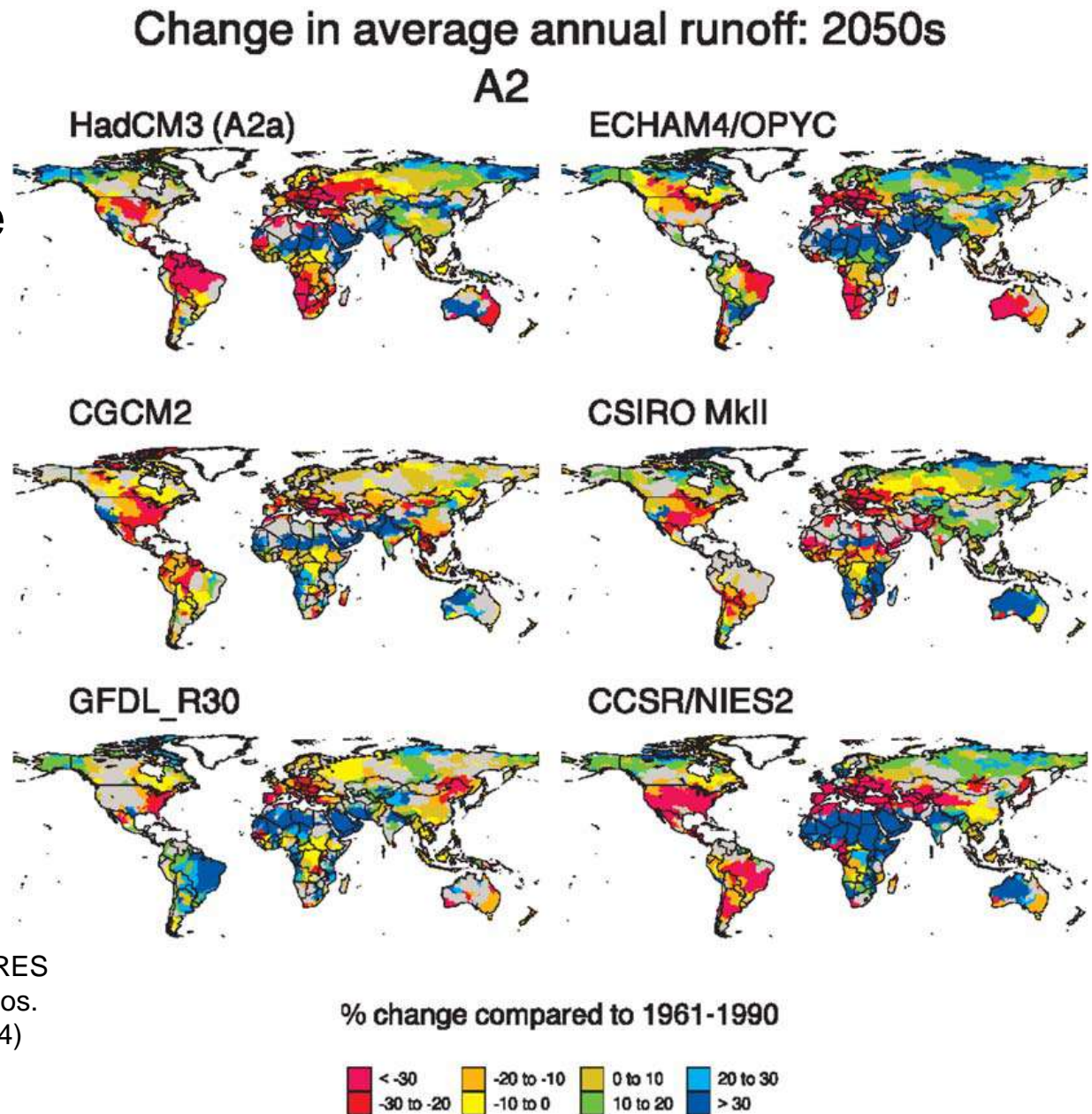


Climate adaptation in river management in a post-stationary world

Federal Rivers session, 5th November 2012

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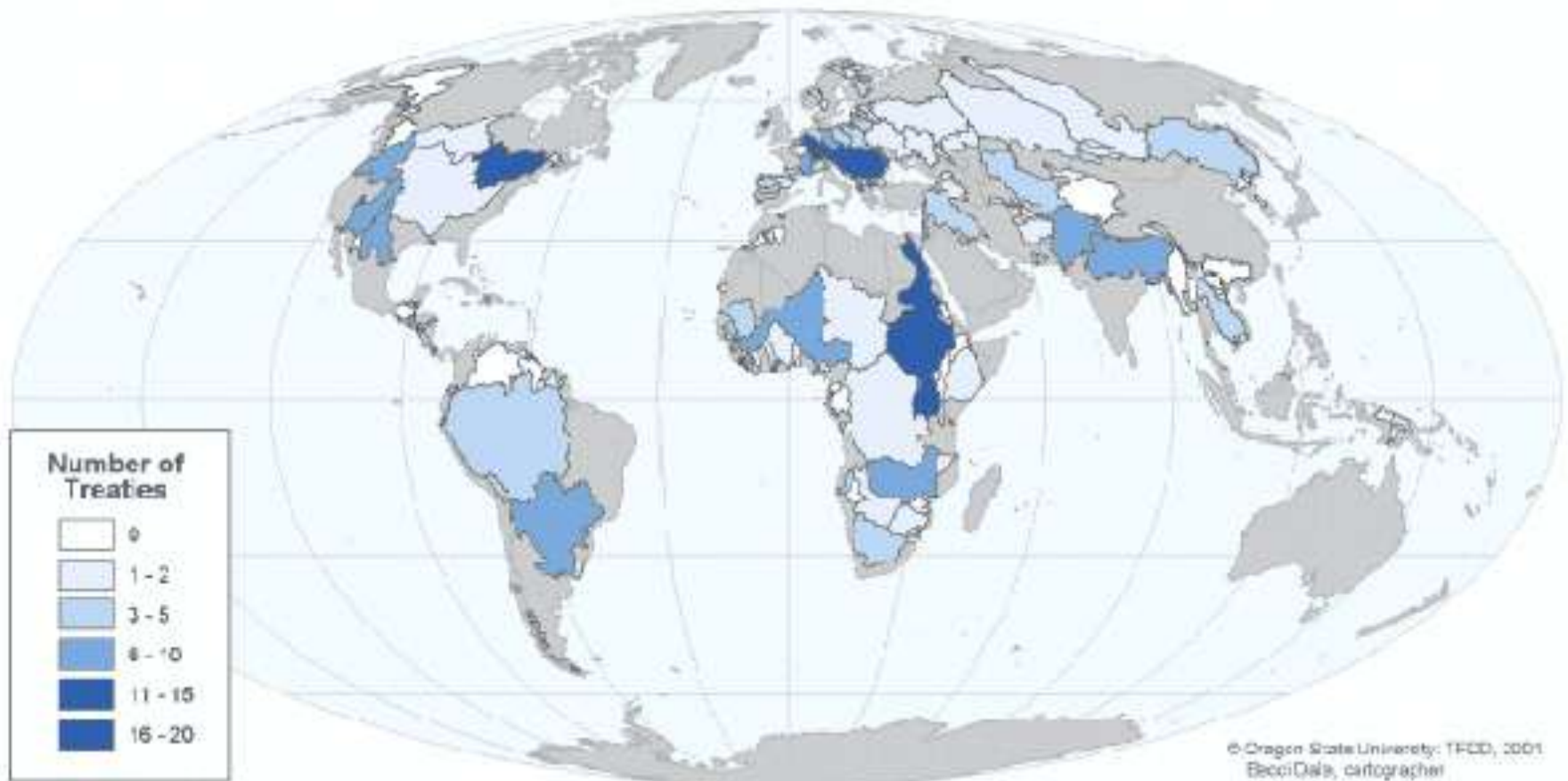
Percentage change
in average annual
runoff “2050s”
(2040–2069)
compared with
1961–1990;
A2 scenarios.



Source: Arnell, N. W. (2004). Climate change and global water resources: SRES emissions and socio-economic scenarios. *Global Environmental Change* 14 (2004) 31–52.

Change less than one standard deviation shown in grey

Agreements per international river

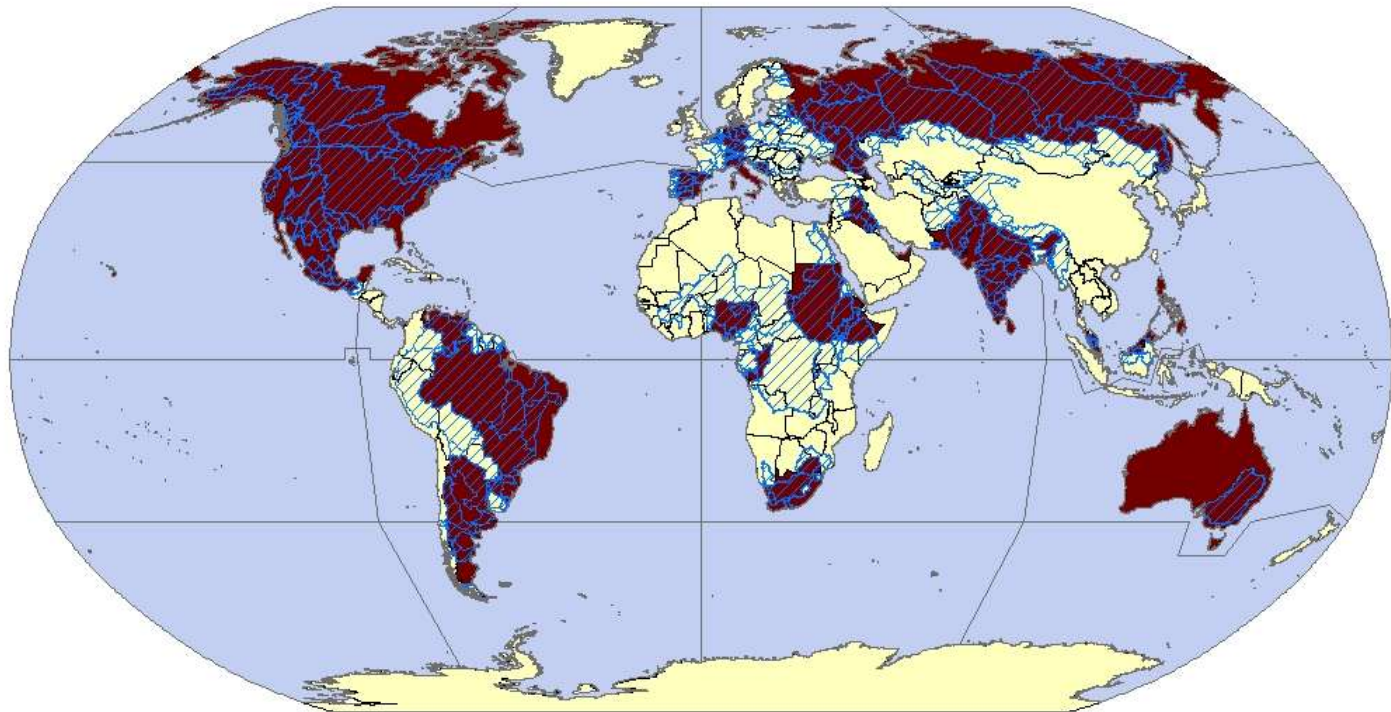


Elements of adaptive river management

1. Overarching policy agreement/s
2. Water allocation
3. Flexibility for flow variability
4. Conflict resolution
5. River basin institutions
6. Sharing data
7. Ability to amend agreements
8. Broader benefit transfers
9. Cyclical policy revision
10. Financing

(Pittock & Loures, forthcoming)

World's Federal Rivers



© Dustin Garrick, University of Oxford, November 2011

Update pending for South Sudan. Excludes de facto federal arrangements (particularly China and the European Union)

Federal States

- Non-Federal Country
- Federal Country
- Federal River

Major watersheds shared by one of the world's 28 federal countries (Garrick 2012)

MDB climate and water scenarios

CSIRO scenario	Average surface water availability in 2030	End of system flows in 2030
2006 “Risks to shared water resources:	-10 to -23%	n/a
2008 extreme wet	+7%	+20%
2008 median	-12%	-24%
2008 extreme dry	-37%	-69%
(Actual, 2009	(inflows -63%)	(no outflows 2002-10

Mechanisms for managing change

MDB Authority proposes:

1. Permanent allocation reductions
2. Proportional annual entitlement reductions (variability)
3. Basin Plan revision
4. Environmental works and measures

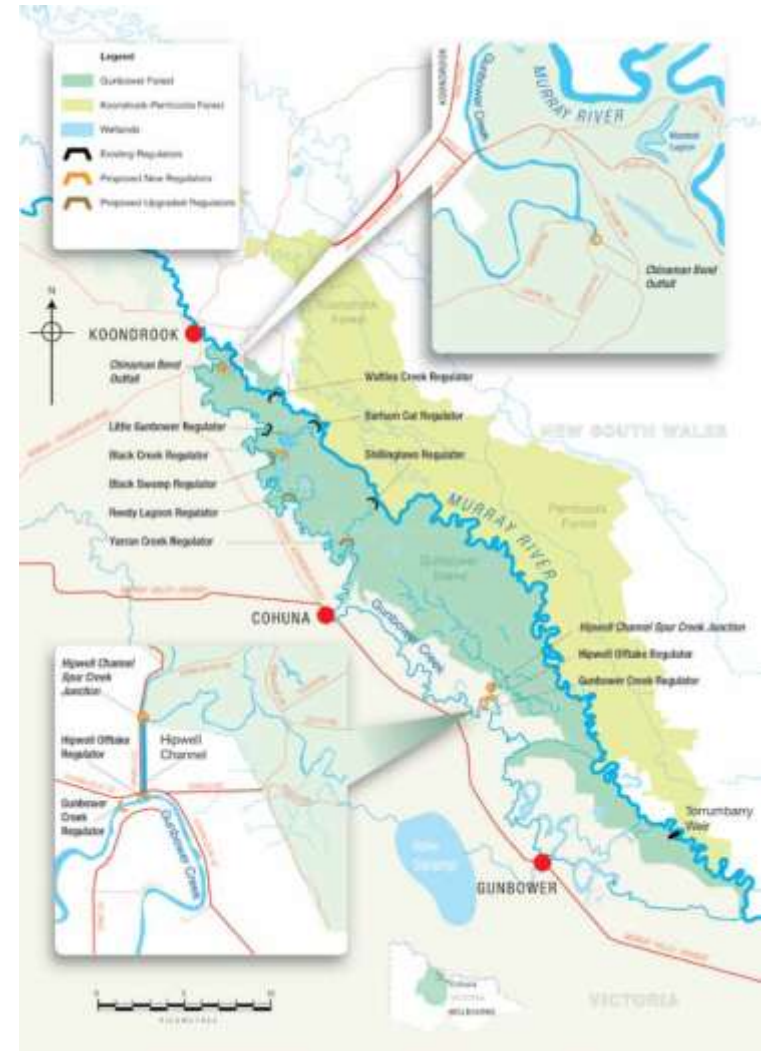


Bottle Bend, NSW, 2009 (c) J Pittock

Examples of environmental works



Source: MDBA



Works & measures: balkanizing the ecosystem

What does A\$235 million to inundate 36,108 ha buy?

- Very expensive adaptation per hectare
- High opportunity costs
- Benefits small areas
- Perverse environmental impacts
- High risks: physical and institutional

But popular so the Federal Government uses works to buy state government compliance



Restored billabong, River Murray, Wentworth, Murray Wetlands Working Group, Sept 2009. (C) J Pittock



Psyche Bend, River Murray, Mildura, Sept 2009. (C) J Pittock

Conclusions

1. Climate change will have major impacts
2. Global to local scale institutions based on stationarity may require reform
3. At the basin scale key reform questions involve: policy reform windows, reallocating water, funding, and incentives for effective subsidiarity
4. The UN Watercourses Convention may be a reform window at the global scale