



Economic Aspects of Adaptation to Climate Change

COSTS, BENEFITS
AND POLICY INSTRUMENTS

Shardul Agrawala
OECD Environment Directorate

OECD Forum
Paris, June 3 2008

The Many Facets of Adaptation to Climate Change

Sector	Public/private	Adaptation example
Agriculture	Private	Alter crop species Alter timing Irrigation
	Public	Plant breeding
Sea level rise	Private	Depreciate vulnerable buildings
	Public	Sea wall construction Beach enrichment
Water	Private	Invest in water efficiency
	Public	Divert/store more water Flood zoning
Health	Private	Prepare for extreme weather
	Public	Control disease carriers Treat infected people
Energy	Private	New cooling capacity Changes in insulation
	Public	New building codes

Economic Context for Adaptation

- Efficient climate policy requires both greenhouse gas mitigation as well as adaptation.
- Adaptation is, however, not a free lunch. Costs of adaptation, alongwith costs of mitigation and the costs of residual climate damages comprise the total price tag of climate change.
- Our knowledge on the economics of adaptation is still nascent. Some key questions are: what are the costs of adaptation across various sectors ? What about aggregate adaptation costs ? Is there a broader role for economic analysis in adaptation, beyond costing ?



Key Messages

1. Sectoral Coverage of Adaptation Costs is Limited and Uneven

Sector	Coverage	Cost Estimates	Benefit Estimates
Coastal Zones	Comprehensive – most coastlines	√	√
Agriculture	Comprehensive – most crops & growing regions	-	√
Water	Isolated Case studies	√	√
Energy	Primarily N. America	√	√
Infrastructure	Cross-cutting issue; Isolated studies	√	-
Tourism	Very limited – winter tourism	√	-
Health	Very limited	√	-

2. Sectoral Costs and Benefits: Some Key Messages

- “Optimal” **coastal adaptation costs** are generally a very small percent of GDP (typically less than 0.01%). However, there are substantial regional differences. Normalised costs can be as high as 10% of GDP for certain small island economies.
- In **agriculture**, many adaptations can offset yield declines (even result in net benefits) at relatively low cost. These benefits, however, vary across regions and crops, assume a suitable enabling environment, and decline with rising levels of climate change.
- In **water resources**, investments in storage and/or water treatment will tend to dominate adaptation costs.

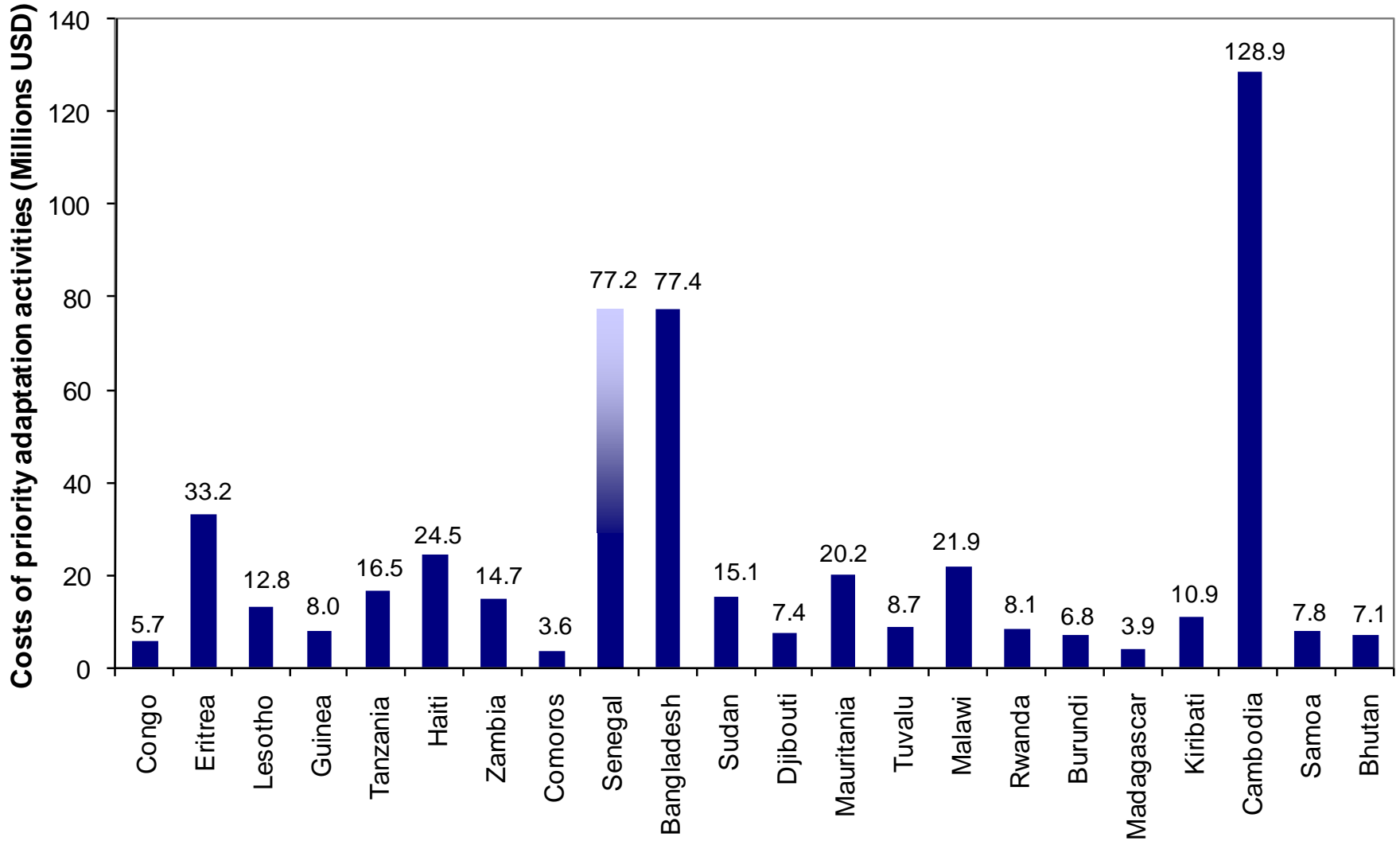
2. Sectoral Costs and Benefits: Some Key Messages

- In the case of **energy demand**, increased costs of space cooling will offset reduced costs of space heating (at least in North America).
- For **winter tourism**, cost effective adaptation are available and are being applied already. However, they may not be viable over the long term.
- Overall, a bulk of the costs of adaptation in most sectors are **infrastructure** costs, both to adapt existing infrastructure to climate change, and to build dedicated adaptation infrastructure.

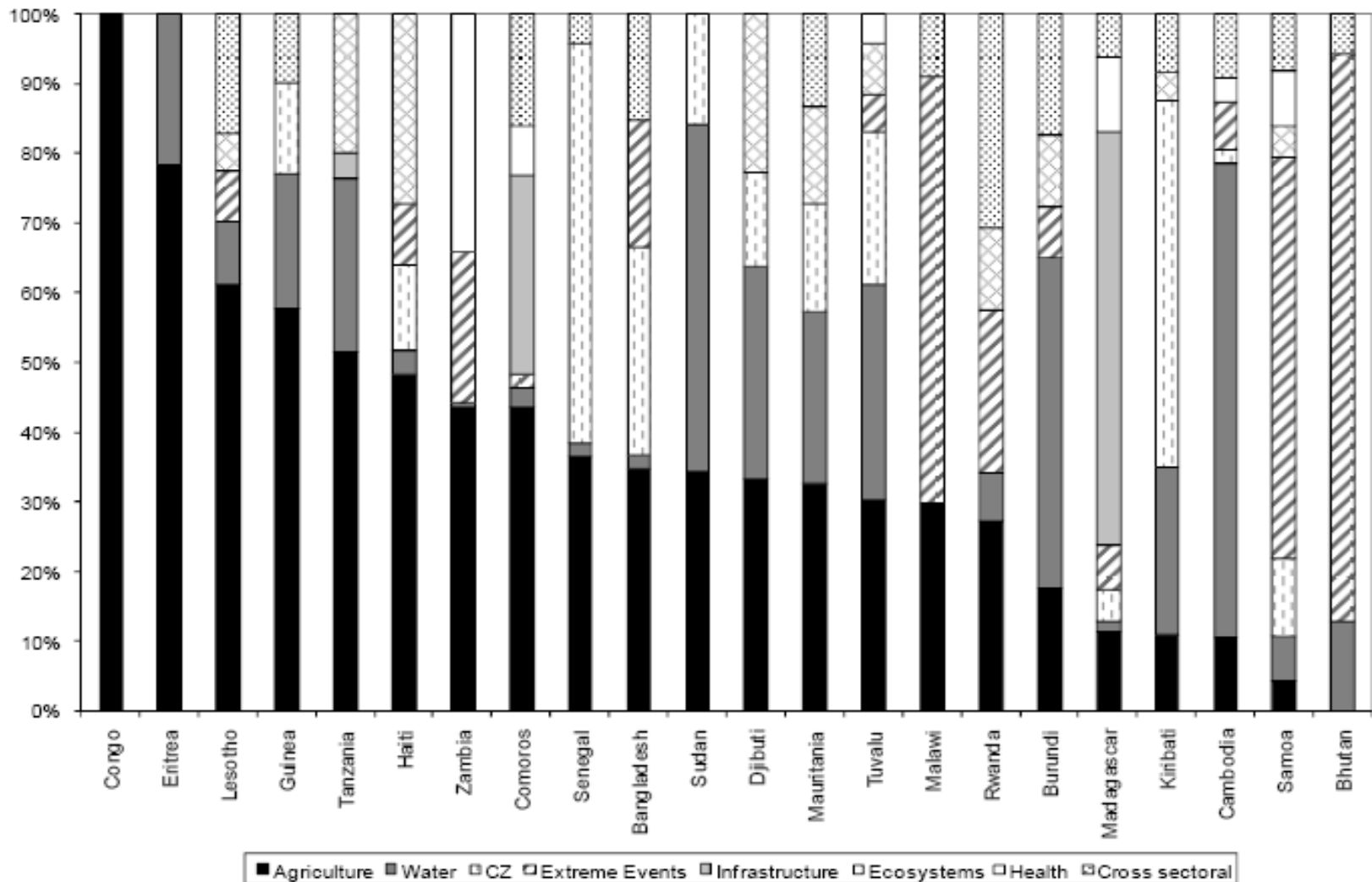
3. Aggregate National Level Estimates: Key Messages

- Very Recent: priority adaptations costed for Least Developed Countries in National Adaptation Programmes of Action (NAPA)s
- Stakeholder “bottom-up” processes. Reveal many “atypical” adaptations missed in theoretical studies
- Selection of priority projects, costing, and intended benefits of adaptation measures often not well documented.

National Costs Estimates for Priority Adaptations (NAPAs)



NAPAs: Sectoral Distribution of Adaptation Costs



4. Global Adaptation “Price Tags” Are Premature

Assessment	Cost of Adaptation	Time Frame	Countries Included	Sectors	Comments on methods/sources
World Bank (2006)	\$ 9 – 41 billion/yr	Present	developing countries	<i>unspecified</i>	Based on OECD & WB analyses of official flows exposed to climate risk. Costs of “climate proofing” are assumed.
Stern Review (2006)	\$ 4 – 37 billion/yr	Present	developing countries	<i>unspecified</i>	Update, with slight modifications, of WB study.
Oxfam (2007)	<i>At least \$50 billion/yr</i>	Present	developing countries	<i>unspecified</i>	WB study + extrapolation of cost estimates from NAPAs & NGO projects.
UNDP (2007)	\$86 – 109 billion/yr	2015	developing countries	<i>unspecified</i>	WB study + costing of targets for adapting poverty reduction programmes & strengthening disaster response systems
UNFCCC (2007)	\$28 – 67 billion/ yr	2030	developing countries	Agriculture; water supply; human health;	In-depth costing of specific adaptations in water, health & coastal zones. Less detailed costing for agriculture, infrastructure & ecosystems. Infrastructure more abstract. Infrastructure adaptation costs overlap w. costing in coastal zones & water res.
UNFCCC (2007)	\$49 – 171 billion/yr	2030	global	coastal zones; infrastructure	

4. Global Adaptation Price Tags Are Premature

- 2 core assumptions in cost estimates:
 - % of assets/investments exposed to climate change risk;
 - % incremental cost of “climate-proofing” such investments
- Very limited (or no) underlying knowledge on these parameters
- Cost estimates very sensitive to assumptions made about these parameters given large magnitude of baseline flows.
- The “consensus”, even in order of magnitude terms of global adaptation costs maybe premature.

5. Costing Adaptation Is Important, But Incentivising It is Critical

- A majority of adaptation actions will be undertaken by private actors in a decentralised manner. Public policy has an important role to play in ensuring that such decisions are made in a timely, well-informed, and efficient adaptation decisions.
- *Policy instruments*, including insurance, environmental markets and pricing, and R&D incentives have a crucial role to play in stimulating adaptation through better internalisation of climate risk, establishing incentives to conserve scarce climate sensitive resources, and harness private sector innovation.

5. Costing Adaptation Is Important, But Incentivising It is Critical

- Private sector engagement through Public Private Partnerships (PPPs) , meanwhile, can play a critical role in leveraging additional resources and enhancing the efficiency of expensive investments in adaptation infrastructure.
- Setting and scaling up appropriate insurance schemes, environmental markets, and PPPs will pose a considerable challenge. Adaptation, as a public policy challenge has only just emerged.