AUSTRALIAN INDUSTRY GROUP
Forum
Wednesday 17 November 2010

IMPLICATIONS OF CLIMATE CHANGE TO INFRASTRUCTURE & ADAPTATION

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Settlements and Infrastructure

Acknowledgement
Dr Bill Peirson , Director WRL , Convenor Node 4 Infrastructure ACCARNSI

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Outline

- Where are we?
- Something old: *some history*
- Something new? *an approach*
- Something borrowed: *other ideas*
- Something blue: *maladaptation*
- What's next?

What is infrastructure?

Constructed facilities to provide:

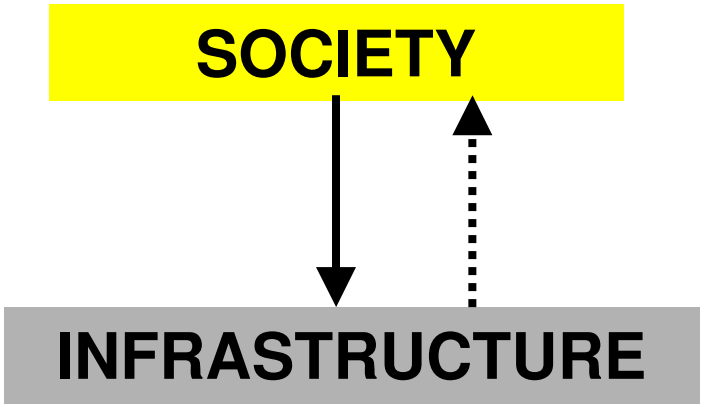
- energy supply
- water supply
- wastewater treatment
- transport
- large-scale protection from storms
- communications
- waste disposal

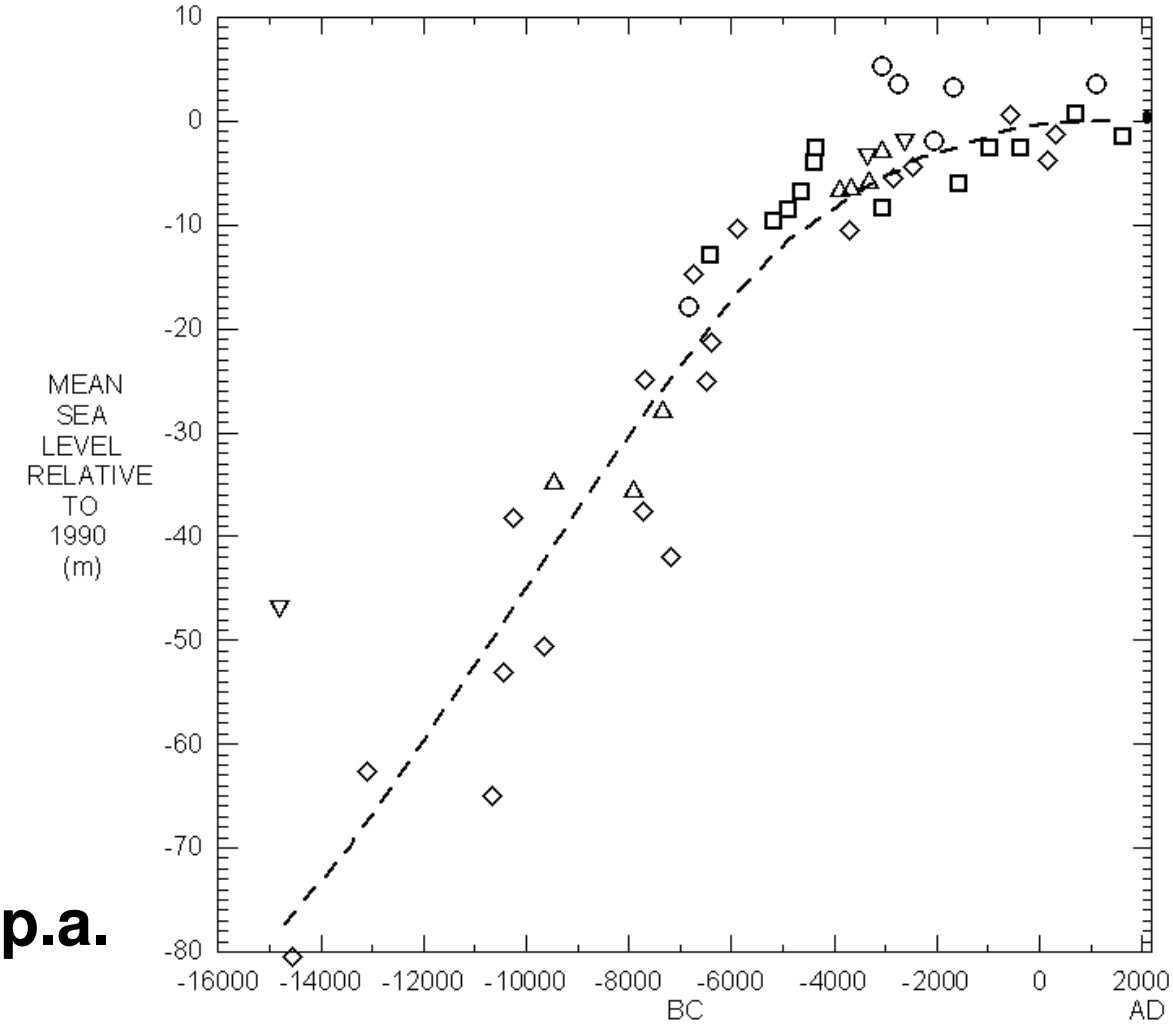
For:

- commercial industry
- settlements
- governance
- education
- medical treatment
- defence

i.e. society

Where were we?.....and why?





"Historically" 1cm p.a.
Presently 0.13cm p.a
Projected 0.5 to 1cm p.a.

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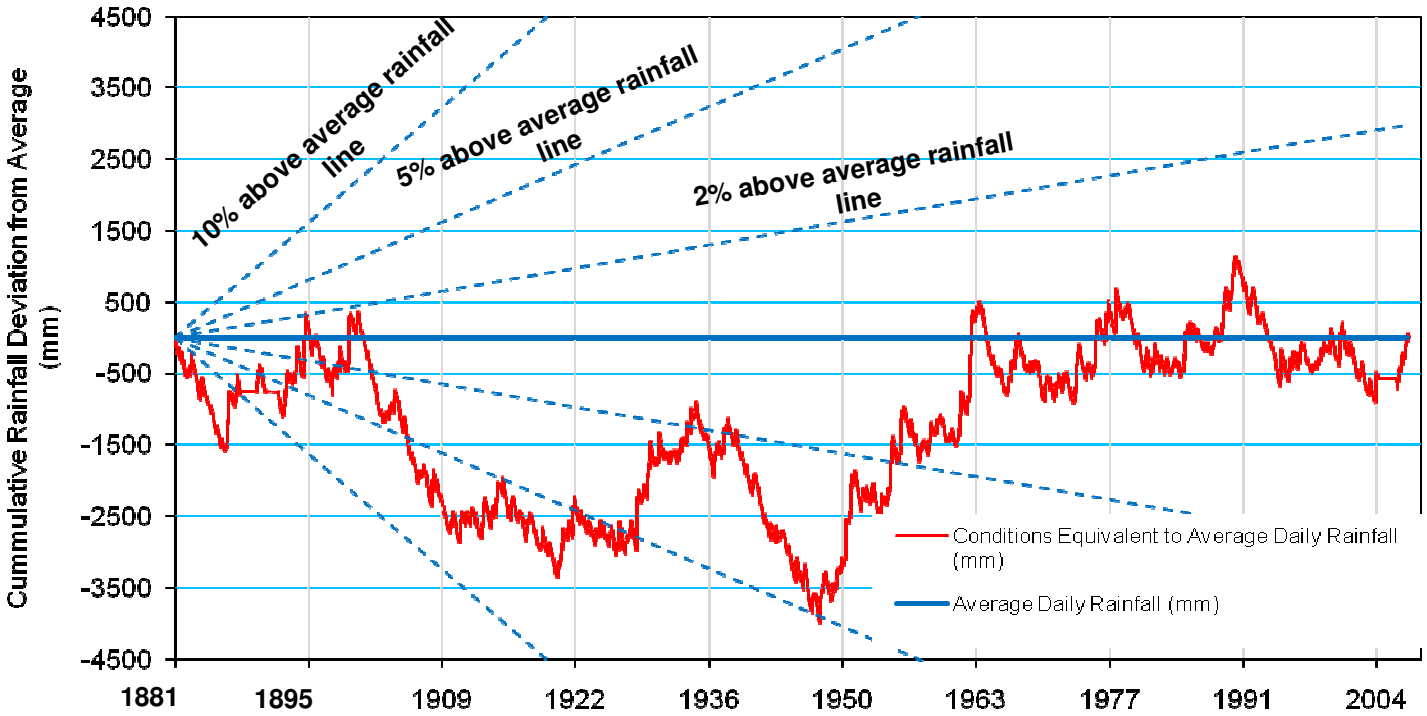
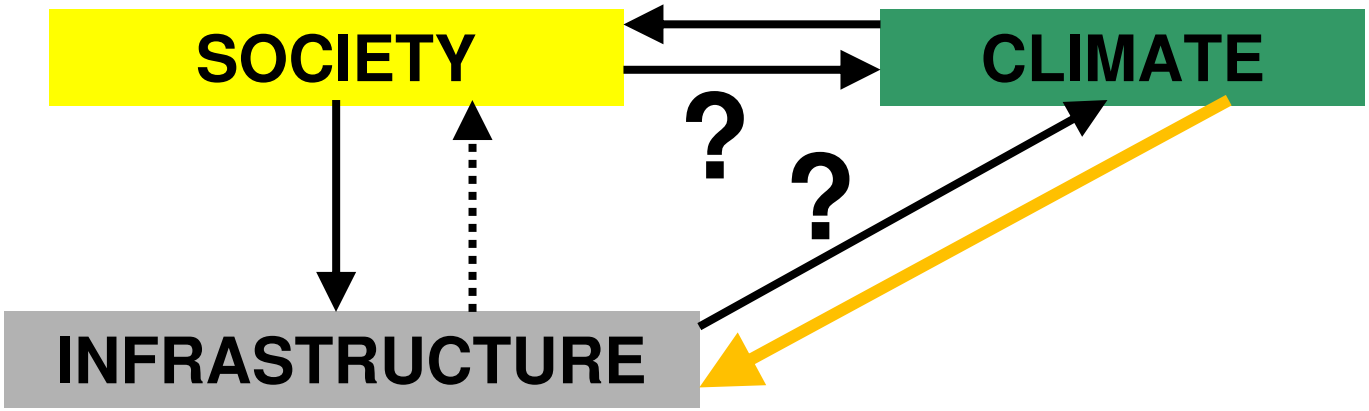
History is (in general) a good teacher but…



Source: Ruprecht, 2009

The next 5+ years…



This is a snapshot… See also
Norman (2009) *Planning for coastal climate change*
- Local Government toolkits

A structured approach?

P. Ingster (2010) “Bill, nobody seems to be doing anything!”

The alternative is a litany….

There are examples out there but I do not wish to (potentially) offend.

Impacts affecting settlements and infrastructure

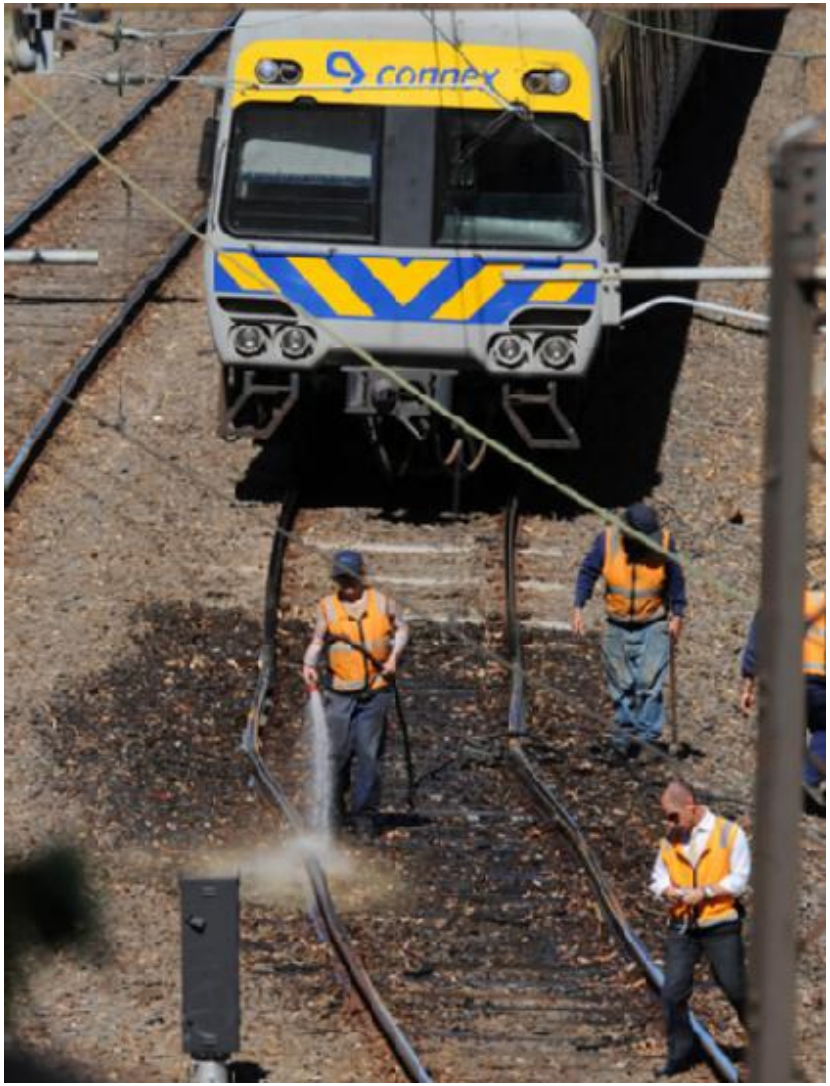
Six primary (sole) climate change **impacts**

1. Increasing mean temperatures
2. Increasing extreme temperatures
3. Increasing drought duration
4. Increasing drought intensity
5. Increasing mean sea levels
6. Increasing storm activity

Vulnerabilities of settlements and infrastructure

Six primary (sole) **vulnerabilities**

1. Energy system failure
2. Water supply failure
3. Dwelling habitability
4. Flooding
5. Communications failure
6. Transport system failure



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Adaptation options

1. Abandon

2. Accommodate
   A. Retreat (horizontally or vertically in the case of sea level rise – European note)
   B. Defend

		I1	I2	I3	I4	I5	I6
		Increase mean temps	Increase extreme temps	Increase drought duration	Increase drought intensity	Increase mean sea levels	Increase storm activity
V1	Energy system failure	reduced efficiency	X			X	X
V2	Water supply failure (V1)		V1	X	X	X	X
V3	Dwelling habitability (V1 + V2)		X V2	V2	V2	X	X
V4	Flooding (V1 in particular cases)					X	X
V5	Communications failure (V1)		X				X
V6	Transport system failure (V1, V4 + V5)		X defend?			X	X

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Use linkages to systematically determine adaptation strategies **and defence costs**

- Engineers Australia National Committee on Coastal and Ocean Engineering (1991, 2004)
- Allen Consulting Group (2005)
- CSIRO (2006) for Victorian Government

Social Aspects

- The overall social problem is extremely complex
- Assessment of climate changes impacts on road infrastructure (Austroads, 2004) - population shifts could be the dominant factor.
- Cities for Climate Protection Australia Adaptation Initiative Toolkit (2008), Kinrade and Justus (2008)

Sustainability and Mitigation
vs
Adaptation

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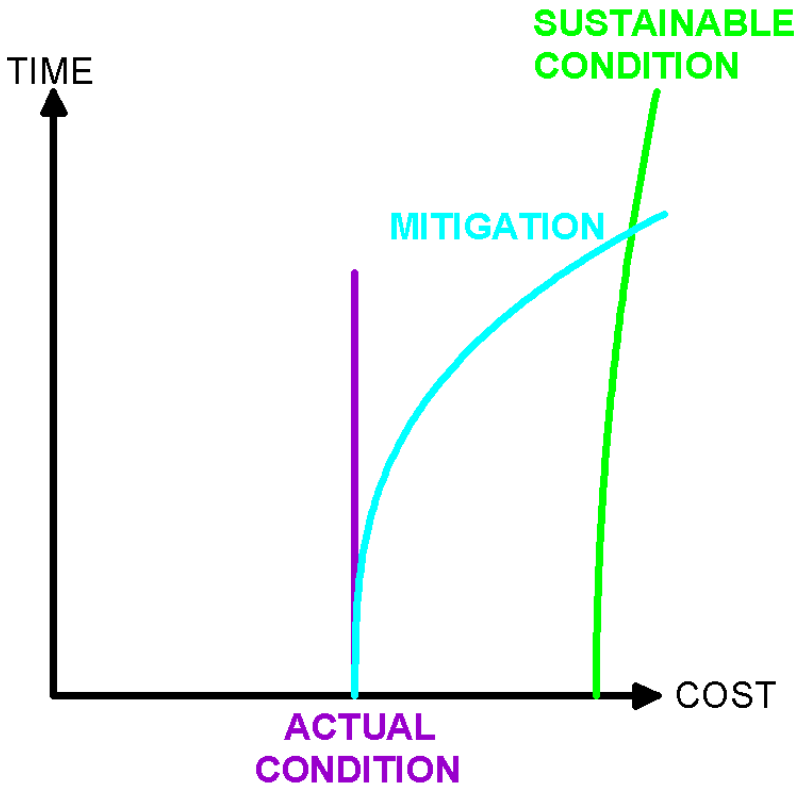
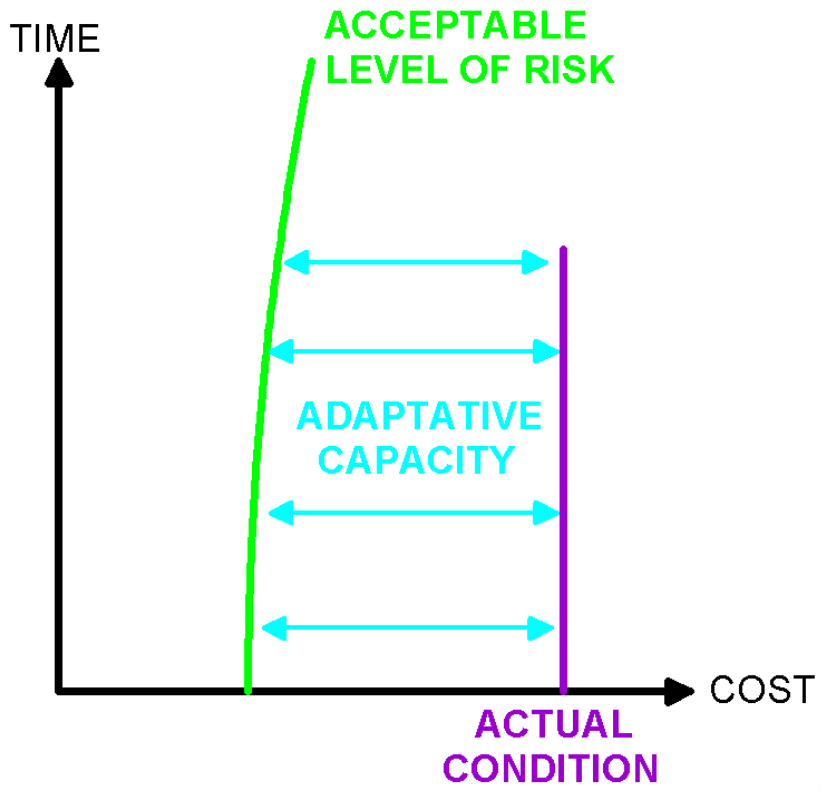
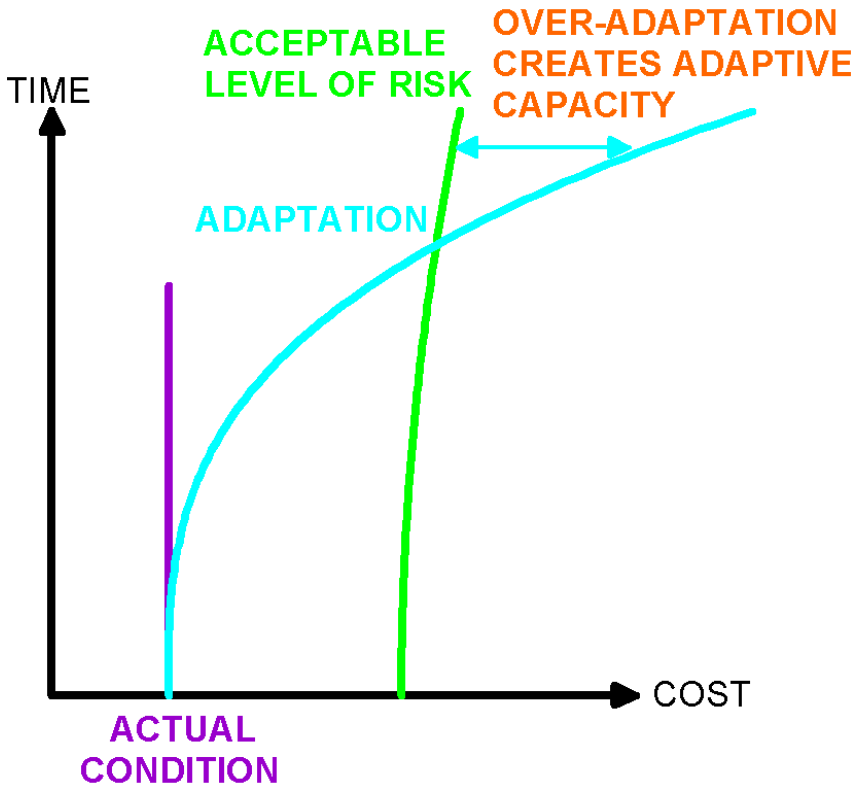
Sustainability and Mitigation



Adaptive capacity



Adaptation


ACCEPTABLE
LEVEL OF RISK
OVER-ADAPTATION
CREATES ADAPTIVE
CAPACITY
TIME
ADAPTATION
COST
ACTUAL
CONDITION

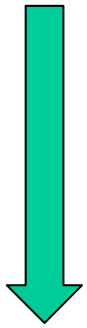
What is next?

- General issue
- Specific issues

Adaptive Engineering Design

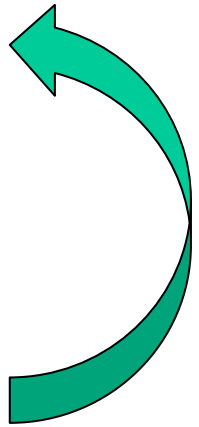
Engineering Design

- Needs
- Specification
- Design
- Implementation



Adaptive Management

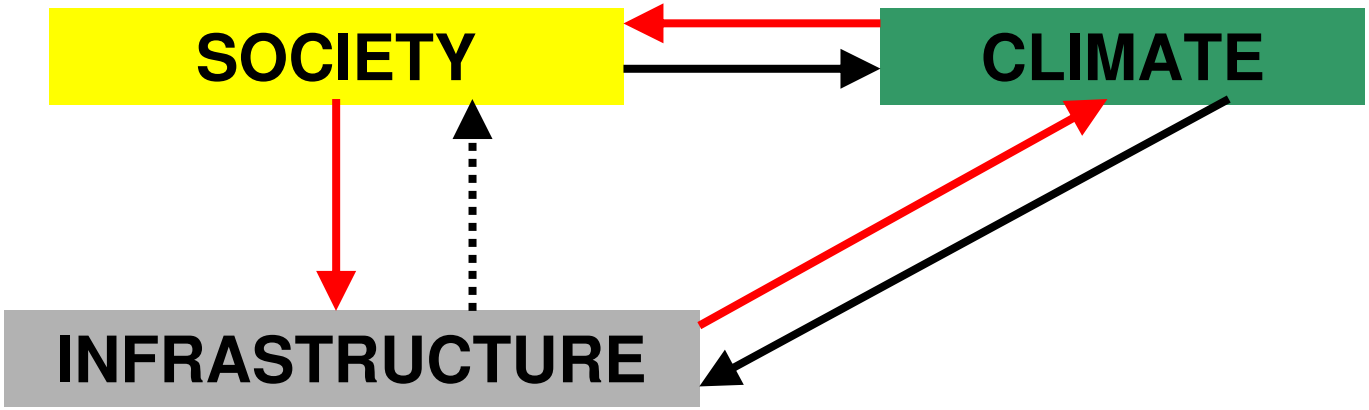
1. Conceptualise
2. Plan
3. Implement
4. Analyse
5. Evaluate



Specific issues

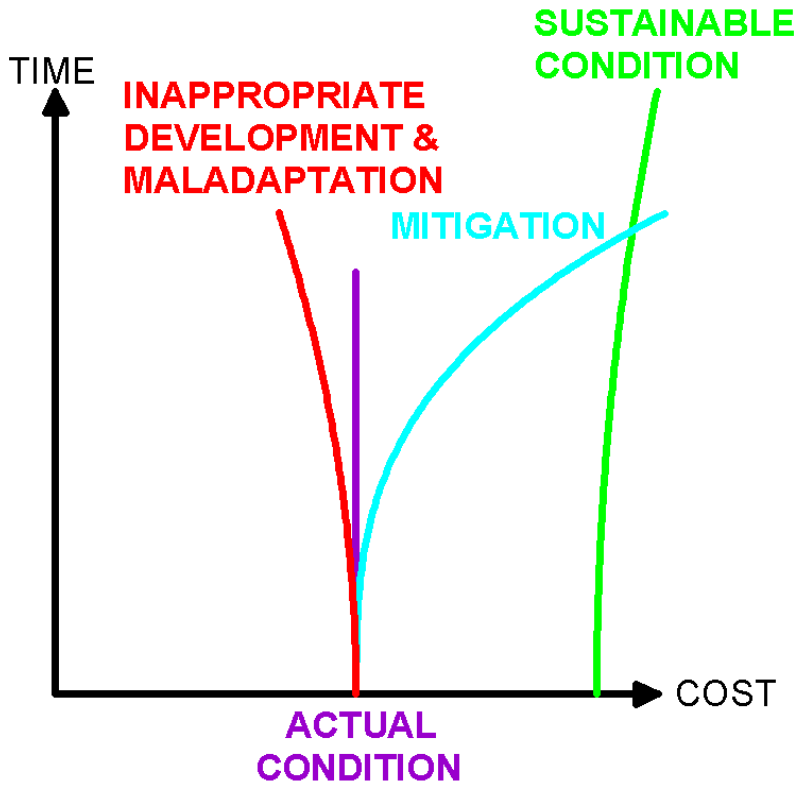
- How much wiggle room (adaptive capacity) do we have?
  - energy supply
  - water supply
  - wastewater treatment
  - transport
  - large-scale protection from storms
  - communications
  - waste disposal
- Again, adaptive management (PI)

Maladaptation



Barnett and O'Neill (2010)

Sustainability and Mitigation



Conclusions and Recommendations

- OLD: Climate adaptation is a lesson of history.
- NEW?: Complex lists are to be avoided, a structured approach is recommended.
- BORROWED: We need to see clearly how adaptation and mitigation fit together.
- BLUE: avoid maladaptation, and you should not be blue.

New Parallel Runway – Brisbane
A$1.3 billion, 2012- 2020, RL+4m, 11 M m^3

Conclusions and Recommendations

- Need to ascertain the status of infrastructure
- Choose the level of service and define the sustainable condition
- Adaptation &/or mitigation pathways
- Investment constraints & opportunities
- Need for certainty – regulation ?
- Avoid maladaptation,

THANK YOU

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