Time	Title	Presenter
11.30	Introduction to the project	Libby Pinkard
11.45	Climate change impacts on stand production and survival, and adaptation strategies to build resilience	Jody Bruce
12.15	Climate change impacts on wood properties	David Drew
12.35	Fire hazard and climate change and adaptation strategies	Stuart Matthews
12.55	Pest hazard and climate change and adaptation strategies	Libby Pinkard
13.15	Discussion	Libby Pinkard

Adaptation to climate change in Australia's temperate plantations

Libby Pinkard, Jody Bruce, Mike Battaglia, Stuart Matthews, David Drew, Geoff Downes, Debora Crawford, Maria Ottenschlaeger

INDUSTRY PARTNERS: WAPRES, Forestry Tasmania, Private Forests Tasmania, State Forests NSW, Norske Skog, Forestry SA, QDAFF, University Western Sydney, University of Tasmania, Treehouse Consulting

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Overview

- Project objectives
- Scope of project
- Dealing with uncertainty
  - Representing future climates
  - Responses to eCO2
  - Interannual variation
- Project outputs

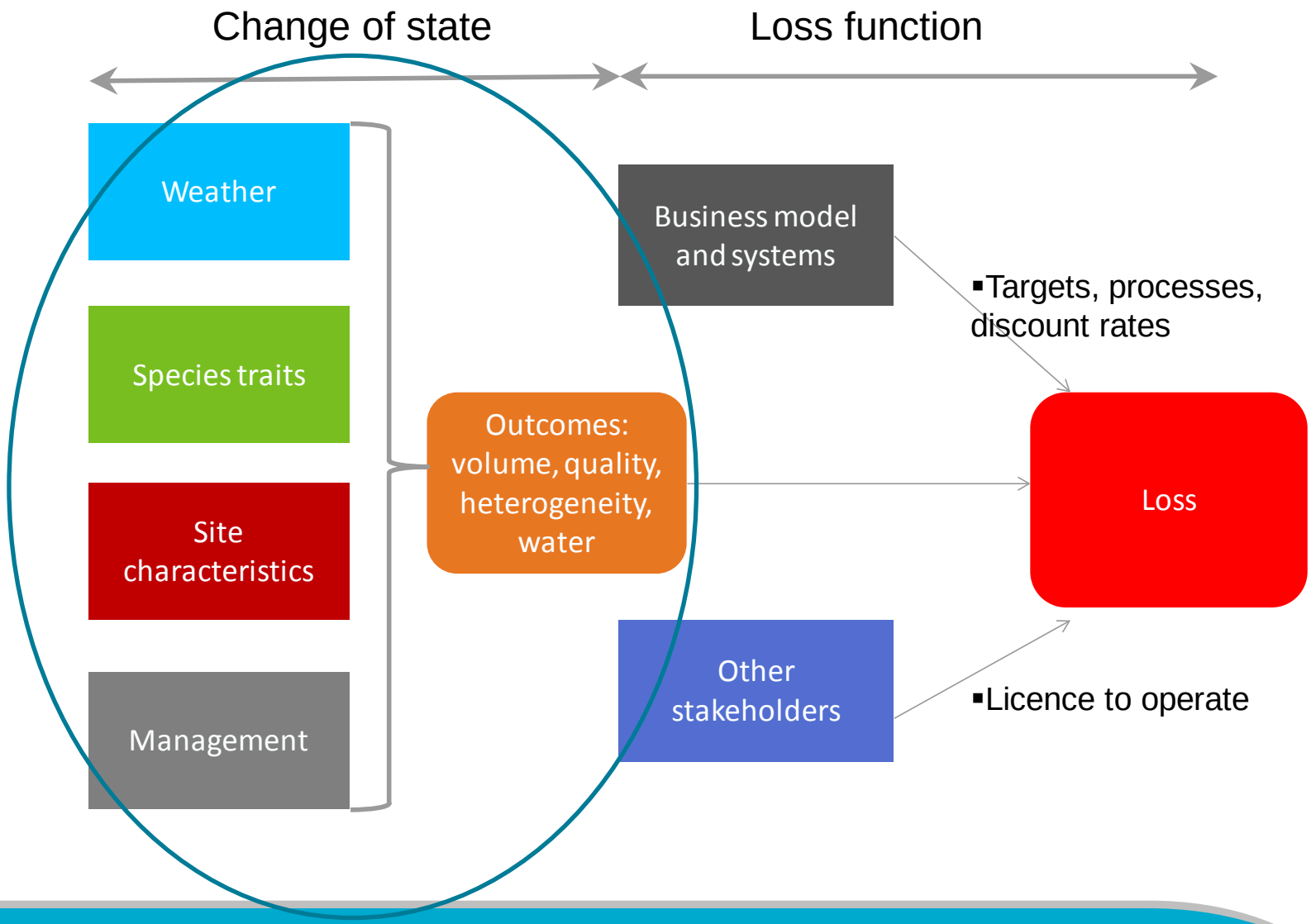
Project objectives

- Develop industry capacity to examine hazards and impacts of climatic variability, through :
  - predictions of changing hazard and impact over the next 20 – 50 years, including wood density – opportunities and threats
  - development of tools for site or regional assessment; and
  - examination of adaptive strategies to manage hazards and impact.
- Focus was on
  - temperate plantations: *E. globulus*, *P. radiata*
  - fire, drought and pests
  - productivity and wood properties
- Modelling tools: CABALA, CAMBIUM, CLIMEX, expert knowledge

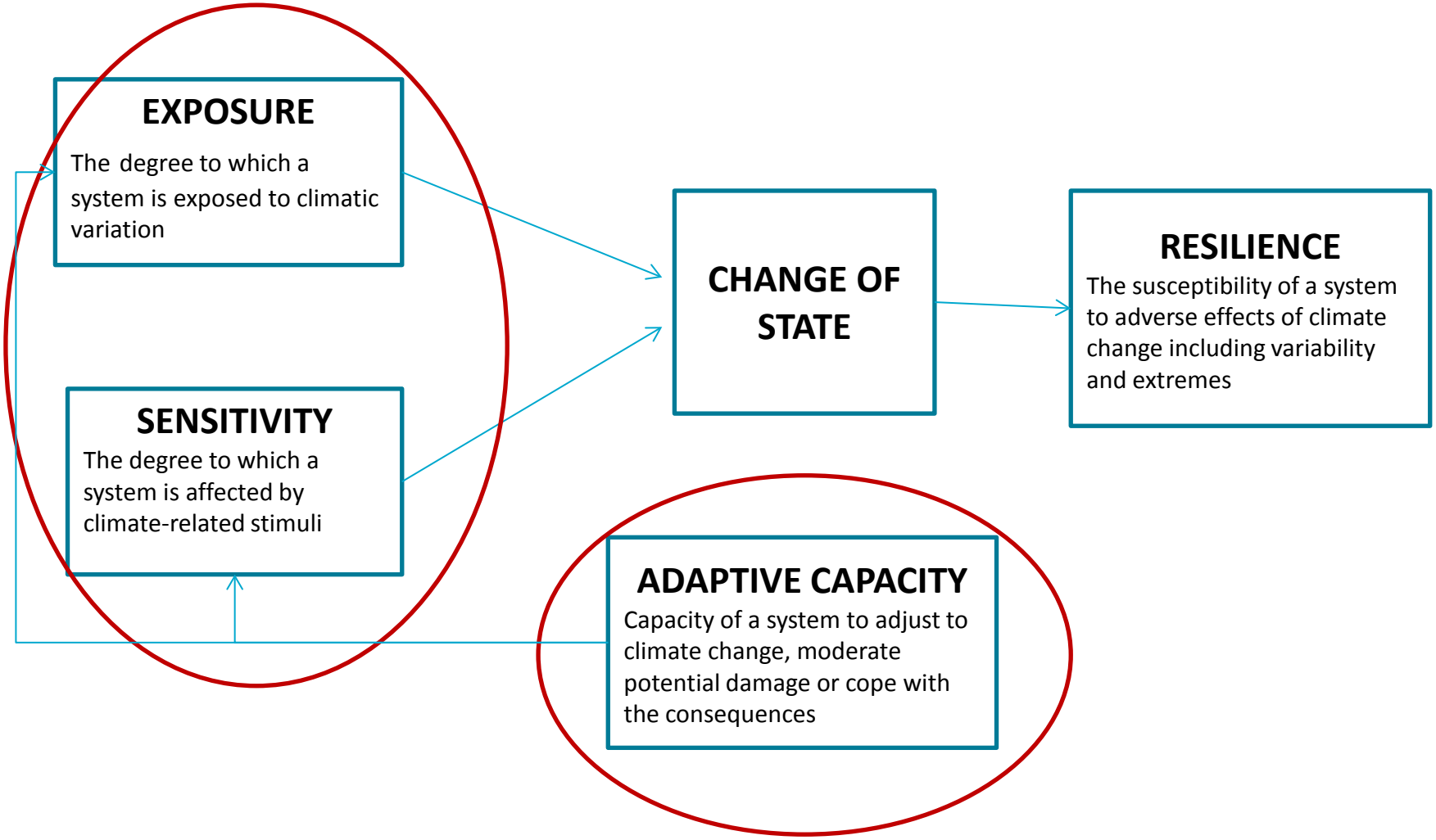
What is risk?

Management interventions can influence change of state

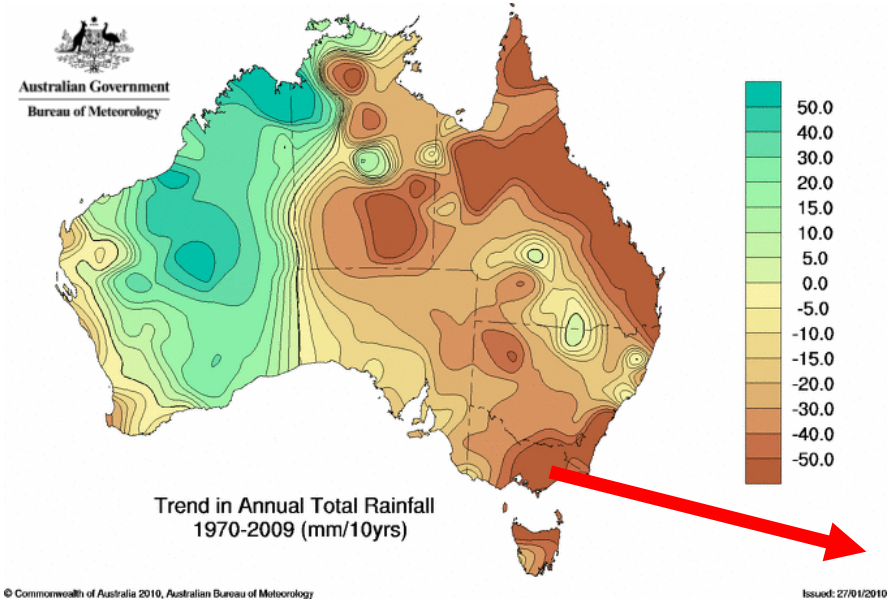
Scope of project

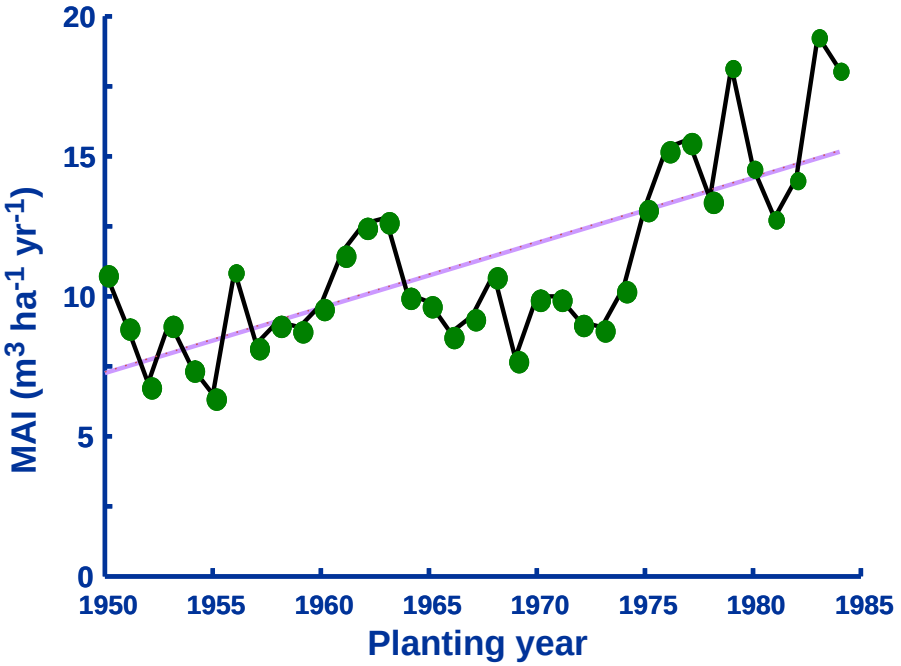


Potential impact



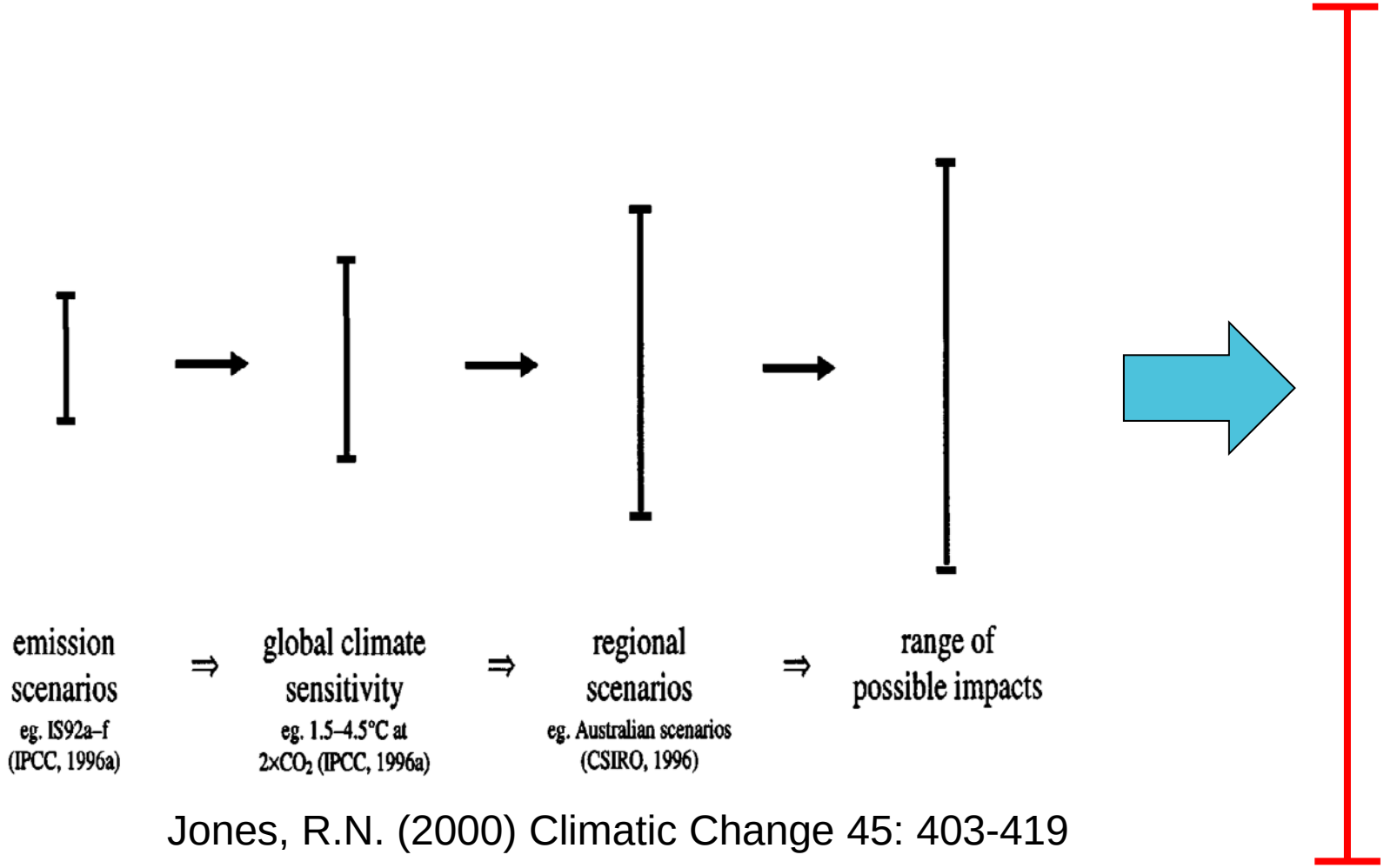
Not all climate change is bad





Positive long-term trend in production *Pinus radiata*
Lieshout *et al (1996)*

The “uncertainty explosion”

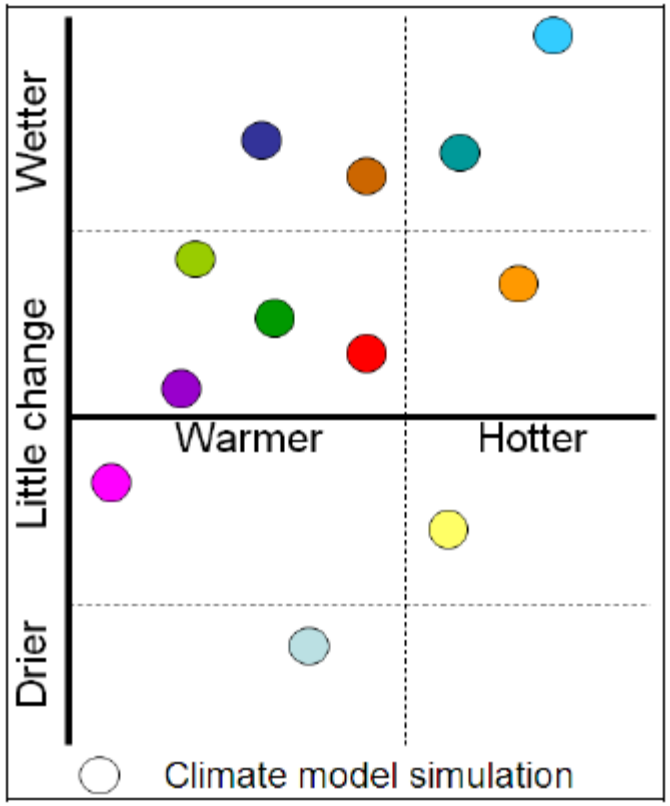


Jones, R.N. (2000) Climatic Change 45: 403-419

Dealing with uncertainty

- Climatic uncertainty: use multiple climate models (Climate Futures Framework)
- Atmospheric CO_2 uncertainty: estimate assuming responsiveness or no responsiveness
- Inter-annual variation: run models with multiple planting dates
- Rerun analyses as more information becomes available

Representing future climates



Clarke JM, Whetton PH, Hennessy KJ (2011)

How do we select the most appropriate climate models?

Climate Futures for region centred on 32.5 S, 116.5 E 2050 A1FI					
		Slightly Warmer <0.5	Warmer 0.5 to 1.5	Hotter 1.5 to 3	Much Hotter >3
Rainfall Annual (% change)	Much Drier <15%			Likelihood: 12 of 24 models (50%)	Likelihood: 1 of 24 models (4%)
	Drier -15 to -5%			Likelihood: 6 of 24 models (25%)	Likelihood: 2 of 24 models (8%)
	Little Change -5 to 5%		Likelihood: 1 of 24 models (4%)	Likelihood: 1 of 24 models (4%)	
	Wetter 5 to 15%			Likelihood: 1 of 24 models (4%)	
	Much wetter >15%				

Clarke JM, Whetton PH, Hennessy KJ (2011)

Project outputs

- Regional reports for 2030
  - Volume impacts
  - Stand mortality
  - Final stocking and piece size
  - Wood basic density
  - Fire and pest hazard
  - Spot analysis of pest impacts, climate impact on wood properties, adaptation strategies
- Review of historical adaptation to climatic variability
- Spatial database
- Updated model: CABALA
- Final project report: summarised project results

Thank you