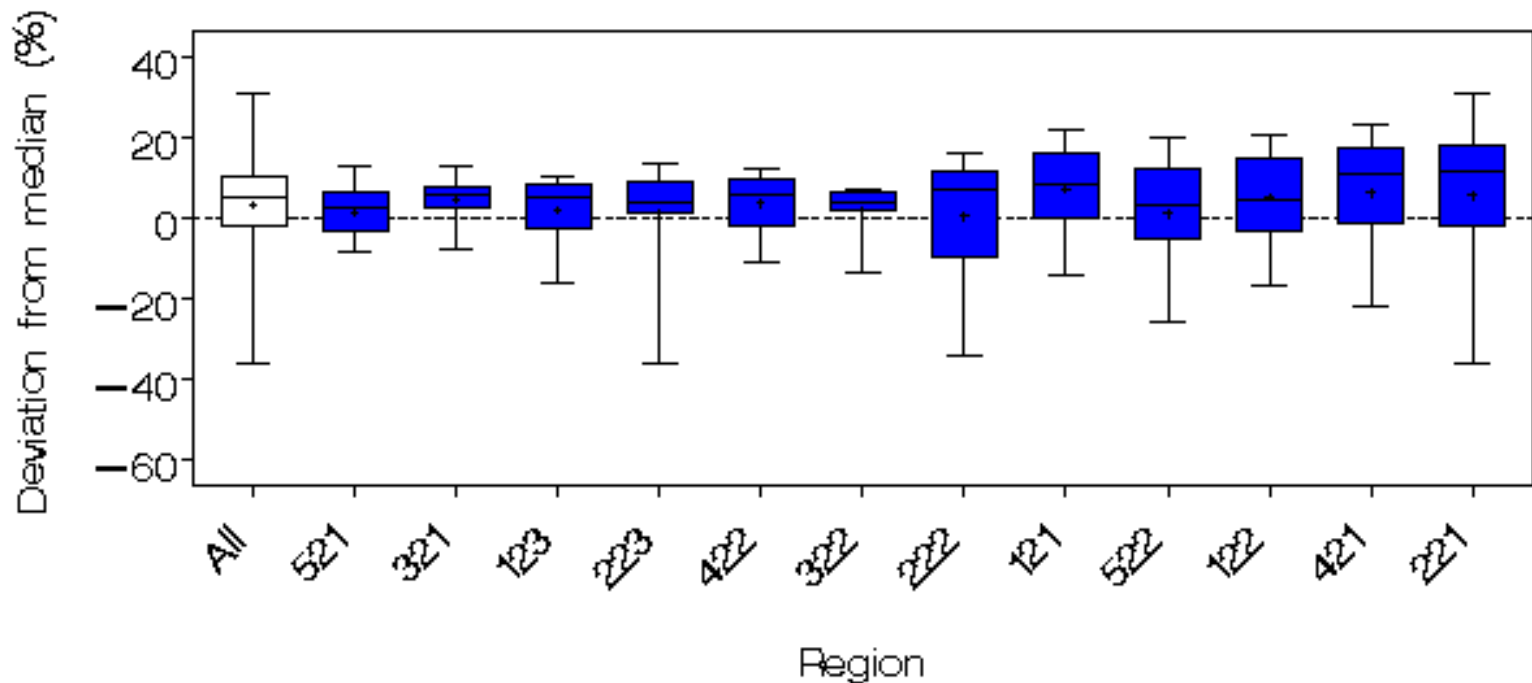
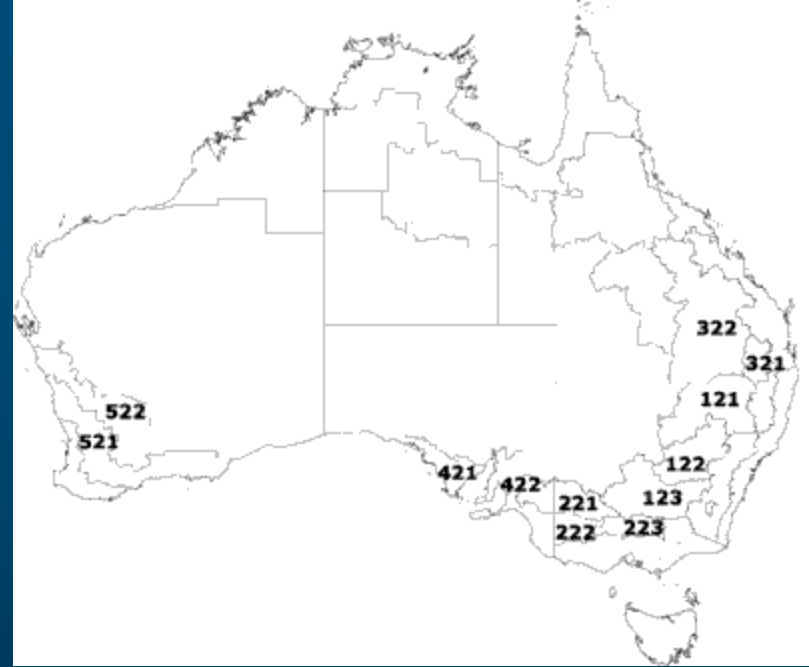
Stone et al.,
1996.
Prediction of
global
rainfall
probabilities
using phases
of the
Southern
Oscillation
Index.

Nature, 384,
252-55.

■ Negative ■ Positive ■ Falling ■ Rising ■ Neutral

Probability of exceeding long term median income

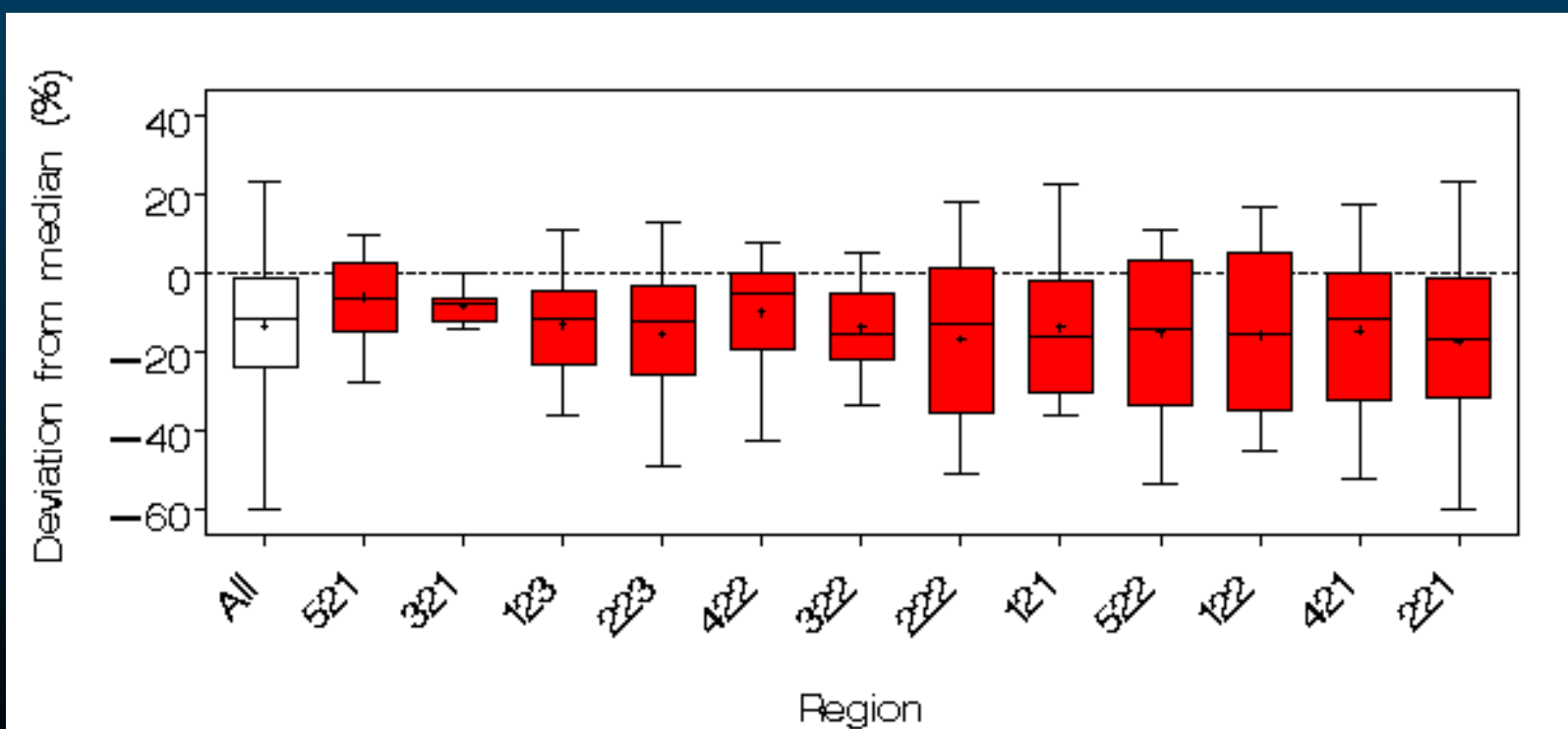
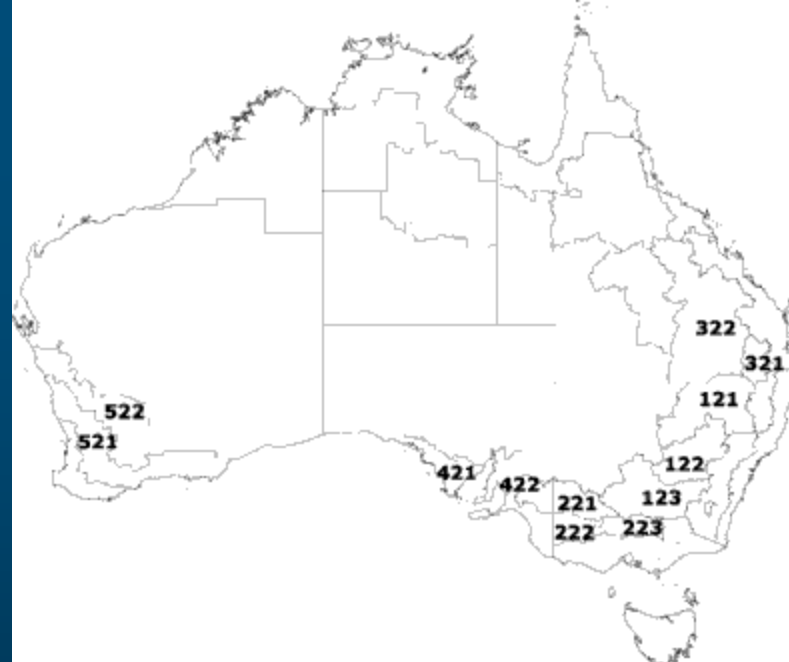
Positive SOI
at the end of May & June



Probability of exceeding long term median income

Negative SOI

at the end of May & June



Conclusions



- **Embed** climate risk management principles (e.g. see Espoo Statement of the WMO, 2006);
- **Establish** priorities for action based on regional or local consultations and risk assessment;
- **Use** existing networks and organisational structures to create and support lasting boundary organisations with capacity to serve concerned stakeholders;
- **Support** these initiatives via the creation of multidisciplinary, sector-focused and solution-driven R&D teams with secure funding;
- **Embrace** 'Adaptation Science' as a solution-oriented scientific endeavour without a pre-defined disciplinary lens;
- **Focus** on designing climate robust systems to better manage climate variability AND change.



Conclusions



A climate forecast has no value unless it positively influences decision-making



Hammer et al. 2000

