

# Approaches to building climate change resilience in South Asia

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Simon Anderson, Nanki Kaur and Jessica Ayers

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**Climate change**

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*Keywords:*

Resilience, adaptation, development, deliberation, policy discourse

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The Climate Change Group works with partners to help secure fair and equitable solutions to climate change by combining appropriate support for adaptation by the poor in low- and middle-income countries, with ambitious and practical mitigation targets.

The work of the Climate Change Group focuses on achieving the following objectives:

- Supporting public planning processes in delivering climate resilient development outcomes for the poorest.
- Supporting climate change negotiators from poor and vulnerable countries for equitable, balanced and multilateral solutions to climate change.
- Building capacity to act on the implications of changing ecology and economics for equitable and climate resilient development in the drylands.

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This paper describes key evidence and strategic considerations for building climate resilience in South Asia. Current public policy responses are fragmented and do not address the scale, complexity or the uncertainty of current and future climate change vulnerability in the region. New approaches are needed to tackle the ‘root causes’ of vulnerability and build resilience to climate and other risks. Conventional ‘science-speaks-to-policy’ approaches cannot address current evidence gaps. We therefore propose deliberative approaches for translating evidence into knowledge, for governance and decision making, as the best way to build long-term climate resilience. This involves a diversity of stakeholders, especially the climate-vulnerable poor.

# Contents

Contents	4	5.5 LESSONS FROM OTHER COLLABORATIVE PROCESSES	27
<b>Summary</b>	<b>5</b>	5.6 GOVERNANCE IMPLICATIONS OF INSTITUTIONAL ARRANGEMENTS	27
<b>1 Introduction</b>	<b>7</b>	5.7 EXISTING REGIONAL ACTIVITIES	28
<b>2 Key climate change concepts</b>	<b>9</b>	5.8 EVALUATION METHODS	29
2.1 GLOSSARY OF CLIMATE CHANGE TERMS	9	5.9 RETURNS ON CLIMATE RESILIENCE INVESTMENTS	30
2.2 FROM COPING TO ACHIEVING RESILIENCE	11	<b>6 Conclusion</b>	<b>32</b>
2.2 DEVELOPMENT AND CLIMATE RESILIENCE	12	<b>7 Appendixes</b>	<b>33</b>
<b>3 'Pressure': projected climate change impacts</b>	<b>13</b>	Appendix 1. Maps	34
3.1 ECONOMIC IMPLICATIONS OF CLIMATE CHANGE ON DEVELOPMENT	14	Appendix 2. Case studies	37
3.2 COST OF CLIMATE CHANGE ON LIVELIHOODS AND ECOSYSTEMS	14	Appendix 3. Tables	40
		Appendix 4. Useful links	45
<b>4 'State': vulnerability, poverty and food security</b>	<b>16</b>	<b>References</b>	<b>46</b>
4.1 RANGE OF CURRENT RESPONSES	17		
4.4 AN INTEGRATED APPROACH	21		
4.5 GAPS	22		
<b>5 'Response': how to enhance current responses</b>	<b>23</b>	<b>Endnotes</b>	<b>50</b>
5.1 SILOED AND FRAGMENTED APPROACHES	23		
5.3 PUTTING EVIDENCE INTO USE	25	<b>Acronyms and abbreviations</b>	<b>52</b>

# Summary

This paper discusses key evidence and strategic considerations for building climate resilience in South Asia. It presents evidence drawn from policy discourse analyses (PDAs) in Afghanistan, Bangladesh, India, Nepal and Pakistan and a detailed review of literature on climate change impacts and development policy responses. The paper is organised around an adapted version of the pressure-state-response framework (see Introduction for more details).

South Asia is disproportionately exposed to the impacts of climate change, including higher temperatures, greater temperature extremes, more erratic rainfall, increased runoff, sea level rise, increased frequency and severity of extreme weather events and glacial melt. These impacts are already being felt; and poor and marginalised people – who have constrained access to the economic, social or political assets that would enable them to manage and respond to the impacts of climate change – are disproportionately affected. These climate-vulnerable poor have low adaptive capacity and should therefore be the target of any investments seeking to build climate resilience. Effective climate change responses need to address the development deficit – indicated by patterns of poverty and food insecurity – that drives vulnerability, and the impacts of climate change.

Uncertainty in climate change projections, and around the complex interactions between climate change and the social-development context, will determine how the impacts of climate change will manifest. Current public policy responses are fragmented and do not address the scale or complexity of existing or projected climate change vulnerability, while the complexities and uncertainties inherent in defining the ‘problem’ of climate resilience are hampering efforts to enable solutions. Current linear models of decision making do not support the identification of robust solutions when the problem is changing and uncertain.

In this paper we examine how the governments of five countries are approaching climate change.

- **Afghanistan:** Discourse is centred on agriculture and natural disasters, with efforts focused on collecting and analysing historical data, creating awareness and knowledge and building capacity among government

staff.

- **Bangladesh:** Climate change is seen as part of a wider threat to development, with discourse focused on climate change impacts (predominantly associated with coastal risks) and socio-economic vulnerability.
- **India:** Climate change discourses are embedded within broader development discourses that focus on inclusive growth and are centred on greening development, resilience and a rights-based approach.
- **Nepal:** The focus on integrating climate resilience into development policy frameworks reflects elements of poverty reduction, disaster risk reduction, natural resource management and potential for innovation. They have a rights-based approach to adaptation planning and delivery.
- **Pakistan:** Climate change is seen as a threat to growth; the main concern is climate-proofing economic sectors and infrastructure.

These approaches and interventions can be characterised along a continuum – with those targeting climate change hazards in isolation of the vulnerability context at one end and those that tackle the root causes of vulnerability and therefore build resilience at the other. The former aim to climate-proof existing policies without questioning how and why they could be reframed to better support the broader resilience of the climate-vulnerable poor, while the latter will be more successful at addressing the vulnerability of the climate-vulnerable poor over the long term.

However, they are not without their challenges. There is confusion over the relationship between adaptation and development, and the target for measuring success – climate resilience or adaptive capacity – is not well defined. In practice, climate and development policies

and practice are often managed in isolation from each other.

An integrated approach to climate resilience can help manage fragmented approaches to climate change and development, by mainstreaming climate resilience into public development policy, and bringing proven good development practice into climate resilience delivery. To do this, there is a need for evidence-based analysis of what works where and why. But the uncertainty and complexity of the challenge means that conventional 'science-speaks-to-policy' approaches cannot address evidence gaps.

Although information about climate change projections is uncertain, vulnerable people and a number of other stakeholders – from government, non-government organisations (NGOs), private sector and academia – know about the drivers of vulnerability. A multi-stakeholder extended participation model – engaging the climate-vulnerable poor in particular – should therefore inform integrated resilience-building strategies.

Collaborative and deliberative models of decision making and governance are one way to open up evidence generation, creating spaces for a diverse range of stakeholders across scales to meet and deliberate common policy objectives and practices. A key principle of deliberation is that the knowledge of all stakeholders (not only scientific experts) is legitimate. In deliberative frameworks, every stakeholder has a say in framing the problem as well as the solution, and therefore needs to be well informed and open to learning from others. The process is time-consuming and costly, but there are numerous examples of collaborative and deliberative models that have sought to improve engagement in policymaking.

There is an urgent need for spaces that will enable regional, multi-stakeholder deliberation around policy solutions for addressing climate resilience. Opportunities already exist for in-country and intra-country learning and discussion around climate change and related issues, but other processes could complement these by:

- addressing issues of scale, giving local, subnational and national stakeholder groups the opportunity to be part of a deliberative process;
- evaluating work on promising climate resilience initiatives;
- focusing co-investment on going to scale and mainstreaming climate resilience into public policy, private sector investments and civil society initiatives;
- local social learning to inform subnational, national and regional processes; and
- testing 'top-down' evidence for its utility at the local level.

The performance of current climate resilience initiatives provides an information base on which to build the knowledge base and the confidence necessary for co-investment. Although there are various methodologies available to choose from, evaluative work will have to:

- assess climate adaptation using development indicators, when the timescales associated with climate change impacts may be too long for such indicators to give a representative picture of outcomes;
- assess climate adaptation against a changing climate-risk baseline, normalising and contextualising development outcome indicators with respect to changing exposure to risk, and use other proxy indicators such as those representing vulnerability; and
- move beyond the dominant view of climate adaptation as coping with existing climate variability and climate-proofing business-as-usual development against incremental changes in existing risks. A shift in view will allow adaptation interventions to address all climate change-related risks that operate on different timescales, through a range of responses.

We conclude with a theory of change for an extended participation model to build climate resilience in South Asia. Such an approach seeks to emphasise social and climate vulnerability in public policy discourse and implementation, with the climate-vulnerable poor participating in developing national pathways to climate resilience, along with other stakeholders able to address 'wicked' climate change problems from innovative and diverse perspectives.

## 1

# Introduction

This paper assesses key evidence and strategic considerations for building climate resilience in South Asia. It reviews and analyses the challenges that climate change presents in South Asia; the gaps in current climate change responses in terms of building resilience at scale for those who are most vulnerable to climate change; and the opportunities and entry points for an 'extended participation' approach to addressing these challenges. Evidence for this paper was collated through a literature review and policy discourse analysis (PDA) scoping studies in Afghanistan, Bangladesh, India, Nepal and Pakistan, that drew together fragmented evidence and engaged key stakeholders to:

- identify key discourses related to climate-resilient landscapes and livelihoods;
- identify the main discourse stakeholders and the evidence on which discourses are based;
- outline the policy, legislative and regulatory developments that support these discourses;
- assess the interaction between dominant discourses; and

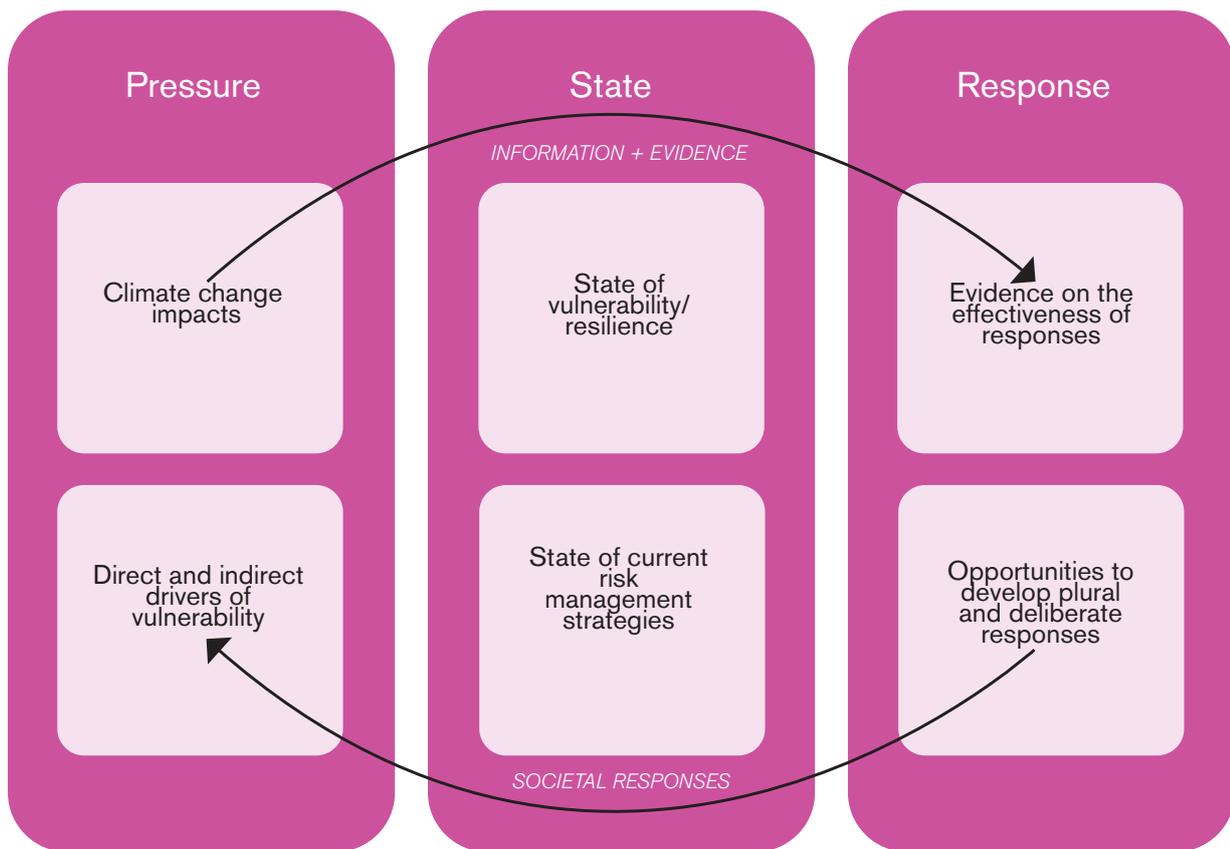
outline the potential future trajectory of these discourses along with emerging policy windows.

The paper starts by explaining key climate-related concepts, which are then structured as a pressure-state-response (PSR) framework (see Figure 1).<sup>1</sup>

- *Pressure* refers to existing and projected climate change impacts, and other factors that directly or indirectly determine the climate vulnerability of people and ecosystems.
- *State* is each country's current status of vulnerability and climate risk management. It includes circumstances relating to poverty and food security (as proxies for climate change vulnerability), and mechanisms in place to help people build resilience to climate impacts.

- *Response* refers to possible responses that could help build the resilience of climate-vulnerable groups and ecosystems. This includes options for taking forward extended participation actions in the region.

Figure 1: Adapted pressure-state-response framework



Source: Authors

## 2

# Key climate change concepts

## 2.1 GLOSSARY OF CLIMATE CHANGE TERMS

*Climate hazards:* A physical manifestation of climate change or variability. Includes:

- short-lived, sudden-onset events: wind storms, storm surges, intense precipitation, runoff;
- longer-lived, but transient events: droughts, heat-waves;
- long-term changes in average conditions: temperature, rainfall, sea level, seasonality; or
- qualitative changes in climatic or environmental conditions that might be associated with abrupt climatic or environmental transitions: changes in monsoon behaviour, catastrophic landscape changes associated with glacial outbursts, extreme floods.

*Climate effects and impacts:* Hazards lead to climate change impacts on ecological, social and economic systems. Climate change can result in the emergence of new hazards, such as Hurricane Catarina in 2004, the first-ever recorded South Atlantic tropical storm, which formed in an area predicted by a global climate model to become a centre of tropical storm formation in the 2070s.

*Climate vulnerability:* Vulnerability to climate and other environmental hazards is understood here as the state that determines the ability of individuals or social groups to respond to, recover from, or adapt to, the external stresses placed on their livelihoods and wellbeing by those hazards (Wisner *et al.* 2004). Vulnerability is

determined by the climate change hazard that defines exposure to climate change impacts, and the social, economic, cultural and political factors that determine resilience to these impacts. As such, poverty, rather than predicted climate change hazards, is one of the most salient indicators of climate-related vulnerability (Ribot 2010). People can also be indirectly vulnerable to climate change – for example, where changing temperature regimes influence the prevalence of malaria. However, the complexity of interactions between climate and other stresses means that poverty does not automatically equate to climate vulnerability.

*Climate-vulnerable poor:* The climate-vulnerable poor live in regions that are vulnerable to climate change and have low adaptive capacity. Figure 2 shows how climate change will substantially affect the basic securities that people need to avoid poverty (Anderson 2011). Although there are overlaps between people who are climate-vulnerable poor and those who are poor and marginalised, climate change adds a new dimension to assessing where the vulnerable are, and how vulnerability will change over time.

*Adaptation:* Adaptation to climate change has been defined as adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. In practice, adaptation is often stimulated by extreme events that breach the boundaries of coping capacity, rather than average changes in climate. It is a continuous and additive process, in response to changing conditions and can be either reactive (precipitated by past events) or proactive (preparing for future impacts).

Where planned adaptation has a long implementation time, delay in initiation is likely to be costly. Planning

over long timeframes increases the levels of uncertainty in terms of timing, the severity of effects and returns on investment. Local adaptation occurs when small-scale adaptation actions are taken by people in response to specific circumstances, usually without the direct intervention of a public agency (Aguilar 2001). But many impacts cannot be managed through local adaptation – for example, where large-scale technological or infrastructural solutions are required, that are beyond the management capacity of households or local institutions, or where impacts cross political and administrative boundaries. Further, many of the causes of the multiple determinants of vulnerability – access to markets, services or good governance – fall above the local level. In these cases, planned adaptation is needed, involving projects or programmes implemented by governments, NGOs and international donors.

The interaction between local and planned adaptations will determine the effectiveness of adaptation planning and delivery (Christoplos *et al.* 2009). The most effective planned adaptation strategies remove barriers to local adaptation while enabling the integration of new stakeholders, technologies, information and institutional frameworks, for the scaling up of local efforts (see Figure 3).

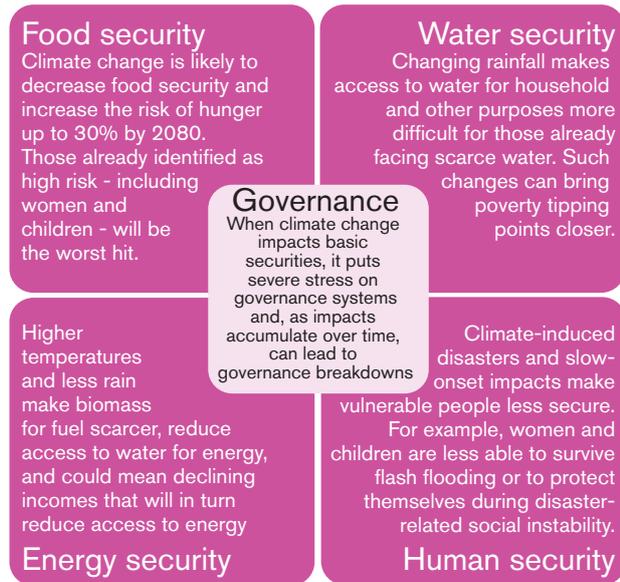
**Adaptive capacity:** The Intergovernmental Panel on Climate Change (IPCC) defines adaptive capacity as the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

There are three types of system that determine adaptive capacity: core, secondary and tertiary (see Table 1). Adaptive capacity may be viewed as a property of individuals or systems; both are closely interlinked. The ability of households and communities to switch strategies depends in large measure on their ability to access services.

**Resilience:** The IPCC defines resilience as the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change. This equates to coping with or managing the impacts of climate change.

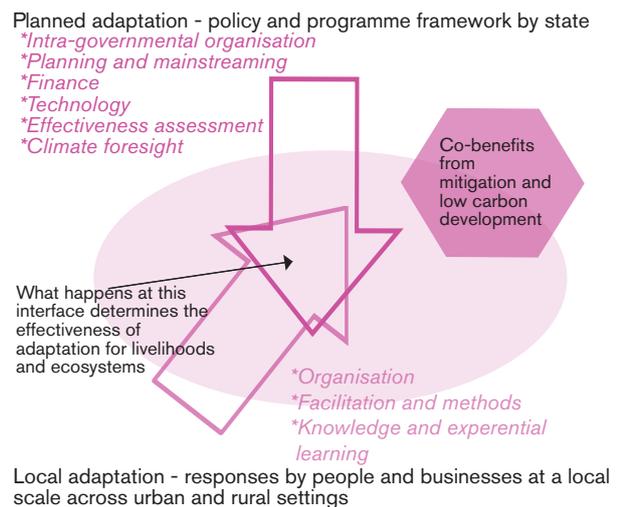
In development deficit situations, returning to the same state means people cannot access the basic securities that underpin wellbeing, and thus remain vulnerable. They are poor because they have not benefited from existing development and building resilience requires effective pro-poor development interventions in the context of highly uncertain climate and other changes (Dodman *et al.* 2009). Higher adaptive capacity leads to better climate resilience – this is true for individuals, households, enterprises and economies.

Figure 2: How climate change challenges basic securities



Source: Anderson 2011

Figure 3: Relationship between local and planned adaptation



Source: Authors

Table 1: Core, secondary and tertiary systems that determine adaptive capacity

SYSTEM	BROAD INDICATORS	DISAGGREGATED INDICATORS
Core	Energy, drinking water, land, forest, food, ecosystem services	Energy: clean energy and traditional fossil-fuel based energy Water: drinking water and irrigation Land: holding sizes and proportion of disaster-affected land
Secondary	Transport and mobility, communication, livelihood (agriculture, irrigation, forestry), shelter	Mobility: distance to highway, road density Communication: telephone coverage Livelihoods: forest and agriculture-based households, households affected by climate hazards Shelter: types of houses
Tertiary	Markets, taxation system, financial services, health, education, social networks, non-farm production systems such as service and industries	Literacy and education attainment Access to health facilities and sanitation coverage Numbers of user groups, and local organisations Presence of and accessibility to markets Government agencies Access to banking and cooperatives

Source: Dixit (2012)

## 2.2 FROM COPING TO ACHIEVING RESILIENCE

There are two main approaches to achieving resilience. Both derive from early work (Burton *et al.* 1993) that looked how coping and resilience are related. The first, a four-stage model of coping strategies, is useful for understanding adaptation to climate change (Pelling 2011). The four stages described below.

- *Loss absorption*: hazard impacts are tolerated and absorbed with no tangible impacts or adjustments.
- *Loss acceptance*: impacts are perceived, but losses borne without active mediation.
- *Loss reduction*: adaptation responses are implemented as the costs are perceived to be lower than those of the hazard.
- *Radical response*: hazards can no longer be mitigated and major socio-economic changes happen due to impacts or responses.

The second approach (Handmer and Dovers 1996) describes three stages:

- *Maintenance*: Responses target specific climate hazards, and maintain the same basic pre-hazard situation. Reaction to risk is to invest in research and resource expenditure – for example, on famine relief or hard engineering solutions. This type

of resilience is prone to system collapse where the underlying ‘pre-hazard’ situation was highly vulnerable. It is prevalent in highly hierarchical regimes.

- *Change at the margins*: Risk is acknowledged and adaptation undertaken that does not challenge core system attributes. It responds to symptoms, not causes, and leads to incremental, rather than major, reforms. The interests of the current generations are prioritised over those of future generations.
- *Openness and adaptability*: This approach requires a willingness to tackle root causes, flexibility and preparedness to change direction to deal with uncertainty. It anticipates the costs of maladaptation.

Both approaches stress the importance of institutions for integrating responses by people and the state correctly to the scale, cost and time profile of the hazard (See Figure 3). They also suggest a continuum of planned adaptation responses from those that target climate change hazards in isolation of the vulnerability context (resulting in maintenance or coping risks) towards those that tackle the root causes of vulnerability and build resilience.

In development deficit situations, managing climate risks to maintain the same basic situation does not address the drivers of vulnerability or the barriers to local adaptation. To achieve openness and adaptability, the

root causes of vulnerability need to be tackled by identifying the climate-vulnerable poor and the drivers behind their vulnerability, and integrating this with information on likely climate impacts.

## 2.2 DEVELOPMENT AND CLIMATE RESILIENCE

There are strong synergies between good development and climate change adaptation to build the resilience of the climate-vulnerable poor. But addressing climate change risk adds a new dimension to development practice in three ways.

- Climate change is a new and dynamic driver of vulnerability, changing the landscape of risk and making it more uncertain. Activities may look the same, but the motivations and information needs behind them are different – for example, climate change may change the target or the timescale of activities.
- Addressing under-development is the first step towards building climate resilience. The climate resilience agenda therefore provides opportunity – and urgency – to review development priorities and assess whether interventions are ‘on track’.
- Conventional change risk management is dominated by technocratic, top-down approaches, with little cross-fertilisation from decades of good development practice. As such, perversely, the climate change agenda is in many ways pushing development off track. Building climate resilience requires emphasising lessons from development and political science about inclusive, responsive policymaking – things that are taken for granted in development and disaster risk reduction, but have not yet reached climate change planning.

## 3

# ‘Pressure’: projected climate change impacts

In terms of the PSR framework, climate change is understood to be one of many pressures exerted on the state of vulnerability that response measures need to address. This section describes the current and expected climate hazards in South Asia and their impacts, paying particular attention to agriculture and food security, which are so important for the climate-vulnerable poor.

South Asia is disproportionately exposed to the impacts of climate change. In 2007, 37 per cent of the world’s reported natural disasters and 90 per cent of reported victims were in Asia (Dodman *et al.* 2009). Weather is increasingly variable and the intensity and frequency of extreme events is increasing.

The South Asia monsoon brings 80 per cent of rainfall between June and September and is already highly variable. As a result, frequent drought affects rice producers in eastern India, Nepali Terai and northwest Bangladesh, and regular floods affect Bangladesh, Bihar and Assam, with saline intrusion in the dry season in the coastal belts of Bangladesh, India and Pakistan (Mizuno and Ibaraki 2007; Moench 1996).<sup>2</sup>

Studies on the projected effects of climate change, and its impact on crops and water across South Asia provide the following predictions by 2050.<sup>3</sup>

- Higher temperatures and greater temperature extremes, with the lowest rises in low-lying areas such as Sri Lanka and the Maldives (about 1°C); in higher altitude areas of Afghanistan, Bhutan and Nepal, temperatures may rise by 1.5-2.5°C. Temperatures above 30°C in parts of India cause

problems in the primary growing season.

- Higher but more variable and intense rainfall across the region, except in the relatively drier areas of Afghanistan, western India and Pakistan, which could see even less rainfall. Increase in duration and severity of extreme events likely. Increasingly variable rainfall makes agriculture riskier.
- Significant change in runoff, with implications for agriculture. Increased runoff expected in the Indus and Ganges/Brahmaputra basins due to precipitation changes and glacial melt, after which there could be significant declines in flows. Annual runoff in the Brahmaputra to decline by 14 per cent and the Indus by 27 per cent. Afghanistan to be particularly impacted by reduced flows, with implications for water storage, irrigation and hydropower systems. Greater rainfall intensity in the Indo-Gangetic plains increases erosion, runoff and localised flooding.
- Sea level rises of 0.30-1.5 meters in Bangladesh, leading to flooding, changes in salinity levels and sedimentation patterns and enhanced storm surge effects.
- Possible higher cyclone intensity in the Bay of Bengal, but lower frequency.
- Increase in both floods and droughts. Central India to become more drought-prone; floods likely to be a continuing problem in Bangladesh, Bihar, Uttar Pradesh and other areas.
- Agricultural yields depressed by 18 per cent,

threatening food security for 1.6 billion people.<sup>4</sup>

- Growing period to decline by 5 per cent or more across the Indo-Gangetic Plains, with Nepal, northern India and Pakistan suffering the highest crop yield reductions. In India, a growing period of less than 120 days will cross a critical threshold for several crops and rangeland vegetation; number of reliable crop growing days might make cropping too risky a major livelihood strategy in the Indo-Gangetic plains and south India.<sup>5</sup>
- Child malnutrition levels to rise by a further 9 to 11 million, on top of the 65 million malnourished children already projected for 2050.

While there is scientific consensus that anthropogenic climate change is happening, there is uncertainty around exact future climate change scenarios and their biophysical impacts, and how these will interact with the complex social-development context in which they strike (Adger *et al.* 2009; Boyd *et al.* 2009).

Climate change amplifies and multiplies existing determinants of vulnerability, and will affect the poorest and most marginalised worst and first. Women and children will be disproportionately affected. Female mortality outnumbers male mortality during climate-related disasters – for example, women accounted for 90 per cent of deaths in the 1991 Bangladesh cyclone. When subsistence farmers produce less, children, especially girls, are taken out of school and the meals of women and girls are reduced first (Watkins 2007). Other marginalised groups include urban slum dwellers, indigenous people whose dependence on forests makes them especially vulnerable and displaced people. Extreme weather events can displace populations internally and across borders, increasing their vulnerability. Monsoon floods, for example, displaced more than 20 million people in Bangladesh, India and Nepal in 2007.

## 3.1 ECONOMIC IMPLICATIONS OF CLIMATE CHANGE ON DEVELOPMENT

Some of the world's poorest people and countries are in South Asia. Nepal, is one of the poorest countries in the world, has a GNI per capita of only US\$700.<sup>6</sup> The country is failing to attract climate investment – it was ranked 123 out of 181 by the World Bank (2010a), 117 out of 148 in global competitiveness and has a country credit rating of 20.7, ranking it 133 out of 148 (World Economic Forum 2013).<sup>7</sup>

Climate change will reduce the effectiveness, and increase the costs, of development in the region. However, the cost of inaction could be 20 times greater than investments in building and maintaining climate-

resilient infrastructure and preparing for disasters (Stern 2006). But political instability, transitioning democracies and socio-political and environmental vulnerability undermine the ability of development policies and institutions to secure climate change resilience and move South Asian countries to lower emissions development pathways. While public, private and civic investments are being made in agriculture, social protection schemes and forestry, there is significant uncertainty about how best to invest in ways which will build climate-resilient landscapes and livelihoods, and reduce poverty, hunger and net carbon emissions.

The governments of the region have called for coherent responses to climate change. The 16th South Asian Association for Regional Cooperation (SAARC) Summit at Thimphu, Bhutan in April 2010 expressed “deep concern about the adverse effects of climate change and its impact on the region, particularly on the lives and livelihoods of the 1.6 billion people of South Asia”, and recognised that “effective responses, both on mitigation and adaptation should be formulated and implemented at regional and international levels.” At the summit, the SAARC heads of state emphasised that “reducing dependence on carbon in economic growth and promoting climate resilience will promote both development and poverty eradication in a sustainable manner.”

dimension to development practice in three way

## 3.2 COST OF CLIMATE CHANGE ON LIVELIHOODS AND ECOSYSTEMS<sup>a</sup>

### 3.2.1 Agriculture

One study estimates that by 2080, the impact of climate change will have led to a 25.3–36.6 per cent drop in agricultural production (See Table A1, Appendix 3). However, we should note that estimating the economic impacts of climate change on agriculture is problematic due to uncertainty in the biophysical effects of climate change, the volatility of the global food supply and demand system, population growth, urbanisation, consumption trends, trade and technology development. The figures above are likely to be underestimated: they do not consider crop losses arising from more droughts and floods, nor changes in surface water availability; they assume a smooth response curve of crop yield to temperature rise and ignore the effects on agriculture of sea level rise and increased saltwater intrusion in groundwater aquifers.

### 3.2.2 Human security

The scale of social and economic losses related to climate-induced disasters in the region is considerable.

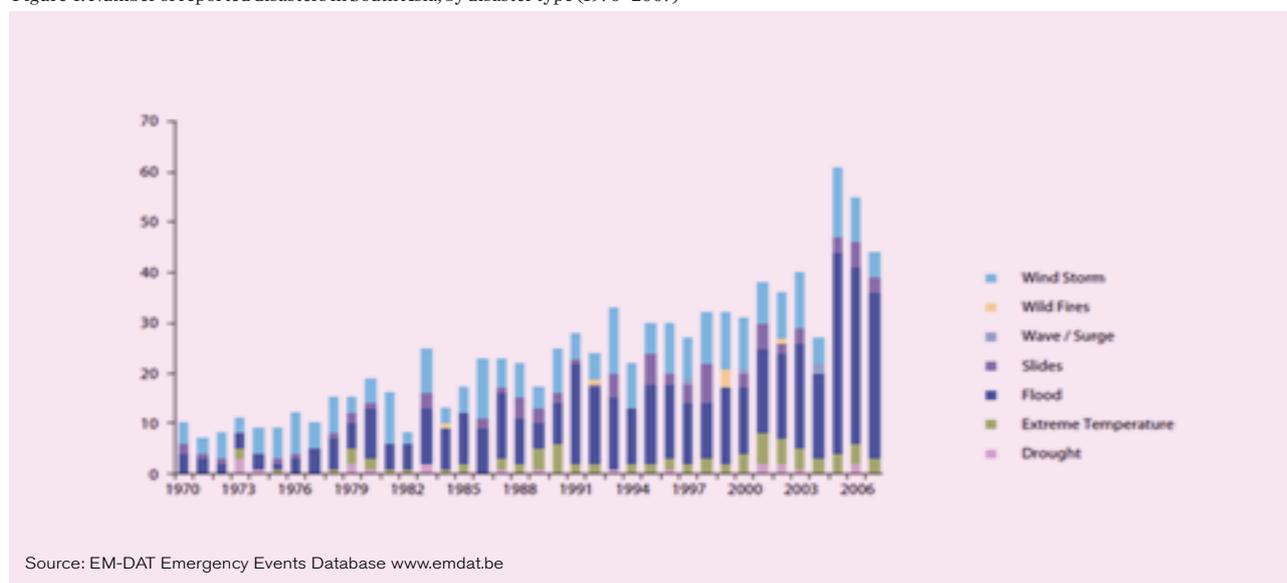
Between 1990 and 2008, more than half of the South Asia population (750 million people) was affected by at least one natural disaster. There were 230,000 deaths and over US\$45 billion in damages. Reported climate-related disasters in the region are rising (see Figure 4). Oxfam estimates that two to six per cent of South Asia's GDP is lost to disasters every year (Oxfam 2008). Many climate-induced hazards cross national boundaries.

### 3.2.3 Ecosystems

- Climate change challenges the sustainability of ecosystems and their services in a variety of ways.
- Flooding induced by a rise in sea level can damage coastal ecosystems and freshwater aquifers.
- Reduced glacial cover will increase biodiversity loss in the mountain and low-lying ecosystems of the Hindu Kush Himalayan range.
- Increased ocean acidity levels due to warmer sea temperatures will slow coral reef formation, disturb the marine food chain, and adversely affect fisheries.
- Reduced ecosystem capacity to sequester carbon can aggravate the impacts of climate change.

Our understanding of the effects of climate change on ecosystems and their services is poor, and there has been little headway in estimating their costs. For example, UNFCCC estimates of US\$12–22 billion to expand and protect terrestrial protected area networks do not include measures of ecosystem services; and the World Bank's Economics of adaptation to climate change study assumes that some ecosystem services are covered by adaptation in other sectors. The UNFCCC concluded that adaptation costs for non-protected areas should be included in costings and could amount to about US\$290 billion (Parry *et al.* 2009).

Figure 4: Number of reported disasters in South Asia, by disaster type (1970–2007)



## BOX 1: THE COST OF PAST DISASTERS

- Cyclone Sidr, Bangladesh, 2007.* Cost to the economy: 2.8 per cent of GDP. Degraded agricultural lands reduced crop and livestock yields.
- Nepal, 2000–2010.* Climate-induced disasters killed more than 4,000 people and caused economic losses of US\$5.34 billion.<sup>9</sup>
- More than one million people are directly impacted by drought, landslides and floods every year.
- Pakistan floods, 2010.* Around 20 million affected; 1,985 killed, 2,964 injured. Some 1.6 million houses were damaged or destroyed; more than five million jobs lost. Massive damage to agricultural crops, irrigation systems and infrastructure. In 2011, economic growth over the previous year remained stunted by 2 per cent.<sup>10</sup>
- India: Maharashtra state drought, 2003 and floods, 2005.* Total cost Rs 175 billion was more than the entire planned expenditure (Rs 152 billion) on irrigation, agriculture and rural development for 2002–2007 (World Bank 2007).

## 4

# ‘State’: vulnerability, poverty and food security

Climate change impacts exert pressure on vulnerable people and systems in complex and uncertain ways. These often depend on their state of vulnerability, and the extent to which they are able to adapt.

Poverty and food security are taken here as proxies for the current state of climate change vulnerability in South Asia. This is because natural resource-based food production systems are sensitive to changes in climate and evidence shows that the rural poor are overwhelmingly dependent on agriculture for their livelihoods (World Bank 2008b).<sup>11</sup> Food security is also an indicator of other elements of wellbeing such as health (malnourishment), wealth (income from agriculture; ability to work) and governance (access to food is often a governance and poverty issue rather than a question of availability).

South Asia is home to over 420 million people living on less than US\$1.25 a day (Mittal and Sethi 2009) and one-third of the world's hungry and undernourished people. It generates less than two per cent of global income, yet supports 22 per cent of the world's population.<sup>12</sup>

Development in South Asia is challenged by various factors. Land and water are under intense pressure and demand for food is increasing.<sup>13</sup> The average farm size has decreased from 2.2 hectares in the 1970s to one hectare today. Per capita fresh water availability is 1,230m<sup>3</sup>, compared to a world average of 6,778m<sup>3</sup>, while high, volatile food prices are increasing poverty and malnourishment as well as increasing political tensions.<sup>14</sup>

Poverty and vulnerability in South Asia are not evenly

distributed between countries. Table 2 summarises the differences in food security status of five South Asia countries.<sup>15</sup>

Poverty and vulnerability are also highly disaggregated within countries. For example, the government of Nepal identifies seven major socially excluded groups, including women and indigenous nationalities. Mountainous terrain often hinders access to markets, services and information, and makes infrastructure development problematic and costly. Fertility rates and maternal and child mortality are high in rural areas, where people cultivate fragile soils and raise livestock for low returns. Land fragmentation is extreme, and many households have insufficient land for food security (Pokharel and Carter 2007).

The impacts of climate change will play out against this backdrop of high poverty and inequality, and will affect current levels of food security and under-development (see Figure A5, Appendix 1). The poorest and most excluded will be the most vulnerable to the impacts of climate change – because of their high dependency on climate-sensitive resources and their lack of access to the material, social, political and economic resources that would enable them to adapt. Effective climate change responses will therefore need to address the impacts of climate change and the development deficit that drives vulnerability, in order to build resilience at wide geographic and administrative scales.

Yet current agricultural development in South Asia appears not to be fit for purpose. Policies have had significant unintended consequences in terms of eroding natural capital, while still failing to eradicate

persistent chronic poverty or hunger.<sup>16</sup> Climate change is adding complexity and uncertainty to this already significant public policy challenge.

## 4.1 RANGE OF CURRENT RESPONSES

Existing responses to climate risks in South Asia reflect the current state in each country. Both domestic and international investments from international climate finance are increasing. Table 3 shows investments from international climate finance per country.

### 4.1.1 Policy discourses

Countries are translating climate investments into various responses to climate risk. In Afghanistan, discourse is centred on agriculture and natural disasters. The focus is on collecting and analysing historical climate change data, creating awareness and knowledge about climate change and building capacity to tackle it among government staff. Climate change in Bangladesh is seen as part of a wider threat

to development, with discourse centred on climate-proofing development against disasters. This is in line with previous environmental management approaches, focusing on climate change impacts (predominantly associated with coastal risks) and socio-economic vulnerability.

In India, climate change discourses are embedded within broader development discourses that focus on inclusive growth. They are centred on greening development to ensure sustainability, resilience – particularly in the context of disaster risk reduction – and rights-based approaches to inclusive development. Nepal's climate resilience framework focuses on integrating climate resilience into development policy frameworks, reflecting elements of poverty reduction, disaster risk reduction, natural resource management and the potential for innovation. The constitution and other climate change planning documents echo a rights-based approach to adaptation planning and delivery. In Pakistan, on the other hand, climate change is seen as a threat to growth, so the main concern with is climate-proofing economic sectors and infrastructure.

Table 2: Food security in South Asia

COUNTRY	FOOD SECURITY STATUS
Afghanistan	7.4 million people – nearly one-third of the population – cannot get enough food to live active, healthy lives. Another 8.5 million people (37%) are on the borderline of food insecurity.
Bangladesh	Growth retardation, an outcome of chronic malnutrition, is widespread, affecting an estimated 48.6% of the country's 20 million children. A staggering 18.2% of women are acutely malnourished and at high risk of giving birth to low birth-weight babies. Approximately one-third of adolescent girls suffer from anaemia and micronutrient deficiency.
India	Although India grows enough food for its people, it is home to about 25% of the world's hungry poor. Around 43% of children under five are malnourished; more than 50% of pregnant women aged 15 to 49 suffer from anaemia. There are stark inter-state disparities.
Nepal	Malnutrition threatens millions of children with debilitating and irreversible mental and physical impairments: half of all children under five are stunted or chronically undernourished; 13% are acutely malnourished. In many communities acute malnutrition rates exceed 15% – the emergency threshold.
Pakistan	Recent assessments show no improvement since 2001: 13% of children aged 6-59 months are wasted; 37% stunted and 38% underweight. One-third of child deaths are associated with malnutrition. Roughly 45% of women and 67% of children under five are anaemic.

Source: FAO (2009)

Table 3: International climate investment in South Asia countries

	AFGHANISTAN	BANGLADESH	INDIA	NEPAL	PAKISTAN
Funds approved (US\$ million)	10.1	128.06	143.69	16.99	15.13
Funds received (US\$ million)	4.24	18.06	122.82	3.17	8.48

Source: Climate Funds Update [www.climatefundsupdate.org](http://www.climatefundsupdate.org)<sup>17</sup>

### 4.1.2 Priorities for investment

Approaches and investments vary according to country priorities<sup>18</sup>, and governments in South Asia are adopting a range of strategies and climate resilience initiatives to address perceived climate challenges in the following sectors (IISD 2011 and individual PDAs).

- *Agriculture*: adaptive production, harvest and storage technologies; adaptive germplasm – crop varieties and livestock breeds; meteorological information provision to farmers and insurance against climate effects.
- *Water and energy*: water management practices and institutions for climate-proofed and efficient use; disaster preparedness and risk reduction; improved capacity of water management institutions; and energy efficiency measures.
- *Coastal zones and infrastructure*: climate-proofing infrastructure; coastal zone adaptation strategies
- *Ecosystems*: controlling invasive species; preserving climate-sensitive watersheds; and climate-sensitive ecosystem management.
- *Climate risk reduction*: climate-smart disaster risk management, including awareness-raising; landslide management; flood prevention; and glacial lake outburst flooding monitoring.
- *Human health*: enhanced climate-sensitive disease early warning systems; improved public awareness around the likely health impacts of climate change; mapping of major communicable diseases and water and food-borne diseases; and exploring indigenous knowledge and community practices for health adaptation.

### 4.1.3 Emerging regional initiatives

There are a number of emerging regional initiatives that aim to support climate change responses across South Asian countries, addressing shared concerns around trans-boundary watershed management, sustainable agricultural production, improving access to information for decision making, and risk reduction. These include:

- *South Asia Water Initiative (SAWI)*, which aims to support collaboration on trans-boundary water issues, including glacial melt and glacial lake outburst flooding.
- *CGIAR research program on climate change agriculture and food security (CCAFS)*, which aims to address threats to agriculture and food security caused by a changing climate in vulnerable rural communities in Africa and the Indo-Gangetic plains. Research focuses on adaptation to progressive climate change, adaptation through managing climate risk, pro-poor climate change mitigation and integration for decision making. In India, CCAFS will

work closely with the government's National Rural Livelihood Mission programme.

- *Improving institutions for pro-poor growth in Africa and South Asia (Bangladesh, India)*. Supported by the UK's Department for International Development (DFID), this initiative focuses on how institutions can be redesigned to support the production and uptake of technologies and policies that contribute to poverty reduction and achieving the millennium development goals.
- *Mangroves for the Future (MFF)*. This Asia-wide programme promotes country-led initiatives and best practice on coastal and marine water body management. Funded by the governments of Australia, Germany, Norway, Sweden, UNDP and UNEP; implemented by the International Centre for Integrated Mountain Development in India, Pakistan and other south and southeast Asian countries.
- Climate change, environment and migration initiative in Bangladesh and western India, supported by the Global Environment Facility (GEF)'s Special Climate Change Fund.
- Developing information sharing systems to enhance farming communities' capacity to cope and deal effectively with climate variability and climate change. This initiative is supported by GEF's Special Climate Change Fund for implementation in India and Pakistan.

## 4.2 CHARACTERISING CURRENT RESPONSES

Figure 5 shows the continuum of approaches to building resilience – with those that support coping or maintenance in the context of climate change at one end, and those that take a more integrated approach to building broader resilience at the other. Current responses are scattered along this continuum.

This echoes the characterisation of climate change responses in literature more generally. A review of more than 100 developing country initiatives labelled as 'adaptation' found that adaptation and development lie along a continuum, with development-orientated initiatives at one end and climate change-orientated ones at the other (McGray *et al.* 2007).

At the development end, efforts overlap almost completely with traditional development practice. Activities – for example, livelihood, literacy or women's rights projects – increase general resilience and take very little account of specific climate change impacts. At the other end of the continuum, highly specialised activities exclusively target distinct climate change impacts – for example, strengthening coastal infrastructure in anticipation of sea level rises or increases in storm intensity.

Strategies to support the maintenance or climate-proofing of existing development interventions promote the idea that climate change impacts present an additional risk to business-as-usual public policies, and responses are therefore targeted at these impacts. This approach, however, often fails to assess the different drivers of vulnerability and whether or not the development policies themselves are actually building resilience.

There are huge uncertainties about the extent to

which these different approaches actually improve the resilience of the climate-vulnerable poor. The PDAs revealed that, in the absence of robust and useful evidence, decision making is being driven by climate change funding opportunities and strong ideology-driven discourses about what should work, rather than actual evidence about what does work. A lack of certainty over what works was noted as one reason for delayed or fragmented decision making around climate change investments.

Figure 5: Continuum of climate-resilient investments in South Asia



Source: Authors

## BOX 2: PAKISTAN AND INDIA – TWO ENDS OF THE CONTINUUM

Pakistan's Framework for Economic Growth (2011), for example, refers to "climate proofing development" and recommends allocating resources to implement the National Environment Policy and related action plans on adaptation and mitigation. The draft climate change policy proposes allocating resources for disaster risk management (climate proofing infrastructure). The climate change agenda is therefore in line with, but additional to, the development and growth agenda. Climate change is annexed in the Vision 2030 policy document, not integrated throughout. This does not incentivise a reassessment of whether or not the development agenda is itself conducive to building resilience.

Achieving a more integrated approach to broader resilience building in development deficit situations requires challenging or re-thinking existing development objectives in light of climate change vulnerability. India's Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is a social protection scheme that aims to enhance the livelihood security of people in rural areas by guaranteeing 100 days of wage-employment per year. There is considerable focus on leveraging MGNREGA investment for climate resilience and other environmental outcomes – for example, the Ministry of Environment and Forests, Ministry of Water Resources and the Indian Council of Agricultural Research have jointly identified 115 pilot districts in 22 states where best practices will be scaled up nationally (UNDP undated).

## 4.3 CHALLENGES OF THE CLIMATE-PROOFING RESPONSE

Most investment in adaptation action to date has been at the climate-proofing end of the continuum, possibly as a result of the original UNFCCC remit as: “a pollution control instrument at the global level”, with the concept of adaptation added as an “afterthought” (Burton *et al.* 2008). Under this framing, the purpose of adaptation is to respond to the uncertain risk of the impacts of biophysical change in order to bring the system back to its original state. This approach takes climate change impacts as its starting point. Adaptation planning and investments aim to manage those impacts (Burton *et al.* 2002; Schipper 2006). The result is ‘technology-based’ adaptation – stand-alone interventions such as dams or early-warning systems – or ‘climate-proofing’ development investments (Klein 2008).

### 4.3.1 A linear approach

This framing of climate risk has resulted in policy frameworks that adopt conventional linear approaches to policymaking that are the norm when dealing with scientific or technical problems.<sup>19</sup>

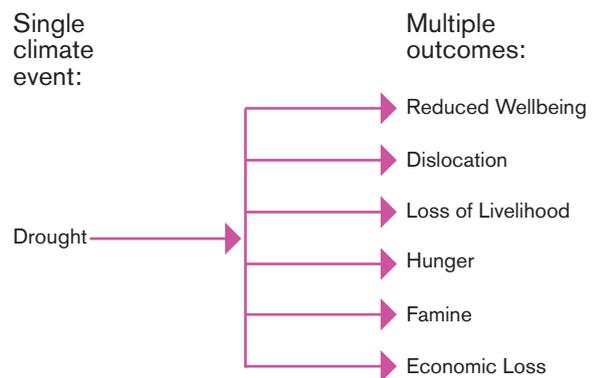
A linear approach starts by framing and defining the problem. Once the problem is specified, evidence is generated that targets the problem to inform a solution; the evidence is analysed, and options for solutions are generated. Outcomes and outputs are then identified, implementation plans designed and performance targets specified.

The Global Change Impact Studies Center in Pakistan was set up to inform climate response decision making and therefore address pre-defined climate change impacts on agriculture, water resources and glacier melt. Such approaches latch onto climate change impacts, assuming that they are the only or main problem.

Much political science literature<sup>20</sup> shows how the dominant approach to assessing risks in environmental governance has adopted this linear science-speaks-to-policy model, often leading to policies that are irrelevant to farmers on the ground. In Cote d'Ivoire, desertification dominated policy discourse while farmers were struggling against bush and tree encroachment. In the UK, government experts' recommendations that farmers feed their sheep hay in the aftermath of Chernobyl, was rejected by farmers as unworkable (see Case studies 1 and 2, Appendix 2). Such risk assessments, made without input from farmers on the ground, are used by scientific networks to answer policy relevant questions and communicate technical advice to decision makers (Farrell *et al.* 2001).

The cases reveal two problems with such linear impacts-based approaches to dealing with complex problems. First, they encourage a reliance on scientific expertise for problem solving. But there are limits to how far scientific knowledge can address the uncertainties and complexity of climate change. Placing weight on scientific expertise to address climate change problems risks understating uncertainty and can result in potentially maladaptive decision making. And yet paradoxically, the framing of problems as climate-orientated makes the adoption of an impacts-based framework more, rather than less, likely.

Figure 6: Impact analysis approach to risk assessment



Source: Ribot (2010)

### BOX 3: NAPA DEVELOPMENT GUIDELINES: A LINEAR APPROACH TO DECISION MAKING AND ACTION

1. Guidelines for NAPA project preparation prepared by the Least Developed Country Expert Group (LEG) recommend four key steps:
2. Synthesis of available information on the adverse effects of climate change and coping strategies.
3. Participatory assessment of vulnerability to current climate variability and extreme events and of areas where risks would increase due to climate change.
4. Identification of key adaptation measures.
5. Identification of prioritisation criteria for selecting NAPA activities.

### 4.3.2 A ‘wicked’ problem

Climate change has been characterised as ‘wicked’, because there is no unequivocal explanation of the problem and no similar previous cases. The term ‘wicked’ in this context does not imply evil, but problems that are highly resistant to resolution because of incomplete, contradictory and changing requirements that are often difficult to recognise. Complex interdependencies also mean that solving one aspect of a problem reveals or creates other problems.

### 4.3.3 Underrepresentation of local stakeholders

The target for measurement – climate resilience or adaptive capacity – is not well defined. Due to uncertainty around the effects and multiple causes of climate vulnerability, policymakers find it difficult to define problems or solutions as they struggle to assess progress as the ever-evolving nature of the problem provides a moving target.

Further, overstating the value of science undermines potential contributions of non-scientific information sources such as lay knowledge, which can be extremely important in informing accurate assessments of risks and solutions.

Stakeholders interviewed, and the policy documents reviewed in the PDAs, recognised the value of local knowledge in defining and addressing vulnerability. There was wide agreement among policy gatekeepers that climate-resilient planning processes should be participatory. This is reflected in the planning guidance for NAPAs and other multi-stakeholder processes for climate decision making across the region – in

Bangladesh and Nepal, for example, NAPAs were developed through multi-stakeholder thematic working groups made up of diverse government, private sector and civil society actors.

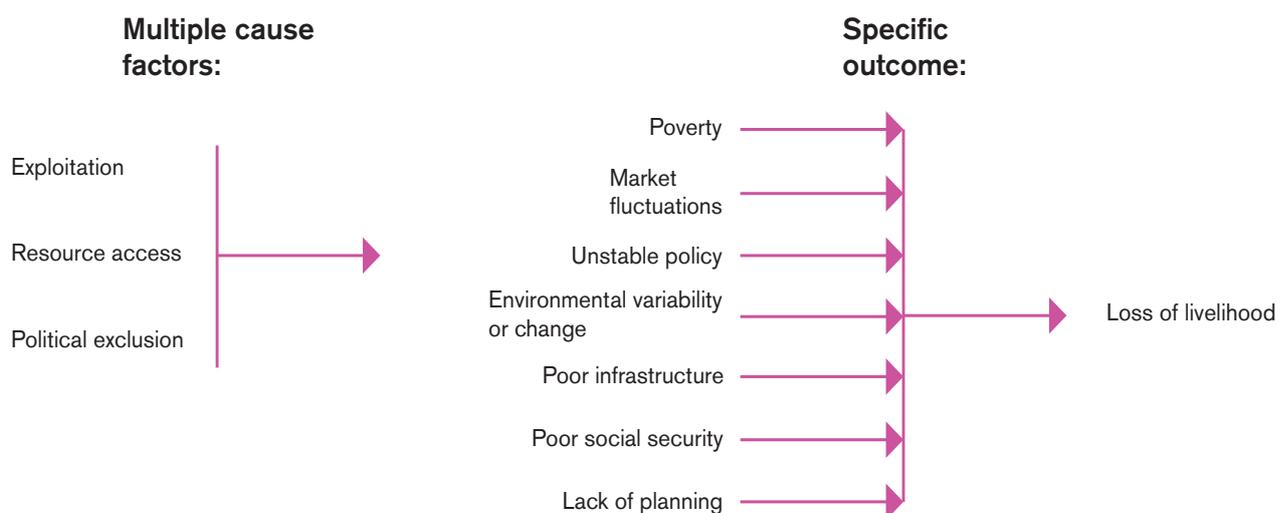
However, local stakeholders are almost always severely underrepresented in these forums, and the process of participation tends to be consultative rather than meaningfully participatory. Vulnerable groups are rarely engaged at the outset of a planning process or given room to shape questions and provide evidence for answering them (Anderson *et al.* 2009). During the Bangladesh PDA feedback meeting, stakeholders suggested that information coming from the grassroots needed to be validated in order for it to be useful for decision makers. Where alternative discourses do exist, there remains confusion over how the kinds of relevant information generated fit into linear policy processes.

## 4.4 AN INTEGRATED APPROACH

At the other end of the continuum, a more integrated approach to climate resilience recognises climate change impacts as one (but not necessarily the main) driver of vulnerability, rather than taking it as a starting point (see Figure 7).

This more integrated model takes social vulnerability as the starting point for any impact analysis. These are the underlying factors that need to be assessed, analysed and addressed in order to reduce vulnerability to climate change and other stresses. The outcomes of such an integrated risk analysis inevitably involve adaptation interventions that overlap strongly with development approaches.

Figure 7: Integrated approach to risk assessment



Source: Ribot (2010)

### 4.4.1 Adaptation deficit

Analysing vulnerable communities will reveal an 'adaptation deficit' – the existing capacity to cope with and adapt to current climate risks. Climate change adaptation programmes need to reduce this deficit to increase people's resilience to climatic variation more generally, before they can adapt to future climatic changes (Burton 2004). As such, much adaptation is simply a way to achieve sustainable development. For example, there are proposals to reduce the risk of storm and cyclone hazards for vulnerable groups in Vietnam by prioritising poverty reduction (and thus spreading risk through income diversification) and addressing land and common property management rights (Kelly and Adger 2009). Such activities could be part of a development programme, irrespective of climatic risks.

### 4.4.2 Development and adaptation

This more integrated perspective poses problems and raises uncertainties, particularly with regards to practical issues such as governance and finance. Climate and development policies and practice are usually managed in isolation from each other, and confusion over the relationship between adaptation and development make it difficult to assess success. If climate change adaptation is simply good development, what makes it adaptation?

Climate change, therefore, brings new challenges and uncertainties to existing development practice. It is a new and dynamic driver of vulnerability, changing the landscape of risk and making it more uncertain. The climate resilience agenda provides opportunity – and urgency – to review development priorities, and the climate change agenda is in many ways pushing development off track – it could, for example, exacerbate the adaptation deficit discussed above (Burton 2004).

While the need to integrate climate change and development is widely acknowledged, assumptions about development trajectories are often based on "monolithic claims about development constructed from the status quo of global capitalism". Approaches to integrating adaptation into development need to consider not only uncertain climate change futures, but also alternative development discourses that may give rise to different adaptation and development priorities for different groups (Manuel-Navarrete *et al.* 2009).

## 4.5 GAPS

So, at the climate-proofing end of the continuum, linear, impact-based approaches to informing policy are struggling to manage the complexities of vulnerability. At the other end of the scale, there are uncertainties over how best to address both climate and development, and the interactions between them, in an integrated way.

Both approaches leave significant unmet information

needs for informing and delivering climate resilience, through targeted climate change policies and more integrated public policy approaches. The South Asian PDAs identified gaps in the following policy areas: climate change; poverty reduction and social protection; agriculture and food security; and forestry and natural resource management. For details on each policy area, see Table A3, Appendix 3.

Many of these knowledge and evidence gaps relate to how governments can best concert developmental responses to climate change challenges. These include:

the scale and cost of current climate-related effects on social and economic development, particularly the ways in which increasing climatic variability and extreme weather events are reducing the effectiveness of poverty reduction initiatives;

- how well, or poorly, the climate-vulnerable poor are able to adapt to long-term climate change, and the limits to adaptation;<sup>21</sup>
- how to establish country-driven, evidence-based planning that couples local priorities for climate resilience to national support;
- how to make policy programmes with climate resilience objectives that are accountable and responsive to local needs and populations and overcome gender-based and other marginalisation;
- how to build local capabilities to reach up and draw down resources, technologies, information and services, which are important to remove development constraints and increase adaptation options; and
- the design of social protection that mitigates climate-induced and other poverty tipping points, which may include climate-resilient public services, climate-induced poverty safety nets and social transfers.

Where evidence is unavailable to confirm problems and inform solutions, decisions are based on 'second-best' approaches. The PDAs showed that climate change investment decisions are often based on scant evidence and perceived truths about climate change impacts and vulnerabilities. For example, interviewees in Bangladesh suggested that fund allocation decisions were sometimes made on political rather than technical grounds because of a lack of information or systematic process.

This review of the current state of climate risk management in South Asia finds that public policy responses to climate risk management are fragmented and do not address the uncertainties and complexities of climate-resilient development. Approaches are needed that go beyond linear models of decision making to define robust solutions that respond to changing and uncertain problems.

# 5

## ‘Response’: how to enhance current responses

### 5.1 SILOED AND FRAGMENTED APPROACHES

It is as important to mainstream climate resilience into public policy for social and economic development as it is to bring proven good development practice into climate resilience delivery. Doing both requires an integrated approach to policymaking. Figure 8 tries to capture this concept.

If proven development practice addresses underdevelopment without taking future climate changes into account, it could lead to development that is susceptible to climate change and maladaptive. Likewise, siloed climate resilience initiatives that are not integrated into good development practice and fail to address the development deficit could potentially undermine good development and overlook opportunities for building long-term resilience. (See Case study 3, Appendix 2.)

Future policy approaches must address development and climate resilience and promote investment in climate-resilient development. There should be no distinction between adaptation and development in the political and negotiating arenas (Fankhauser and Schmidt-Traub 2010). There is therefore a need for evidence-based analysis of what works, where and why. Lessons from aid effectiveness and efficiency assessments can be applied to help reduce transaction costs.

### 5.2 UNCERTAINTY

### AND IMPROVING STAKEHOLDER ENGAGEMENT

There are two strategies for managing wicked and complex problems, each with differing implications for how power is dispersed among stakeholders (Roberts 2000):

**Authoritative strategies:** a group (or individual) takes on the problem-solving process, while others agree to abide by its decisions. Group or individual identification may depend on their expertise, organisational position in the hierarchy or coercive power.

- Examples: High Court decisions around native title, Reserve Bank decisions on interest rates.
- Advantages: efficiency, timeliness.
- Disadvantages: potential disregard for important issues, lost opportunities for learning.

**Collaborative strategies:** arguably the more effective approach for dealing with wicked problems, as power is dispersed among many stakeholders.

- Examples: partnerships, governments, international treaties, information campaigns.
- Advantages: more comprehensive and effective solutions, fewer resources used by any one stakeholder.
- Disadvantages: increased transaction costs, limited supply of collaboration skills, dialogue could turn into conflict, hardened positions, stalemate.

Most political science literature around responding to complex and uncertain problems advocates for a collaborative approach.<sup>22</sup> Problems framed as global, scientific or technical tend to elevate technocratic expertise and consequently subjugate local and lay knowledge.<sup>23</sup> Yet to understand vulnerability, it is precisely this lay knowledge that can help inform sustainable and realistic adaptation policies in the face of uncertain climate change impacts. Vulnerable people often have a wealth of creativity and knowledge about practical adaptation strategies that respond to increasing climate variability (Prolinnova 2011), and the most robust way to deal with the uncertainty around climate impacts is to build on existing coping strategies (Conway 2009).

That is not to say that ‘all knowledge is expert’ or that every viewpoint on a problem is equally valid. Clearly, it is not possible to take every opinion on every problem into account, but encouraging wider public consultation in policy decision making can improve process legitimacy.

A post-normal science model (see Figure 9) could address the challenges of uncertainty and stakeholder engagement (Funtowicz and Ravetz 1990). This builds on ‘normal’ science, which assumes one single set of experts for each policy problem and attempts to lock down complex problems using expertise, rather than opening them up for deliberation and consideration (Australian Public Services Commission 2007).

Adaptation science is currently approached through scientific research on climate change impacts, excluding lay or local knowledge. A post-normal science framework would incorporate extended facts – such as beliefs and anecdotes that have been circulated verbally

– allowing for a plurality of perspectives where different kinds of knowledge are taken as legitimate and can fill the gaps that science alone cannot answer (Funtowicz and Ravetz 1990, 1993).

Climate change policymaking needs to value local knowledge and evidence when defining climate change risks and steps towards resilience (Prolinnova 2011). A wide range of non-scientific stakeholders – from disaster risk reduction practitioners to vulnerable communities – have knowledge that is critical for informing resilience-building. Involving these groups will shift the debate towards more integrated resilience-building and away from climate-proofing, thus reducing uncertainty by widening the relevant knowledge base. Discussions around wicked problems such as climate change involving all relevant stakeholders will help ensure a full understanding of their complexity. “What matters about climate change is not whether we can predict the future with some desired level of certainty and accuracy, it is whether we have sufficient foresight, supported by wisdom, to allow our perspective about the future, and our responsibility for it, to be altered.”(Hulme 2007)

There is a need for intellectual, educational, ethical and political spaces to bring in, share and debate a diversity of ideas around vulnerability. These include approaches to poverty eradication, the role of the state, how to act on knowledge under uncertainty, components of human security (food, water, energy, wellbeing) and the value of technological innovation. Responses to these issues will determine how solutions to climate change are chosen and implemented. But this requires alternative approaches to evidence generation and decision making.

Figure 8: Mainstreaming climate resilience into public policy and bringing proven development practice into climate resilience delivery

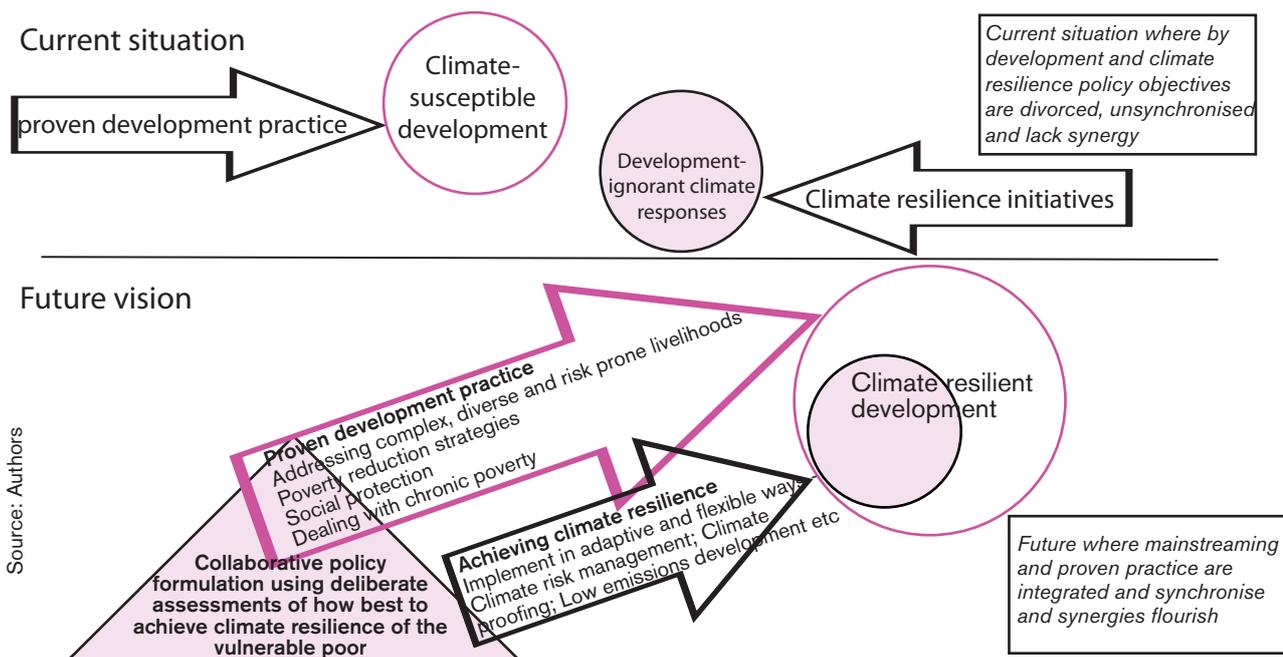
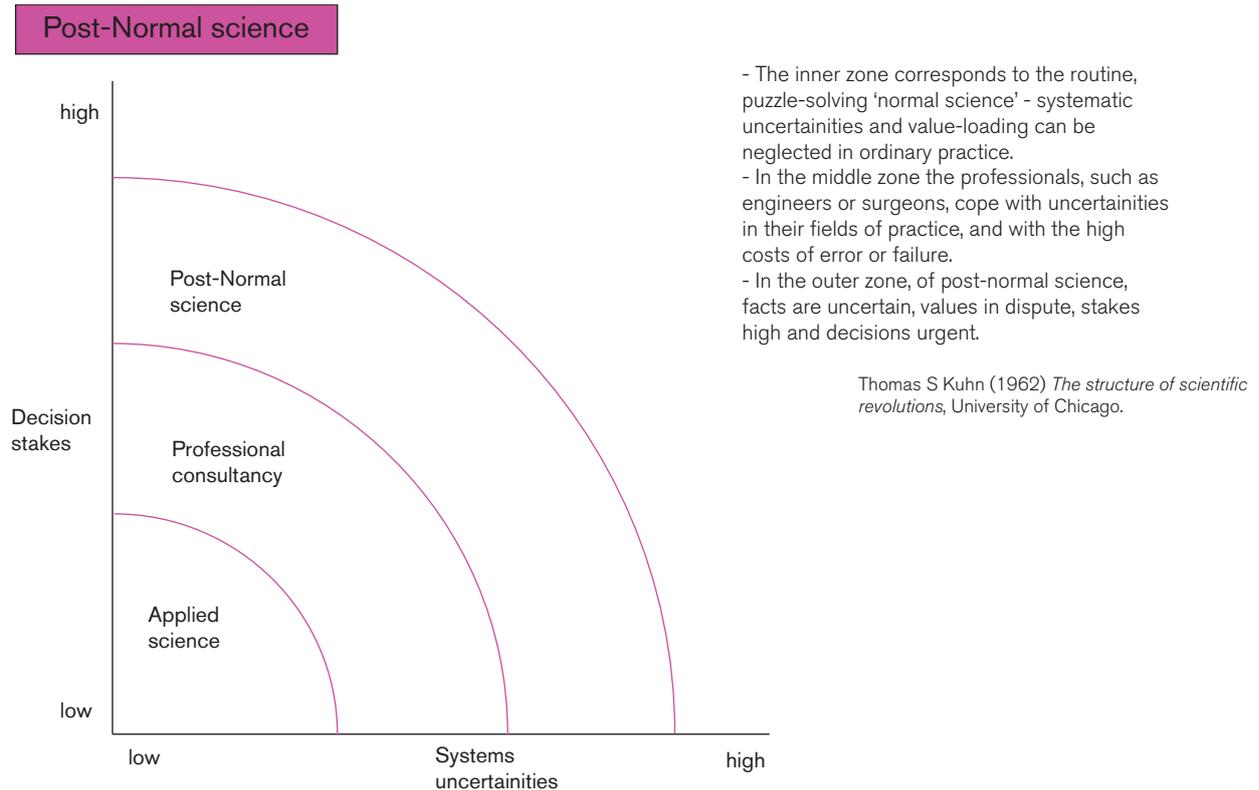


Figure 9: A post-normal framework for decision making



## 5.3 PUTTING EVIDENCE INTO USE

Generating evidence is only one part of the solution towards enabling public policies to better manage uncertainty. Many factors shape what knowledge policymakers use, including the type of evidence generated (Datta *et al.* 2011) and their own values, experiences, judgement, pressure and pragmatism. Evidence-based policy is a complex concept, and it is rare for policymakers to pick up research recommendations automatically (Drimie 2011).

DFID's Research into use programme has revealed a number of valuable lessons for improving the uptake of research for better evidence-based policymaking. These include using both the research products and process; recognising that research is context-specific and there is no optimal way of organising it to secure innovation and impact; and combining the perspectives of diverse user groups to be attractive to and usable by a wide audience (Hall *et al.* 2010).

## 5.4 COLLABORATIVE AND INCLUSIVE DECISION MAKING

Collaboration is needed at every stage of decision making – from problem definition, through to evidence generation, evidence use and decision making for

implementation. This shifts away from linear models, where actors have fixed roles in the decision-making cycle – for example, experts generate evidence, policymakers make decisions, local people are beneficiaries.

If resolving a wicked issue requires changes in the way people behave, these changes cannot be imposed. Behaviours are more likely to change if issues are widely understood, discussed and owned by those whose behaviour is being targeted for change (Australian Public Services Commission 2007).

Deliberative processes are one way to achieve collaborative decision making. Deliberation can be used to increase multi-stakeholder engagement in evidence generation and decision making, and to address uncertainties in a way that relying only on scientific expertise does not.

Deliberation means opening up a concept to “careful consideration or discussion” (Oxford Dictionary). In governance terms, however, it has come to refer to rational, reasoned debate around a policy problem, which can ideally result in consensual decisions that are perceived by all involved as legitimate, rational and just (Rosenberg 2007). Everyone within the deliberative arena is viewed by all stakeholders as equally capable of being (and willing to be) reasonable; every reasonable argument is weighed up with a view to making a decision on the basis of that weighing (Dryzek 2006, 2007).

Table 4: Decision making and science for policy relationships

PROBLEM TYPE	KNOWLEDGE MODEL	NARRATIVE	DECISION-MAKING MODEL	EXAMPLES
Simple (high certainty)	Modern: perfection, perfectibility	Scientific facts are not seen as problematic; they are employed in rigorous demonstrations and determine correct policy. Human control over the environment is limitless. Classic technocratic vision.	Authoritative	Linear
	Precautionary: uncertain and inconclusive information	Scientific facts are not viewed as conclusive. Control over environment can fail. Precautionary principle therefore introduced to policy decisions, to protect the value of science on shaping policy.		
	Framing: arbitrariness of choice and possible misuse	Without conclusive facts, science is just one input to policymaking. Framing the scientific problem and choosing the discipline for inquiry becomes a priority. Disciplines become competitors. Who owns the debate contributes most to policy resolution.		
	Demarcation: possible abuse of science	Scientific information and advice for policy are created by those working to their own agendas, possibly compromising objectivity and neutrality. Demarcation ensures that accountability rests with policymakers.		
Complex/wicked (low certainty)	Extended participation	Science is one of many contributors of evidence. Rigorous scientific demonstration is replaced by open public dialogue. Citizens become critics and creators in knowledge production	Collaborative/deliberative	Integrated

Adapted from Pereira and Funtowicz (2009)

Deliberative governance means creating spaces for stakeholders across scales to meet and deliberate common policy objectives and practices. In terms of governing adaptation, it should provide arenas for global, impact-based and local, vulnerability-based adaptation discourses to come together and be resolved.

There are strong overlaps between the collaborative/deliberative models suggested here, and participatory policymaking, which includes stakeholders at different stages of policy design and implementation. Extensive assessments of participatory processes in development practice have shown that where stakeholders are excluded from the initial framing of a problem, there are limits to the extent that they can engage in developing solutions (Chambers 1997). This is especially the case where problems are initially framed as technical, and so the engagement of non-experts is limited and often consultative (Jasanoff and Wynne 1998; Leach *et al.* 2005).

From a deliberative perspective, inclusiveness is more than participation, in which people are brought together into one space to participate in the governance of a problem. Achieving deliberation depends on whether, and how, people make use of that space, and the impact this has on policy outcomes. Key to deliberative governance arrangements is dialogue that brings about change. So deliberation around a policy issue must produce an outcome in relation to that policy.

Institutional arrangements that enable meaningful deliberation are more likely to be able to address complex and uncertain problems.<sup>24</sup> For example, an IFPRI study on agricultural policy reform in India proposes “community-based policy solutions, new coalitions for policy reform, fresh approaches to the policy debate, innovative and consensus-oriented forms of deliberation, and effective use of research-based knowledge” to help counteract the political factors blocking reform (Birner *et al.* 2011).

## 5.5 LESSONS FROM OTHER COLLABORATIVE PROCESSES

There are many models of inclusive and deliberative processes to learn from: citizens' juries or panels, committees, conferences, workshops, focus groups, participatory assessments, public meetings and rapid or participatory rural appraisal (Pimbert and Wakeford 2001). The results of deliberation depend not only on deliberative institutional design, but also on how the process is managed, who is included or excluded, and the types of problems addressed.

Case studies of public consultation meetings for healthcare reforms in the US, citizens' juries in West Africa and the global 'rights and resources' coalition (see Case studies 4-6, Appendix 2) provide the following lessons for designing deliberative processes.

- Vulnerable people are one of the most important stakeholder groups for inclusion; their representatives must play a role in shaping the decisions that affect them.
- Opportunities for ensuring the participation of vulnerable groups and equal weighting of their knowledge in deliberation arenas need to be actively created. Emphasising uncertainties in scientific knowledge and the need for local knowledge to address contextual vulnerability can help do this.
- All stakeholders need to be well informed and open to learning from each other. Sensitisation around issues related to resilience could be beneficial.
- It is easier to manage the power politics of smaller groups than larger ones.
- Existing relationships can be capitalised on within networks, but it is also important to move beyond the usual suspects and avoid elite capture of knowledge.
- Effective deliberation is time consuming and costly.

## 5.6 GOVERNANCE IMPLICATIONS OF INSTITUTIONAL ARRANGEMENTS

While collaborative institutional design is a strong policy ideal, achieving this in practice can be problematic. The politics of deliberative processes will therefore need to be managed within and between countries. Deliberative forums are never apolitical; they include actors with different levels and perceptions of power, and different perspectives on what policy problems are and how they should be addressed. These dynamics can be

especially acute where expert and lay stakeholders are brought together (Leach *et al.* 2006). Nepal's NAPA process (Case study 7, Appendix 2) is a good example of meaningful deliberation.

Simply recognising the value of local knowledge in public and adaptation policymaking<sup>25</sup> and creating platforms for local stakeholders to have voice does not, however, automatically mean that voice will have influence (Leach *et al.* 2005). Furthermore, defining a social group as local often implies they are less powerful than their global counterparts (Agrawal 1995). Research by the Overseas Development Institute into voice and accountability has shown that the circumstances in which voice actually leads to influence depend on the political context. Strengthening local voice in decision-making processes requires actors to take into account the context-specific rules of the game, and address the power politics of decision-making processes, rather than ignore them. This may require "building the capacity of the 'right' state and civil society actors," whose legitimacy and accountability are crucial dimensions of success (Foresti *et al.* 2007).

The issue of managing dynamics between government, NGO and local stakeholders emerged during PDA interviews. For example, in Bangladesh they noted that leadership would default to government if officials were present. Resource availability may also affect who is included or excluded in the first place. The discussion proposed careful and informed facilitation by a neutral agency to manage such dynamics.

Between countries, feedback from the Bangladesh PDA noted that "any alliance is political – especially a regional one. We need to be honest about how the alliance could be used for political ends and facilitate this as best as possible, being realistic and transparent about limitations."

Relationships between South Asian countries are characterised by tension and sensitivities related to disputed territories and trans-boundary water resources. India, Nepal and Bangladesh share the Ganges-Brahmaputra-Meghna basin, while India and Pakistan share the Indus basin. Although India has various bilateral treaties with neighbouring countries to determine water rights, many issues remain unresolved.

Recently, there has been growing recognition that climate change impacts and ecosystems cut across national boundaries, and that there is an acute need for regional responses to common climate change-related challenges. These have led to joint positions on climate change – such as the SAARC's Thimphu statement on Climate Change (see Box 4) – and stronger recognition of the need for inter-governmental cooperation on mountain ecosystems, monsoon and disaster risk reduction.

Forums for deliberative learning are needed to

strengthen regional approaches to building climate resilience. These can facilitate knowledge sharing across countries, evaluate interventions and work to scale up good and proven initiatives. Multi-stakeholder composition will ensure more 'out of the box' thinking and a holistic approach and perspective.

## BOX 4: THE THIMPHU STATEMENT ON CLIMATE CHANGE

The statement proposes the following key initiatives on mitigation and adaptation.

- Inter-governmental expert group on climate change, to develop clear policy direction and guidance for regional cooperation.
- Commission a study on climate risks in the region.
- Explore the feasibility of a SAARC mechanism to finance low-carbon technology and renewable energy projects.
- Marine initiative to strengthen understanding of shared water bodies.
- Inter-governmental initiative to study mountain ecosystems and glaciers, and their contribution to livelihoods and sustainable development.
- Inter-governmental monsoon initiative to assess vulnerability to climate change.
- Inter-governmental climate-related disasters initiative to integrate climate change adaptation with disaster risk reduction.
- Inter-institutional links to facilitate regional knowledge sharing and climate change capacity-building programmes.
- Cooperation in the energy sector to facilitate energy trade and develop efficient conventional and renewable energy sources, including hydropower.

Action Plan on Energy Conservation, and a new web portal to exchange information and share best practice on energy conservation.

## 5.7 EXISTING REGIONAL ACTIVITIES

A number of alliances provide opportunities for countries in South Asia to learn from each other and discuss climate change and related issues.

**SAARC:** Recognises the need for regional collaboration to address member country adaptation needs. The

SAARC Declaration on Climate Change, or Dhaka Declaration, committed members to implementing the Action Plan on Climate Change 2009-2011, which focuses on fostering technology and knowledge transfer between countries and developing regional-level action based on national priorities. In 2010, the heads of state adopted the Thimphu Statement (see Box 4) to review the action plan and develop clear policy direction.

*Climate Action Network South Asia (CANSAs):* With some 850 NGO members in more than 90 countries, CANSAs works to promote government and individual action to limit human-induced climate change. Members exchange information and develop strategies on international, regional and national climate issues. CANSAs focuses on: knowledge sharing; capacity development; lobbying on common positions; coordinating media messages, research and campaign efforts; cooperating with other NGO groups; and mobilising public support and awareness.

*Climate Parliament:* A global, cross-party network of lawmakers who aim to inform legislative action on climate change. The alliance currently focuses on issues related to climate change, energy and forests. In India, Climate Parliament uses informal means to engage with parliamentarians and inform legislative debates on climate change and energy.

*Asia Pacific Climate Change Network (AP-NET):* Actions in the region include providing access to recent information on climate change issues, providing a platform for policy dialogues and consultation, and building capacity for developing countries.

*Forest Governance Learning Group (FGLG):* Active in Cameroon, Ghana, India, Indonesia, Malawi, Mozambique, South Africa, Uganda and Vietnam, FGLG has developed practical tactics for securing safe space, provoking dialogue, building constituencies, wielding evidence and interacting politically (see Case study 8, Appendix 2).

However, these initiatives alone are not enough. They need to be complemented by other mechanisms. To address the issue of scale-extended participation, membership must represent local, subnational and national stakeholder groups. A deliberative platform for stakeholders representing these different scales would allow them to interact, engage in framing problems, generate evidence to reach answers and influence outcomes. Promising climate resilience initiatives must be evaluated, with a focus on going to scale and mainstreaming<sup>26</sup> climate resilience in public policy, private sector investments and civil society initiatives.

SAARC and CANSAs currently focus on joint action rather than cross-country learning. Local-scale learning must inform subnational, national and regional processes, while the utility of top-down evidence for application at local level needs to be tested.

## 5.8 EVALUATION METHODS

There is a need to evaluate adaptation options for building climate resilience. This process could be fraught with difficulties, particularly around the long timescales and shifting baselines, whereby stresses and risks evolve rapidly and change the context in which development takes place. The desired outcome – climate resilience or adaptive capacity – is also difficult to measure and poorly defined, making it hard to know when change has happened.

Existing results frameworks address these problems poorly, if at all. Some seek to measure adaptation success in terms of the achievement of intended development outcomes, but how such success will be attributed to adaptation interventions is unclear. There is often no attempt to normalise<sup>27</sup> or contextualise<sup>28</sup> measures based on development outcomes with respect to shifting climatic baselines and changing risks. Adaptation cannot neutralise climate change impacts and enable development to meet targets when these have been set on the assumption that climate is stationary.

A further problem with many existing results frameworks, and with current adaptation policy and practice as a whole, is that they focus almost exclusively on improving the ability to cope with current climate variability, and on climate-proofing to address small incremental changes in near-term climate-related risks. There is very little discussion of longer-term changes, new and unfamiliar risks, and impacts that generalised actions – such as livelihood diversification, seasonal forecasts, weather-based insurance and better natural resources management – cannot address.

While good monitoring and evaluation (M&E) is critical for ensuring effective and accountable adaptation investments, it tends to be seen as a highly technical and specialist area that focuses on quantifiable results. Advocates of econometric approaches to impact evaluation question the validity of qualitative evaluation approaches under the assumption that if you cannot measure something, any evaluation will be guesswork.

Capacity often poses a hurdle, as very few people are experts in both M&E and climate change. M&E must also answer to two parties – the agencies providing resources for adaptation investments and the beneficiaries.

When it comes to monitoring and evaluating adaptation on the ground, the methodological, technical, capacity and ethical difficulties discussed above create four key tensions:

1. Investing time and financial resources to work out how adaptation is additional to development

versus pragmatically using development indicators for climate-vulnerable populations as proxies. The emerging consensus is sensible: the best use of short-term climate finance is development activities that increase adaptive capacity. Adaptation is development where development is deficient and climate challenged; a preoccupation with additionality makes integrating the two harder.

2. Developing new M&E methods that account for the uncertainty and complexity of climate change effects versus building on existing results-based approaches. Only the former can reveal the need for transformative, rather than incremental, change.
3. Using quantitative impact evaluation methods only versus quantitative and qualitative methods combined to capture the behavioural and institutional changes that support adaptation. Many adaptation gains will involve improved governance, but impact evaluations cannot yet assess this type of change.
4. Using independent assessments versus participatory M&E involving climate-vulnerable groups. The former may improve impartiality, but will do little to support mutual accountability and learning.

Unfortunately, a recent review of M&E approaches reveals many shortcomings. These include adaptation considered to be additional to development, uncertainty considered to be difficult, the use of purely quantitative methods and the climate-vulnerable poor being treated as objects (Brooks et al. 2011). This highlights a need for new approaches that:

- address the problems associated with assessing adaptation using development indicators, when timescales may be too long to get a representative picture of adaptation outcomes;
- address the problem of how to assess adaptation against a changing climate-risk baseline, by normalising and contextualising development outcome indicators with respect to changing exposure to risk, or using other indicators (such as those representing vulnerability) rather than development outcomes; and
- move beyond the current dominant view of adaptation as coping and climate-proofing towards interventions that use a range of responses to address different types of climate change-related risks operating on different timescales.

More recent M&E frameworks lean towards pragmatism. They focus on the capacity of institutions, government and civil society to understand climate change and integrate adaptation into decision making.<sup>29</sup> The extent to which climate adaptation keeps development on track – by tracking societal adaptive capacity while also

measuring development outcomes – is also important. This is evident in the results frameworks developed for the PPCR<sup>30</sup> and Adaptation Fund.<sup>31</sup>

### 5.8.1 Methods and frameworks

Four main evaluative methods could be used, which we summarise here. A diversity of options is included because a targeted approach cannot address the complexity or diversity of evidence gaps. For more information on each method, see Table A4, Appendix 3.

- *Explorative* methods to identify outliers in terms of instruments and interventions. Includes positive deviance, affirmative inquiry and formative evaluation.
- *Summative* methods, to assess the broader picture from a series of initiatives. Includes systematic reviews and meta-analysis.
- *Quasi-experimental* methods, to quantitatively assess the effects of interventions and instruments. Includes randomised controlled trials and regression and (fuzzy) regression discontinuity designs.
- *Qualitative* methods, to qualitatively assess the effects of interventions and instruments. Includes participatory M&E.

Two existing frameworks for assessing climate change adaptation are Making adaptation count,<sup>32</sup> for developing M&E systems that can track the success and failure of adaptation initiatives in the development context, and *Tracking adaptation and measuring development*,<sup>33</sup> which assesses programme and public policy investment performance on climate risk management and relates this to development outcomes.

## 5.9 RETURNS ON CLIMATE RESILIENCE INVESTMENTS

A number of recent studies are starting to reveal the returns on investments from different types of climate resilience-related activities. These can inform the choice of entry points for building resilience investments.

### 5.9.1 Disaster risk reduction

A study of the economic returns from disaster risk reduction case studies in India, Nepal and Pakistan drew the following conclusions.

- Benefit/cost ratios (BCRs) are positive for all types of interventions – from insurance to early warning; from village-level distributed responses to large-scale infrastructure. In some instances BCR is well above other common development investments.
- Return rates are often higher when the impacts

of climate change are considered, particularly for people-centred interventions that often cost less and reduce risks associated with high-frequency, low-magnitude events rather than large disasters.

- Estimates of economic benefits from high-cost interventions for less frequent extreme events are particularly vulnerable to discount rate assumptions and uncertainties about the frequency and magnitude of extreme events.
- Investing in lower-cost forms of risk reduction designed to increase the resilience of livelihoods, housing and other infrastructure at the local level may be an economically effective avenue for reducing risks and supporting adaptation.
- Combining sustained attention to small disasters that receive little public or policy attention, as well as large-scale, high-profile extreme events, is recommended (Moench *et al.* 2008).

Research into flood prevention investments in India's Rohini River Basin also found that returns were higher when using people-centred, resilience-driven flood risk reduction approaches rather than major structural measures for flood control (Kull *et al.* 2008). For more information, see Case study 9, Appendix 2.

In 2011, economic appraisal of DFID's support to climate change adaptation in Nepal developed BCRs from existing case studies (Kull *et al.* 2008; Khan *et al.* 2008). Of the range of climate resilience interventions eligible for support, DFID selected local-level adaptation measures because of the multiple ways that vulnerability to climate change can manifest itself.

For details of the indicative cost/benefit analysis of different interventions for climate adaptation, see Table A5, Appendix 3.

### 5.9.2 Renewable energy, watersheds and forestry

A recent report evaluating the economic and environmental costs and benefits of the six key interventions under India's Madhya Pradesh Rural Livelihoods Project found that all forms of renewable energy gave economic and time cost savings while many also had health benefits (Mitra *et al.* 2012). The full results are in Table A6, Appendix 3.

A cost effectiveness assessment of DFID's rural livelihoods programmes concluded that economic internal rates of return of 10–20 per cent were acceptable, while over 20 per cent were good (Reid 2010). Economic internal rates of return from DFID's West India Rainfed Farming Project and Western Orissa Rural Livelihoods Project were 19 and 20.8 per cent respectively.

A meta-analysis to evaluate the impact of 626

watersheds in India (Wani *et al.* 2008) demonstrated that:

- watershed programmes in India had a mean BCR of 2.03 and a mean economic internal rate of return of 27.43 per cent;
- some 99 per cent of watersheds had a BCR of more than one; and
- those with high participation in watershed development had a ratio of 2.63; medium participation generated an average of 1.6; low participation gave an average of 1.42.

Cost-effectiveness assessments in the forestry arena demonstrated that:

- £35 can lift one person out of poverty through community forestry interventions (DFID 2009);
- community forestry costs £3 for each ton of carbon dioxide captured every year (MSFP 2013); and
- developing community adaptation capacity under DFID's Nepal Livelihoods and Forestry Programme cost £6.70 per person (MSFP 2013).

## 6

# Conclusion

In light of the evidence gathered and presented here, we have developed a theory of change for an extended participation approach to build climate resilience in South Asia. We explain it here in terms of context, challenges, opportunities, impact sought and protagonists.<sup>34</sup>

Countries in South Asia are highly differentiated – by scale, stability, natural resource base, governance, gross national product trends, income distribution, climate investment, etc. Climate change challenges are uncertain, but likely to be very significant across this very dynamic region. The uncertainty and complexity of climate effects is common, and poverty leads to low adaptive capacity among marginalised people.

The countries share an interest in finding effective responses to climate change, with initiatives emerging at the regional level and shared ecosystems providing opportunities for regional cooperation. A consolidated South Asian response could gain global attention.

Climate change will multiply stresses on poor people and ecosystems and threatens to reverse development gains. Current climate adaptation deficits need to be acknowledged, and the prospect of persistent adaptation gaps addressed. The scale and complexity of climate change effects means that public policy solutions must support local action on climate resilience. However, achieving climate resilience is not yet a cross-government policy objective: although climate change mainstreaming is recognised as important, it has yet to happen. Validated policy interventions and instruments for climate resilience are lacking, partly because of poorly defined outcomes and pathways.

An extended participation approach can exploit various opportunities. Both social and sectoral policy areas are apt for supporting climate resilience, with a diverse range of small-scale initiatives presenting a menu for

evaluative work to build an evidence and knowledge base.

Such an approach seeks to emphasise social and climate vulnerability in public policy discourse and implementation, with the climate-vulnerable poor participating in developing national pathways to climate resilience. A validated array of policy instruments and interventions will address wicked and complex climate change challenges, with clusters of solutions identified and tested. Decision-making processes and tools will be developed to support integrated, deliberative, multi-sector approaches that collectively identify, validate and scale out effective instruments and interventions for climate resilience, fully emulating the extended participation model. Linking stakeholders – from local to national to regional arenas and back – will foster multi-country engagement in rapid and iterative learning on how to achieve climate resilience, innovative and diverse thinking that challenges orthodoxy; and an agile, opportunistic and influential alliance.

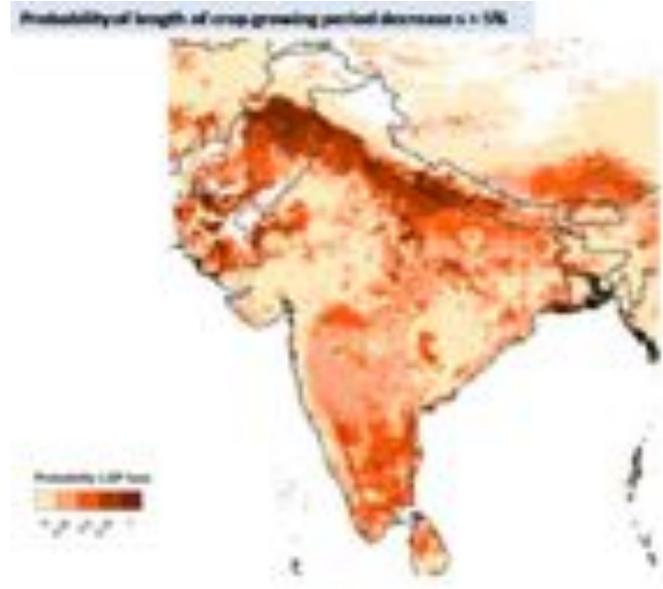
The protagonists and stakeholders in an extended participation approach would be individuals and organisations able to address ‘wicked’ climate change problems from innovative and diverse perspectives, including national and provincial government agencies, representatives of the climate-vulnerable poor, corporate and social responsibility representatives from the private sector and social entrepreneurs, NGOs, research and training institutes, and the media.

# 7

## Appendixes

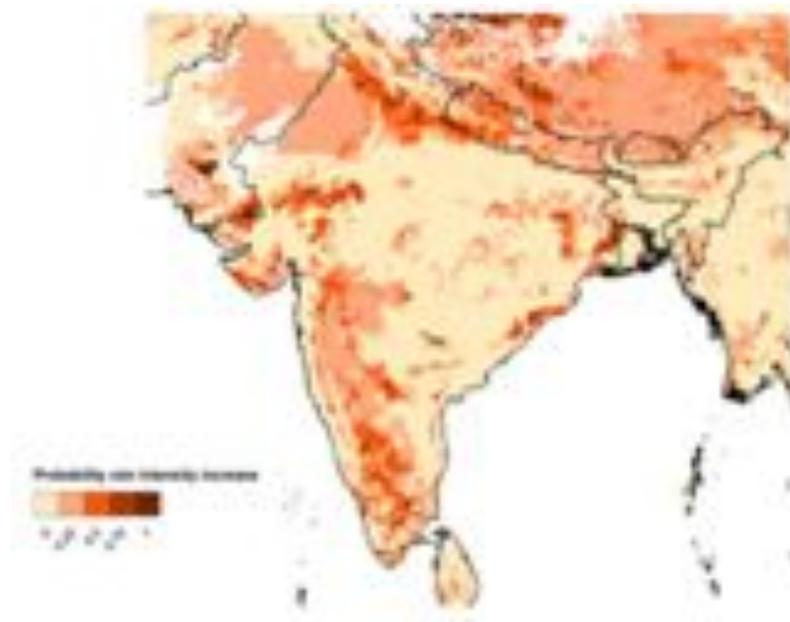
## Appendix 1. Maps

Figure A1. Projected climate change impacts on South Asian crop yields, by 2050



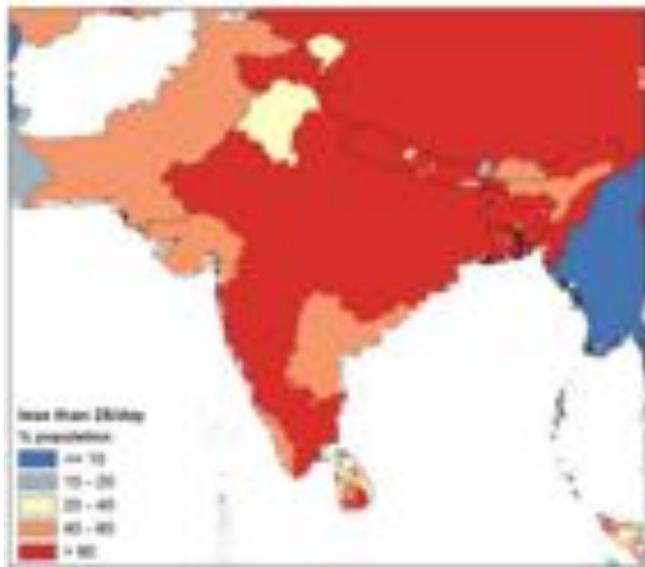
Source: Ericksen *et al.* (2011)

Figure A2. Projected climate change impacts on South Asian water resources, by 2050



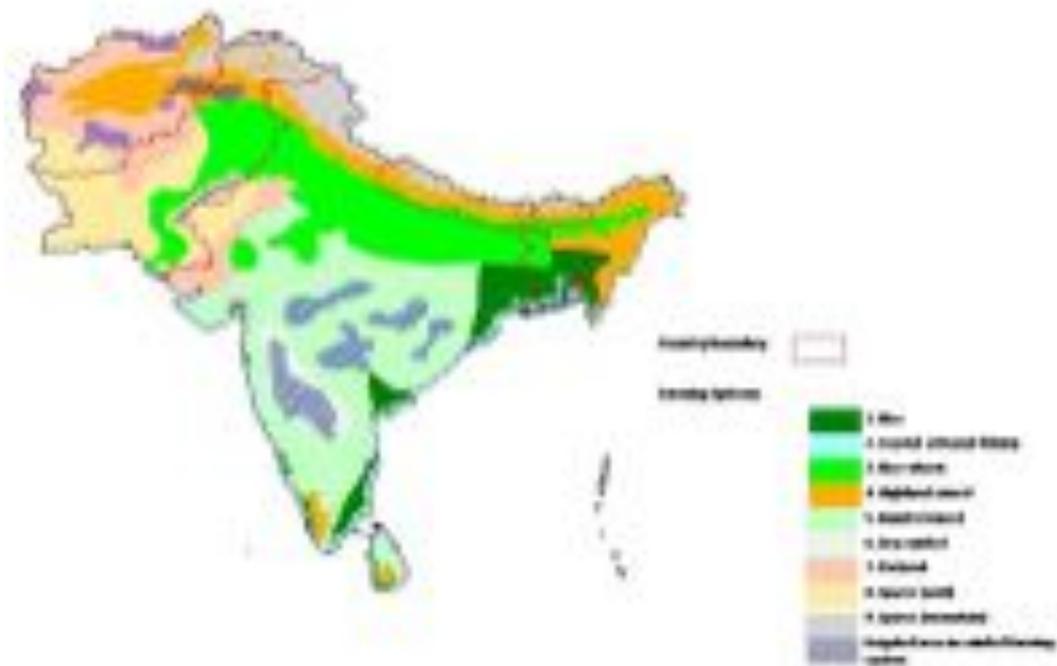
Source: Ericksen *et al.* (2011)

Figure A3. Poverty distribution: people living on less than US\$2 per day



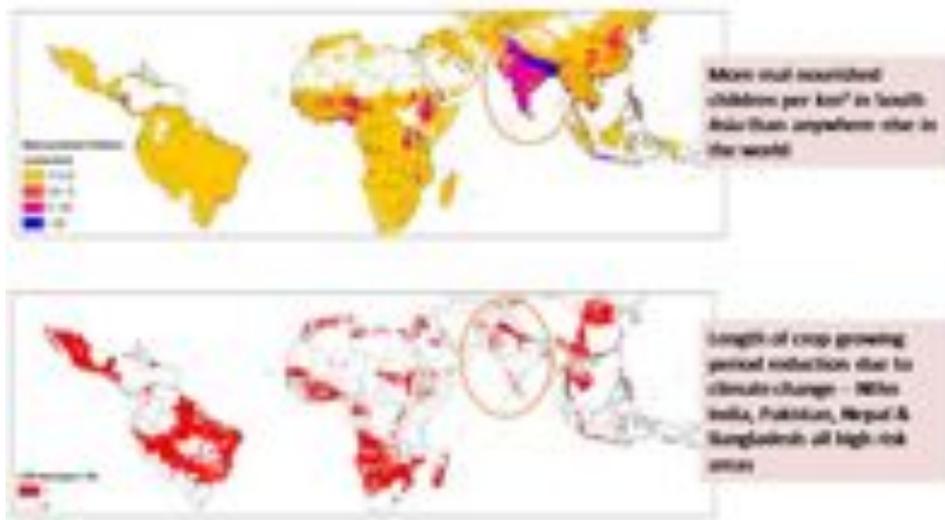
Source: Ericksen *et al.* (2011)

Figure A4. Farming systems of South Asia



Source: FAO (2009)

Figure A5. Climate change effects compounding the implications of under-development in South Asia



Adapted from 2011 research conducted by Climate Change, Agriculture and Food Security (Erickson *et al* 2011)

## Appendix 2. Case studies

### Case study 1. National environmental planning in Cote d'Ivoire

Source: Bassett and Zueli (2000)

The World Bank requires low-income countries receiving its financial assistance to develop National Environmental Action Plans (NEAPs). In Cote d'Ivoire, NEAPs are produced "in assembly-line fashion, according to the blueprint", following the four stages in a linear process: identifying environmental problems and their underlying causes; setting priorities; establishing goals and objectives; and proposing new policies, institutional and legal reforms and priority actions. The authors cite one Bank official as saying: "It is relatively easy to identify problems and formulate appropriate responses to them."

Yet this linear process was insufficient for managing the complexities and uncertainties of environmental problems in the region. While it identified desertification as the main problem, local farmers found that tree and bush encroachment was hindering livestock development. The idea of desertification, however, dominated subsequent policy discourse in the region and the resulting NEAP was littered with images of desert-like conditions spreading into the savannah, despite evidence to the contrary. The NEAP process claimed to be participatory, but tensions between groups inhibited meaningful local participation and the voices of experienced farmers and herders were largely excluded.

### Case study 2. Sheep farming in the UK post-Chernobyl

Source: Wynne (1996)

After the Chernobyl disaster of 1985, radioactive fallout was deposited via rainfall on land used by sheep farmers in the Lake District in the northwest of England. Government scientists visited the area to assess the risks for food production. Basing their risk assessments on uniform, scientific assumptions about how the fallout would affect the environment, they provided a range of generalised policy recommendations that did not match the complexity of the problem at the local scale. For example, they advised farmers to feed their sheep hay instead of grass. Farmers rejected such advice on the grounds that sheep rarely, if ever, ate hay. But their contextualised 'lay' knowledge was ignored in favour of external, expert knowledge, ultimately leading to mistrust and a failure of the policymaking process.

### Case study 3. Tuvalu: a siloed climate resilience initiative

Source: Ayers and Huq (2009)

The Tuvalu NAPA identifies coastal infrastructure to protect the shoreline from erosion as a key project. This addresses an existing development need that is exacerbated by climate change, and so has additional costs. The NAPA project team experienced extreme difficulties calculating the adaptation component of the infrastructure needs. This was also somewhat irrelevant as the baseline infrastructure is not in place and the country cannot fund it; so any offer to fund the 'top section' of the infrastructure required to respond to the additional impacts of climate change is absurd. The project is currently in limbo while they seek co-financing to pay for the lower section.

### Case study 4. Deliberation around public healthcare reforms in Oregon, USA

Source: Fung (2007)

During the 1990 Oregon healthcare planning reforms, the Health Care Act required the Oregon Health Services Commission to undertake participatory, community-based planning. The Commission chose a deliberative institutional design including a decentralised participatory advisory panel to solicit input from various public assemblies.

Institutional design features relating to selection (who participates?) and subject (what do people participate about?) had significant implications for the democratic quality of the policy deliberation process. Participants had few opportunities to contest or reframe problems under discussion in the forum, as only the solutions were open to debate. Seventy per cent of participants were healthcare professionals. Participation was skewed towards the educated middle class, because meetings were voluntary. Little effort was extended towards recruiting from disadvantaged communities. As with developing climate resilience policy, public healthcare policy is arguably most relevant to the poorest and most disenfranchised, because they are least likely to have access to private alternatives. These groups must therefore be adequately represented in policy debates.

However, deliberation processes (how do people participate?) were well structured, and participants actively engaged in discussions, given the high stakes and their strong knowledge of the subject matter. There was high mutual respect among participants, who received information orientation briefings. Decisions were based on group consensus of the relative importance of various healthcare values. These decisions were reflected in the resulting healthcare policy decisions. The deliberation outputs were taken as legitimate and therefore had an impact.

## Case study 5. Citizens' juries in West Africa

Source: Pimbert *et al.* (2011)

A citizens' jury draws on the symbolism and some of the practices of a legal trial by jury. It has three main elements:

- The jury: made up of people who are usually selected at random; the selection process is open to outside scrutiny.
- Jurors cross-question specialists they have called to provide different perspectives on the topic, and collectively produce a summary report of their conclusions.
- Supervision by an oversight or advisory panel who take no direct part in facilitating the citizens' jury, but decide whether to respond to, or act on, report conclusions.

In Mali, the International Institute for Environment and Development (IIED) and local partners organised citizens' juries to democratise decision making around the needs of food-producing communities and ensure that research serves their needs. In each jury, 45 men and women heard from expert witnesses – agriculture specialists from universities, representatives of the Syngenta Foundation, the Alliance for a Green Revolution in Africa, and Institut d'Economie Rurale du Mali (the Malian Institute for the Rural Economy). The jurors made recommendations that were presented in policy dialogues involving representatives of food producers, social movements, the FAO, the Consultative Group on International Agricultural Research and donors who fund agricultural research. Social movements adopted the recommendations to promote a citizen-controlled, farmer-led agricultural research system for food sovereignty.

A recent mid-term evaluation of the process revealed that the juries were largely successful in facilitating co-learning around food sovereignty between scientific and lay stakeholders. The following were particular successful:

- Thematic entry points enabled participants to break down and understand the complexity of the issues and engage more effectively.
- Authorities were open to, and responded to, the outputs of the public debates. This was facilitated by the shift in political context in Mali towards democracy and decentralisation – a precondition for process success.
- Otherwise politically marginalised groups, including women, were involved.
- There was sufficient involvement of plural actors from civil society and the public and private sectors.

- The media and other social outreach tools helped ensure deliberative output uptake.

The evaluation noted that the process could do more to achieve influence at scale. It recommends strengthening regional platforms and improving collaboration between decentralised processes at the subnational scale to help amplify the voice of producer-led models in national and regional forums.

## Case study 6. The Rights and Resources Initiative (RRI)

Sources: [www.rightsandresources.org](http://www.rightsandresources.org) and personal communications from Marlene Buchy, RRI Evaluation Team

The RRI works in Asia, Africa and Latin America to support forest tenure reform in two ways: in-country, leading collaborative activities that support local-level forest tenure transitions; and regionally, supporting a wide network of stakeholders within the tenure dialogue. The RRI governance model is complex and multi-scale, with a coalition of core partners who conduct work in their specific areas of regional and thematic expertise. A coalition of in-country core partners then engages local collaborators (smaller, national NGOs) to work and advocate on key relevant issues nationally.

A recent RRI programme evaluation revealed the following important lessons:

- Stakeholders had different levels of access to resources, leading to a potential power imbalance. For example, core partners had access to RRI seed money, while the collaborating partners had to fundraise for activities.
- By carefully selecting collaborating partners, core partners did minimise power imbalances. The size of the coalition in each country was kept extremely small – between five and eight members – so everyone had the chance to have choice. Good existing working relationships ensured every partner was respected.
- The multi-scale nature of the in-country coalitions brought benefits to all stakeholders. Engagement with local partners gave higher-level stakeholders access to field level and local insights, which informed their advocacy strategies. Affiliation with the coalition gave local partners' advocacy messages more legitimacy.
- The added value of regional collaboration was not evident for all regions. Shared learning provided some value, but early results from Africa indicate that the coalition's strength was at national level.
- Maintaining good-quality, multi-stakeholder dialogue comes with significant costs.

## Case study 7. Meaningful deliberation in Nepal

Source: Ayers 2010.

At the start of Nepal's NAPA process to assess climate change effects and identify adaptation options, process technocrats called for the inclusion of local people's perspectives. They felt that Nepal's diversity of ecosystems, cultures and topography necessitated wide consultation to identify the mosaic of adaptation needs. Little available climate change information in appraisal areas, coupled with a shared learning dialogue approach, meant facilitators were open to unspecified inputs from participants, discussing and capturing a much wider range of social vulnerability issues and climate-related impacts. Local community-based development agencies, local government officials, and most importantly vulnerable people themselves were involved. The result was meaningful deliberation between policymakers and vulnerable people about what local-level climate risks meant and how they could be addressed.

## Case study 8. Forest Governance Learning Groups

Source: [www.iied.org/tag/forest-governance-learning-group-fglg](http://www.iied.org/tag/forest-governance-learning-group-fglg)

FGLG started in 2003 as an alliance of in-country teams and international partners, facilitated by IIED. Connecting people who are marginalised from forest governance to those who control it, FGLG pushes for better decisions using a four-pronged approach, modified for each country context:

- a team of governance-connected people from different agencies, with a mix of experience and ideas;
- studies and policy work on forest livelihood issues that arise when people are marginalised from decision making;
- generating practical guidance and tools; and
- creating and taking opportunities to improve forest governance.

FGLG holds major learning events involving all the country teams and other international players. There is inter-country capacity-building work and engagement with over 40 international organisations and forums to disseminate insights and embed findings in international policy. In 2009, an independent evaluation showed that the work had influenced a wide range of forest governance decisions, and that the effects of this on the ground were beginning to be significant.

## Case study 9. Higher returns from people-centred investments

Source: Kull *et al.* (2008)

Research into flood prevention investments in India's Rohini River Basin found that returns were higher when using people-centred, resilience-driven flood risk reduction approaches rather than major structural measures for flood control. BCRs ranged from 2 to 2.5 under both current and future climate change scenarios. Low initial annual operation and maintenance investment costs mean the returns are not sensitive to discount rates or assumptions regarding future climate conditions. Research concluded that projected increases in flood risk due to climate change are unlikely to erode returns from people-centred strategies.

## Appendix 3. Tables

Table A1. Estimated impacts of climate change on agricultural production, by 2080

COUNTRY	FARM AREA (1,000 HA)	OUTPUT PER HECTARE (US\$)	OUTPUT (US\$MIL)B	% CHANGE (RICARDIAN)	% CHANGE (CROP MODELS)
Afghanistan	7,828	313	2,448	-9.5	-32.1
Bangladesh	8,429	1,355	11,421	-14.3	-25.3
India	170,115	777	132,140	-49.2	-27.0
Nepal	3,294	728	2,399	-0.9	-25.3
Pakistan	22,120	856	18,935	-17.9	-36.6

Source: Cline (2007)

Table A2. Sectors of concern with regards to climate change risk in South Asia

COUNTRIES	AFGHANISTAN	BANGLADESH	BHUTAN	INDIA	NEPAL	PAKISTAN
Agriculture	+	+	+	+	+	+
Water and Energy	+	+	+	+	+	+
Coastal zones and infrastructure		+	+	+	+	+
Forestry and rangelands	+	+	+	+	+	+
Nature and biodiversity		+	+			+
Fisheries		+		+		
Risk reduction		+		+	+	
Health		+	+		+	

Source: IISD (2011)

Table A3. Information needs for informing climate resilient policymaking in South Asia

POLICY AREA	INFORMATION NEEDS
Climate change	<ul style="list-style-type: none"> <li>▪ Improve evidence generation around climate change impact assessment for poor and vulnerable people</li> <li>▪ Collate evidence on how the poorest have been affected by extreme weather events</li> <li>▪ Test the implementation at scale of climate-smart disaster risk reduction</li> <li>▪ Generate evidence around the relative benefits and impacts of targeted climate change investments (such as climate-proofed infrastructure) for the poor and vulnerable</li> <li>▪ Gather evidence around the potential for community-based adaptation interventions to build the resilience of poor and vulnerable people at scale</li> <li>▪ Evaluate the benefits of climate change risk insurance mechanisms for poor and vulnerable people</li> </ul>
Poverty reduction and social protection	<ul style="list-style-type: none"> <li>▪ Assess economic growth-orientated interventions for their contributions to climate change resilience among the poor and the ecosystems on which they depend</li> <li>▪ Assess social protection as a mechanism for delivering resilience benefits to vulnerable and marginalised groups and aiding post-disaster recovery and production of assets</li> <li>▪ Build and evaluate adaptive social protection programmes that focus on social protection to vulnerable individuals/households and building adaptive social infrastructure</li> <li>▪ Assess role of micro-finance and micro-insurance as a mechanism for delivering resilience benefits to vulnerable and marginalised groups</li> </ul>
Agriculture and food security	<ul style="list-style-type: none"> <li>▪ Assess the impacts of increased climate variability and extreme weather events on all aspects of food security, not just agricultural yields</li> <li>▪ Evaluate initiatives to mediate these impacts on the climate-vulnerable poor</li> <li>▪ Assess potential for crop insurance mechanisms to build resilience of poor farmers</li> <li>▪ Gather evidence around the role of extension services in facilitating information/evidence provision and reaching and delivering adaptive benefits to poor and marginalised farmers</li> <li>▪ Invest in climate-resilient agricultural value chains, with buy-in from – and complementary interventions in – neighbouring countries</li> </ul>
Forestry and natural resource management	<ul style="list-style-type: none"> <li>▪ Generate evidence around climate change impacts on ecosystems and biodiversity, and the implications for resilience among the climate-vulnerable poor</li> <li>▪ Assess implications of ecosystem-based adaptation strategies for resilience among the climate-vulnerable poor</li> <li>▪ Generate evidence on the relative costs and benefits of REDD strategies for the climate-vulnerable poor</li> </ul>

Source: Country PDAs

Table A4. Evaluative methods for identifying and assessing the effects of climate resilience interventions

METHOD	APPLICATION
<b>Explorative methods</b> to identify outliers in terms of instruments and interventions	
Positive deviance	Appropriate for populations – local people, social entrepreneurs, etc – to assess climate resilience where expert-driven methods alone cannot be relied upon. Potentially a starting point for scaling up, as positive deviants (people who achieve greater resilience with a similar resource base to others) are identified and emulated.
Affirmative inquiry	Collaborative inquiry, based on affirmative questioning, to collect positive, interesting and intriguing characteristics of a practice, intervention or instrument.
Formative evaluation	Potentially used to assess what good performance looks like and how it might be measured comparatively.
<b>Summative methods</b> to assess the broader picture from a series of initiatives	
Systematic reviews	Can be used to identify, appraise, select and synthesise all research evidence that is relevant to a specified question – for example, the efficacy of policy instruments to facilitate household investments in asset protection. Can help rationalise the selection of initiatives for scaling-out, and collate evidence from evaluations that look at common components of adaptive capacity or climate resilience.
Meta-analysis	Statistical methods for combining evidence from distinct sources with comparable parameters using a common analytical framework. Appropriate for assessing how interventions and instruments affect closely related aspects of climate resilience.
<b>Quasi-experimental methods</b> to quantitatively assess the effects of interventions and instruments	
Randomised controlled trials	Only appropriate where randomisation of treatment and control groups – those targeted or not targeted – is possible. Useful in scaling-out initiatives when baselines and counterfactuals can be established.
Regression and (fuzzy) regression discontinuity designs (RDD)	Yields an unbiased estimate of local treatment effects when properly implemented and analysed. Does not require prior randomisation and thereby circumvents ethical issues over who is targeted in a random assignment. Fuzzy RDD does not require a sharp discontinuity in the probability of treatments/control assignment and can be used as long as the probability of assignment is different.
<b>Qualitative methods</b> to qualitatively assess the effects of interventions and instruments	
Participatory monitoring and evaluation	Systematic and robust assessments are possible if qualitative methods are used properly with adequate information sources, informant types and inquiry tool triangulation. Methods can secure strong target group involvement in the inquiry, analysis and communication of findings.

Source: Country PDAs

Table A5. Indicative estimates of cost/benefit analysis for climate adaptation

INTERVENTION TYPE	BCR AT 12%	BCR AT 3.5%
Community-based disaster risk reduction	3.5	5.7
Flood protection	1.5	2.1
Managing drought	2.0	2.4
Insurance	1.5	2.3
Combined basket	2.15	3.12

Source: IIED internal working paper

Table A6. Benefit-cost ratios for renewable energy technologies in India

TECHNOLOGY	BCR	OBSERVATIONS
Biogas	1.62	Direct economic savings from using less cooking fuel and fertiliser, time and health cost savings and emission reductions.
Smokeless <i>chulha</i> (cooking stove)	2.92	Costs are small compared to direct economic savings from using less cooking fuel, time and health cost savings and emission reductions.
Solar lighting system	.96	High procurement and maintenance costs offset by direct economic savings from using less lighting fuel, time savings and emission reductions.
Treadle pumps	1.36	Low adoption costs and direct economic savings through fuel and time saved and emission reductions.
Rice intensification system	1.10	Economic benefits counter the additional agricultural production costs.
Agroforestry	1.02	The benefits computed here include only direct economic benefits and not the wider environmental benefits, such as carbon sequestration.

Source: IIED internal working paper

Table A7. Strengths, weaknesses, opportunities and challenges of an extended participation approach to building climate resilience in South Asia

STRENGTHS	OPPORTUNITIES
<ul style="list-style-type: none"> <li>▪ Right time for crucial topic in all countries</li> <li>▪ Stakeholder willingness to collaborate</li> <li>▪ Niche functions well defined</li> <li>▪ Intervention costs and risks of evaluation outcomes borne by stakeholders</li> <li>▪ IIED has impartial convening power</li> <li>▪ Very capable people and organisations to carry initiative forward in all countries</li> <li>▪ Key public policy areas for mainstreaming climate resilience will remain priorities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Large array of climate resilience-related initiatives</li> <li>▪ Governments turning to climate change as a priority issue</li> <li>▪ Links to national and regional programmes that can be enhanced by alliance functions</li> <li>▪ Stagnant global climate change negotiations push regional and country initiatives to the fore</li> <li>▪ Global stage set for evidence provision of this type</li> <li>▪ Leveraging of other donor funding</li> </ul>
WEAKNESSES	CHALLENGES
<ul style="list-style-type: none"> <li>▪ Assumes clear and common understanding of climate resilience as a policy objective is possible</li> <li>▪ Security and other regional issues may displace climate resilience as a priority</li> <li>▪ Willingness to collaborate between countries may not be equal for all stakeholder groups</li> </ul>	<ul style="list-style-type: none"> <li>▪ Time-span of intervention to impacts beyond political cycle</li> <li>▪ Complexity of issues makes buy-in difficult</li> <li>▪ Demonstrating impact against moving baseline</li> <li>▪ Extended participation model</li> <li>▪ Findings from evaluative exercises may alienate stakeholders.</li> </ul>

Source: IIED internal working paper

## Appendix 4. Useful links

Adaptation Fund

[www.adaptation-fund.org](http://www.adaptation-fund.org)

Climate and Development Knowledge Network

<http://cdkn.org>

Climate Funds Update

[www.climatefundsupdate.org](http://www.climatefundsupdate.org)

Climate Network

[www.climatenetwork.org](http://www.climatenetwork.org)

Climate Parliament

[www.climateparl.net](http://www.climateparl.net)

Climate and Development

[www.climateanddevelopment.org/ap-net/index.html](http://www.climateanddevelopment.org/ap-net/index.html)

FAO Typology of climate change impacts and response

[www.fao.org/nr/water/art/2008/flash/ccmap/gallery1.html](http://www.fao.org/nr/water/art/2008/flash/ccmap/gallery1.html)

Forestry Governance Learning Group

[www.iied.org/natural-resources/key-issues/forestry/forest-governance-learning-group](http://www.iied.org/natural-resources/key-issues/forestry/forest-governance-learning-group)

Multi Stakeholder Forestry Programme

[www.msfp.org.np](http://www.msfp.org.np)

Rights and Resources Initiative

[www.rightsandresources.org](http://www.rightsandresources.org)

SAARC

[www.saarc-sec.org](http://www.saarc-sec.org)

SaltNet

[www.olemiss.edu/sciencenet/saltnet](http://www.olemiss.edu/sciencenet/saltnet)

World Food Programme

[www.wfp.org/countries](http://www.wfp.org/countries)

# References

- Adaptation Fund. 2010. Project level results framework and baseline guidance document. December 9 2010, Ethics and Finance Committee, Third Meeting, Cancun, 13 December 2010 (AFB/EFC.3/3, Agenda Item 3). Bonn: Adaptation Fund.
- ADB. 2009. Building climate resilience in the agriculture sector in Asia and the Pacific. Mandaluyong City, Philippines: Asian Development Bank.
- Adger, W.N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D., Naess, L., Wolf, J. and Wreford, A. 2009. Are there social limits to adaptation to climate change? *Climate Change* 93(3–4): 335–354.
- Agrawal, A. 1995. Dismantling the divide between indigenous and scientific knowledge. *Development and Change* 26(3): 413–439.
- Aguilar, Y. 2001. Autonomous and planned adaptation: The low watershed of the Lempa River. El Salvador, Central America. UNFCCC-UNDP workshop on adaptation methodologies. Hotel Mont Gabriel, St. Adele, Nr. Montreal, Canada, 11–14 June 2001.
- Anderson, S. 2011. Climate change and poverty reduction. Policy Briefing, Climate and Development Knowledge Network, August 2011. See [http://cdkn.org/resource/climate-change-and-poverty-reduction/?loclang=en\\_gb](http://cdkn.org/resource/climate-change-and-poverty-reduction/?loclang=en_gb)
- Anderson, S., Burton, I., Jensen, L.G. and Smederup, D. 2009. Joint external evaluation: Operation of the Least Developing Countries Fund for Adaptation to Climate Change. Copenhagen: Ministry of Foreign Affairs Denmark.
- Australian Public Services Commission. 2007. Tackling wicked problems: A public policy perspective. Canberra: Australian Public Services Commission.
- Ayers, J. 2010. Can global climate change adaptation policy be locally inclusive? Thesis submitted to the Department of International Development of the London School of Economics and Political Science for the degree of Doctor of Philosophy, London, October 2010.
- Ayers, J. and Huq, S. 2009. Supporting adaptation to climate change: What role for ODA? *Development Policy Review* 27(6): 675–692.
- Bassett, T.J. and Zueli, K.B. 2000. Environmental discourses and the Ivorian Savannah. *Annals of the Association of American Geographers* 90(1): 67–95.
- Birner, R., Gupta, S. and Sharma, N. 2011. The political economy of agricultural policy reform in India. Washington DC: International Food Policy Research Institute.
- Boyd, E., Grist, N., Juhola, S. and Nelson, V. 2009. Exploring development futures in a changing climate: frontiers for development policy and practice. *Development Policy Review* 27(6): 659–674.
- Brooks, N., Anderson, S., Ayers, J., Burton, I. and Tellam, I. 2011. Tracking adaptation and measuring development. Working Paper. IIED Climate Change Group. London: IIED.
- Burton, I. 2004. Climate change and the adaptation deficit. Occasional Paper 1. Adaptation and Impacts Research Group. Quebec: Environment Canada.
- Burton, I., Dickinson, T. and Howard, Y. 2008. Upscaling adaptation studies to inform policy at the global level. *Integrated Assessment Journal* 8(2): 25–37.
- Burton, I., Huq, S., Lim, B., Pilifosova, O. and Schipper, L. 2002. From impacts assessment to adaptation priorities: the shaping of adaptation policy. *Climate Policy* 2: 145–159.
- Burton, I., Kates, R. W. and White, G. F. 1993. The environment as hazard. New York: Guilford Press.
- Chambers, R. 1997. Whose reality counts? Putting the first last. London: Intermediate Technology Publishing.
- Cornwall, A. 2006. Spaces for change? The politics of citizen participation in new democratic arenas. Sussex: Institute for Development Studies.
- Christoplos, I., Anderson, S., Arnold, M., Galaz, V., Hedger, M., Klein, R.J.T. and Le Goulven, K. 2009. The human dimension of climate change adaptation. Commission on Climate Change and Development, Stockholm.
- Cline, W. 2007. Global warming and agriculture: Impact estimates by country. Washington DC: Center for Global Development and Peterson Institute for International Economics.
- Conway, G. 2009. The science of climate change in Africa: impacts and adaptation. Discussion Paper 1. London: Grantham Research Institute on Climate Change and the Environment.
- Datta, A., Jones, H., Febriany, V., Harris, D., Dewi, R. K., Wild, L. and Young, J. 2011. The political economy of

- policy-making in Indonesia: Opportunities for improving the demand and use of knowledge. London: ODI.
- Deb, U.K., Hossain, M. and Jones, S. 2009. Rethinking food security strategy: Self-sufficiency or self-reliance. Dhaka: UK DFID.
- DFID Nepal Livelihoods Forestry Programme. 2009. Impact evaluation study. Kathmandu: DFID.
- Dixit, A. 2012. An approach to local adaptation planning in Nepal. Presentation at 2012 World Water Week in Stockholm, Sweden. See: [www.worldwaterweek.org/documents/WWW\\_PDF/2012/Mon/Water-for-climate-adaptation/Ajaya-Dixit.pdf](http://www.worldwaterweek.org/documents/WWW_PDF/2012/Mon/Water-for-climate-adaptation/Ajaya-Dixit.pdf)
- Dixit, A., McGray, H., Gonzales, J. and Desmond, M. 2012. Ready or not: Assessing national institutional capacity for climate change adaptation. Washington DC: World Resources Institute.
- Dodman, D., Ayers, J. and Huq, S. 2009. Building resilience. In Worldwatch Institute (ed.) 2009. State of the world 2009: Into a warming world. New York/London: W. W. Norton and Company.
- Drimie, S. 2011. Creating a 'safe' space to advance evidence-based policy. Science and Development Network. 19 September 2011.
- Dryzek, J.S. 2000. Deliberative democracy and the beyond. Oxford: Oxford University Press.
- Dryzek, J.S. 2006. Deliberative global politics: Discourse and democracy in a divided world. Cambridge: Polity Press.
- Dryzek, J.S. 2007. Theory, evidence, and the tasks of deliberation. In Rosenberg, S.W. (ed.) *Deliberation, participation and democracy: Can the people govern?* New York: Palgrave Macmillan, 237–250.
- Ericksen, P., Thornton, P., Notenbaert, A., Cramer, L., Jones, P. and Herrero, M. 2011. Mapping hotspots of climate change and food insecurity in the global tropics. A report by the CGIAR Research Program on CCAFS. Copenhagen: CCAFS.
- Fankhauser, S. and Schmidt-Traub, G. 2010. From adaptation to climate-resilient development: the costs of climate-proofing the millennium development goals in Africa. Policy paper. London: Grantham Research Institute on Climate Change and the Environment.
- FAO. 2009. The state of food insecurity in the world 2009: Economic crises – impacts and lessons learned. Rome: Food and Agriculture Organization.
- Farrell, A., VanDeveer, S. and Jager, J. 2001. Environmental assessments: Four under-appreciated elements of design. *Global Environmental Change* 11(4): 311–333.
- Foresight. 2011. The future of food and farming: Challenges and choices for global sustainability. Government Office for Science, Foresight, London.
- Foresti, M., Sharma, B. and Evans, A. 2007. Voice for accountability: Citizens, the state and realistic governance. Briefing paper 31. London: Overseas Development Institute.
- Fung, A. 2007. Minipublics: Deliberative designs and their consequences. In Rosenberg, S. W. (ed.) *Deliberation, participation and democracy: Can the people govern?* New York: Palgrave Macmillan, 259–184.
- Funtowicz, S.O. and Ravetz, J.R. 1990. Global environmental issues and the emergence of second order science. Report EUR 12803 EN. Luxembourg: Commission of the European Communities.
- Funtowicz, S.O. and Ravetz, J.R. 1993. Science for the post-normal age. *Futures* 26 (September): 739–756.
- Government of Pakistan, Planning Commission. 2011. Pakistan: Framework for economic growth. See: [www.pc.gov.pk/hot%20links/growth\\_document\\_english\\_version.pdf](http://www.pc.gov.pk/hot%20links/growth_document_english_version.pdf)
- Habermas, J. 1984. *The theory of communicative action: Volumes 1 & 2.* Boston, MA: Beacon.
- Hall, A., Dijkman, J. and Sulaiman, R.V. 2010. Research into use: An experiment in innovation. Learning Innovation Knowledge. Linklook, 2010.
- Handmer, J. W. and Dovers, S. R. 1996. 'A typology of resilience: rethinking institutions for sustainable development'. *Organization and Environment* 9(4): 482–511.
- Hulme, M. 14 March 2007. The appliance of science. *The Guardian*.
- IIED. 2013. Tracking adaptation and measuring development. *Reflect and Act*, December 2013. See: <http://pubs.iied.org/>
- IISD. 2011. Review of current and planned adaptation action: South Asia - Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. April 2011 draft. Winnipeg: International Institute for Sustainable Development.
- Jasanoff, S. and Wynne, B. 1998. Science and decision making. In Rayner, S. and Malone, E. (eds.) *Human choice and climate change*. Columbus, OH: Battelle Press, 1 –87.
- Kelly, P.M. and Adger, W.N. 2009. Theory and practice in assessing vulnerability to climate change and facilitating adaptation. In Schipper, L. and Burton, I. (eds.) *The Earthscan reader on adaptation to climate change*. London: Earthscan, 161 –186.
- Khan, F., Mustafa, D., Kull, D. and the Risk to Resilience Study Team. 2008. Evaluating the costs and benefits of disaster risk reduction under changing climatic

- conditions: A Pakistan case study. From Risk to Resilience Working Paper No 7. Kathmandu: ISET-Nepal.
- Klein, R.T.J. 2008. Mainstreaming climate adaptation into development policies and programmes: a European perspective. In European Parliament (ed.) Financing climate change policies in developing countries. Brussels: European Parliament.
- Klein, R.J.T., Schipper, L. and Dessai, S. 2005. Integrating mitigation and adaptation into climate and development policy: Three research questions. *Environmental Science and Policy* 8: 579–588.
- Kuhn, T.S. 1962. *The structure of scientific revolutions*. Chicago: University of Chicago.
- Kull, D., Singh, P., Chopde, S., Wajih, S.A. and the Risk to Resilience Study Team. 2008. Evaluating costs and benefits of flood reduction under changing climatic conditions: Case of the Rohini River Basin, India. From Risk to Resilience Working Paper No 4. Kathmandu: ISET-Nepal.
- Leach, M., Scoones, I. and Cockburn, K. 2006. *Science and citizens: Local and global voices*. Policy Briefing 30. Brighton: Institute of Development Studies.
- Leach, M., Scoones, I. and Wynne, B. (eds.) 2005. *Science and citizens: Globalisation and the challenge of engagement*. London: Zed Books.
- LEG (Least Developed Countries Expert Group). 2002. *Annotated guidelines for the preparation of National Adaptation Programmes of Action*. Bonn: UNFCCC.
- Manuel-Navarrete, D., Pelling M. and Redclift, M. 2009. *Coping, governance, and development: The climate change adaptation triad*. Environment, Politics and Development Working Paper Series, 18. London: Department of Geography, King's College London.
- McGray, H., Hammill, A. and Bradley, R. 2007. *Weathering the storm: Options for framing adaptation and development*. Washington DC: World Resources Institute.
- Millennium Ecosystem Assessment. 2005. *Ecosystems and human wellbeing: Biodiversity synthesis. A report of the millennium ecosystem assessment*. Washington DC: World Resources Institute.
- Mitra, K., Garg, R., Kaur, S., Khan, A. and Srivastava, N. 2012. *Climate change impact assessment study – risk management, adaptation and mitigation co-benefits for Madhya Pradesh Rural Livelihoods Project*. New Delhi: Winrock India.
- Mittal, S. and Sethi, D. 2009. *Food security in South Asia. Issues and opportunities*. New Delhi: Indian Council for Research on International Economic Relations.
- Mizuno, J. and Ibaraki, M. 2007. Potential losses of freshwater resources in coastal aquifers caused by climate change. Paper presented at Geological Society of America, Annual Meeting, Denver 28–31 October 2007. See: [http://gsa.confex.com/gsa/2007AM/finalprogram/abstract\\_128176.htm](http://gsa.confex.com/gsa/2007AM/finalprogram/abstract_128176.htm)
- Moench, M. 1996. *Groundwater policy: Issues and alternatives in India*. Country Paper, India No 2. Colombo Sri Lanka: International Irrigation Management Institute.
- Moench, M. and the Risk to Resilience Study Team. 2008. *Understanding the costs and benefits of disaster risk reduction under changing climatic conditions*. From Risk to Resilience Working Paper No 9. Kathmandu: ISET-Nepal.
- MSFP (2013). *A decade of the livelihoods and forestry programme*. See: [www.msfp.org.np](http://www.msfp.org.np)
- Nelson, G.C., Rosegrant, M.W., Koo, J., Robertson, R., Sulser, T., Zhu, T., Ringler, C., Msangi, S., Palazzo, A., Batka, M., Magalhaes, M., Valmonte-Santos, R., Ewing, M. and Lee, D. 2009. *Climate change: Impact on agriculture and costs of adaptation*. Washington DC: IFPRI.
- Oxfam. 2008. *Rethinking disasters: why death and destruction is not nature's fault but human failure*. UK: Oxfam. See: <http://policy-practice.oxfam.org.uk/en>
- Oxfam. 2011. *Ready or not: Pakistan's resilience to disasters one year on from the floods*. Oxfam Briefing Paper. Oxford: Oxfam.
- Parry, M., Arnell, N., Berry, P., Dodman, D., Fankhauser, S., Hope, C., Kovats, S., Nicholls, R., Satterthwaite, D., Tiffin, R. and Wheeler, T. 2009. *Assessing the costs of adaptation to climate change: A review of the UNFCCC and other recent estimates*. London: IIED and Grantham Institute for Climate Change.
- Pelling, M. 2011. *Adaptation to climate change: from resilience to transformation*. Abingdon: Routledge.
- Pereira, A.G. and Funtowicz, S. 2009. *Science for policy: New challenges, new opportunities*. Oxford: Oxford University Press.
- Pimbert, M., Barry, B., Berson, A., Tran-Thanh, K. 2011. *Democratising agricultural research for food sovereignty in West Africa*. London: IIED.
- Pimbert, M., and Wakeford, T. 2001. *Overview: Deliberative democracy and citizen empowerment*. PLA Notes 40. London: IIED.
- Pokharel, B. and Carter, J. 2007. *Addressing chronic poverty and spatial poverty traps in Nepal's middle hills: the Nepal Swiss Community Forestry Project*. London: ODI.
- Prolinnova. 2011. *Strengthening local resilience to*

- climate change. Policy Brief. Leusden: Prolinnova.
- Reid, H. and Simms, A. 2007. Up in smoke? Asia and the Pacific. Fifth report of the Working Group on Climate Change and Development. London: new economics foundation.
- Reid, P. 2010. Land-based productivity; impact and learning from DFID projects. Regional conference on sustainable livelihoods and rural development: Two decades of impact and learning. 21-23 April 2010, Delhi, India: DFID.
- Ribot, J. C. 2010. Vulnerability does not just fall from the sky: Toward multi-scale pro-poor climate policy. In Mearns, R. and Norton, A. (eds.) Social dimensions of climate change: Equity and vulnerability in a warming world. Washington, DC: The World Bank.
- Roberts, N. 2000. Coping with wicked problems. Working Paper. Montgomery, California: Naval Post Graduate School, Department of Strategic Management.
- Rosenberg, S.W. 2007. An introduction: theoretical perspectives and empirical research on deliberative democracy. In Rosenberg, S.W. (ed.). 2007. Deliberation, participation and democracy: Can the people govern? New York: Palgrave Macmillan, 1–24.
- Rosenberg, S.W. (ed.) 2007b. Deliberation, participation and democracy: Can the people govern? New York: Palgrave Macmillan.
- Sarmah, E. and Bordoi B. 2010. Building a climate resilient agriculture sector. Agriculture yearbook 2010. New Delhi: International Agriculture Consulting Group, 165–167.
- Schipper, L. 2006. Conceptual history of adaptation in the UNFCCC process. *RECIEL* 15(1): 82–92.
- Smith, G. 2001. Taking deliberation seriously: Institutional design and green politics. *Environmental Politics* 10(3): 72–93.
- Smith, L.C., Ramakrishnan, U., Ndiaye, A., Haddad, L. and Martorell, R. 2003. The importance of women's status for child nutrition in developing countries. Research Report No 131. Washington DC: IFPRI.
- Stern, N. 2006. Stern review: The economics of climate change. London: HM Treasury.
- UNDP. Undated. UNDP support to implementation of Mahatma Gandhi National Rural Employment Guarantee Act. UNDP and government of India.
- Wani, S.P., Joshi, P.K., Raju, K.V., Sreedevi, T.K., Wilson, M.J., Shah, A., Diwakar, P.G., Palanisami, K., Marimuthu, S., Ramakrishna, Y.S., Sundaram, S.S.M. and D'Souza, M. 2008. Community watershed as growth engine for development of dryland areas. A comprehensive assessment of watershed programs in India. Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.
- Watkins, K. 2007. Human development report 2007/2008. Fighting climate change: Human solidarity in a divided world. New York: UNDP/Palgrave Macmillan.
- Wisner, B., Blakie, P., Cannon, T. and Davis, I. 2004. At risk: Natural hazards, people's vulnerability and disasters. 2nd Edition. London: Routledge.
- World Bank. 2003. Financing rapid onset natural disaster losses in India: A risk management approach. Report No 26844-IN. Washington, DC: World Bank.
- World Bank. 2007. Climate change impacts in drought and flood-affected areas: Case studies in India. IBRD 43946. Washington, DC: World Bank.
- World Bank. 2008a. International assessment of agricultural knowledge, science and technology for development. Washington DC: World Bank.
- World Bank. 2008b. World development report: Agriculture and poverty reduction. Washington DC: World Bank.
- World Bank. 2009. South Asia: Shared views on development and climate change. Washington DC: World Bank.
- World Bank. 2010a. Doing business report. Washington DC: World Bank.
- World Bank. 2010b. Food price increases in South Asia: National responses and regional dimensions. Washington DC: World Bank.
- World Bank. 2010c. World development report. Washington DC: World Bank.
- World Bank. 2013. World Development Indicators 2013. See <http://data.worldbank.org/country>
- World Economic Forum. 2006. Global competitiveness report 2006–2007. Geneva/New York/Beijing: World Economic Forum.
- World Economic Forum. 2013. Global competitiveness report 2012–2013. Geneva/New York/Beijing: World Economic Forum.
- World Resources Institute. 2011. Making adaptation count: Concepts and options for monitoring and evaluation of climate change adaptation. See [www.wri.org](http://www.wri.org)
- Wynne, B. 1996. May the sheep safely graze? A reflexive view of the expert-lay knowledge divide. In Lash, S., Szerszynski, B. and Wynne, B. (eds.) Risk, environment and modernity. London: Sage, 44–83.

# Endnotes

1. The PSR framework was developed by the Organisation of Economic Co-operation and Development (OECD) to structure work on environmental and sustainable development reporting. It highlights relationships between pressure (usually human pressure on the environment), the state or condition of the environment (quality and quantity of resources that enable the system to cope), and societal response (economic or sectoral policies, awareness or behaviour change). Criticisms related to the oversimplification of interactions between these groups of indicators are noted. The framework is adapted and used here as an organising, rather than explanatory, tool.
2. See also SaltNet: [www.olemiss.edu/sciencenet/saltnet](http://www.olemiss.edu/sciencenet/saltnet) and FAO data: [www.fao.org/nr/water/art/2008/flash/ccmap/gallery1.html](http://www.fao.org/nr/water/art/2008/flash/ccmap/gallery1.html)
3. Unless otherwise noted, the information in the bullet points below was adapted from World Bank (2009 and 2010c); ADB (2009), Ericksen et al. (2011). Climate change projections in this report are taken from the most recent and relevant IPCC reports.
4. Expected reductions are in the range of 14–20 per cent for irrigated paddy, 32–44 per cent for irrigated wheat, 2–5 per cent for irrigated maize, and 9–18 per cent for irrigated soybean (Nelson et al. 2009).
5. For maps showing the projected impacts of climate change on crops and water resources in South Asia, see Figures A1 and A2, Appendix 1.
6. 2012 World Development Indicators figures <http://data.worldbank.org/country/nepal>
7. [http://www3.weforum.org/docs/WEF\\_GlobalCompetitivenessReport\\_2013-14.pdf](http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf)
8. The information presented here is drawn from various sources, including World Bank (2009).
9. Figures from Ministry of Home Affairs, Disaster Preparedness Network, Documentation Center, 2010.
10. Pakistan Federal Finance Minister, budget speech, June 2011, quoted in Oxfam (2011).
11. Although it should be noted that this relationship is complex and there are many anomalies to it. For example, in Nepal, remittances are an increasingly important source of income for the rural poor.
12. See [www.ifpri.org/book-49/ourwork/program/south-asia-initiative](http://www.ifpri.org/book-49/ourwork/program/south-asia-initiative)
13. Mittal and Sethi (2009); FAO (2009); Sarmah and Bordoi (2010); Deb et al. (2009).
14. Food price inflation can lead to: deteriorated terms of trade; worsening fiscal balances (due to subsidies); further strain on political relations if it leads to export bans; domestic protest; and worsening poverty (World Bank 2010b).
15. For more information on food security in these countries, see [www.wfp.org/countries](http://www.wfp.org/countries)
16. World Bank (2008a, 2008b); Foresight (2011); Millennium Ecosystem Assessment (2005); ADB (2009); Mittal and Sethi (2009).
17. Accessed on 03/11/2011. Note that the table refers to total climate change investments, not just adaptation. Funding for Nepal does not reflect recent approval of Pilot Program for Climate Resilience (PPCR), Reducing Emissions from Deforestation and forest Degradation (REDD) and Least Developed Country Fund (LDCF) funds.
18. See Table A2, Appendix 3 for a summary of individual country concerns.
19. Australian Public Services Commission (2007); Bassett and Zueli (2000).
20. For example, Funtowicz and Ravetz (1990, 1993); Farrell et al. (2001); Jasanoff and Wynne (1998).
21. For example, smallholder agriculture is often adaptable, but small farms on less productive land in marginal environments will struggle to adapt, especially where the financial costs of adaptation are too high.
22. Australian Public Services Commission (2007); Pimbert and Wakeford (2001).
23. Smith (2001); Funtowicz and Ravetz (1990, 1993); Leach et al. (2005); Jasanoff and Wynne (1998); Agrawal (1995).
24. Habermas (1984); Dryzek (2000); Smith (2001); Rosenberg (2007b).
25. See, for example, the Least Developed Country NAPA guidelines, which stress the importance of inclusive processes and indigenous knowledge.
26. Mainstreaming is the integration of information, policies and measures to address climate change into ongoing development planning and decision making. It is more sustainable, effective and efficient

than designing and managing policies separately from ongoing activities (Klein et al. 2005).

27. Essentially this means calibrating data from different contexts to make them comparable. For example, to compare excess mortality between two episodes of climate extremes, it is necessary to know underlying mortality levels so that the excess can be assessed in terms of deviations from these usual conditions.

28. Overly technocratic approaches can decontextualise adaptation by ignoring the wider ecological, human and social context. It could, for example, mediate vulnerability to food insecurity in the face of drought, resulting in misunderstandings and ineffective adaptation.

29. See, for example, Dixit et al. (2012).

30. See [www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Implementing%20the%20PPCR%20Results%20Framework\\_CIF\\_June%2023%202011.pdf](http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Implementing%20the%20PPCR%20Results%20Framework_CIF_June%2023%202011.pdf),

31. See Adaptation Fund (2010) and [www.adaptation-fund.org](http://www.adaptation-fund.org)

32. See <http://www.wri.org/search/site/making%20adaptation%20count>

33. See <http://pubs.iied.org/pdfs/17192IIED.pdf?>

34. See Table A7, Appendix 3 for a SWOC summary.

# Acronyms and abbreviations

AP-NET	Asia Pacific Climate Change Network	OECD	Organisation of Economic Co-operation and Development
BCCSAP	Bangladesh Climate Bangladesh Climate Change Strategy and Action Plan	PDA	policy discourse analysis
BCR	benefit/cost ratios	PPCR	Pilot Program for Climate Resilience
CANSA	Climate Action Network South Asia	PSR	pressure-state-response
CCAFS	climate change agriculture and food security	RDD	regression discontinuity designs
DFID	Department for International Development (UK)	RRI	Rights and Resources Initiative
FAO	Food and Agriculture Organization (UN)	SAARC	South Asian Association for Regional Cooperation
FGLG	Forest Governance Learning Group	SAWI	South Asia Water Initiative
GEF	Global Environment Facility		
IFPRI	International Food Policy Research Institute		
IIED	International Institute for Environment and Development		
IISD	International Institute for Sustainable Development		
IPCC	Intergovernmental Panel on Climate Change		
LDCF	Least Developed Country Fund		
LEG	Least Developed Country Expert Group		
M&E	monitoring and evaluation		
MFF	Mangroves for the Future		
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act (India)		
MSFP	Multi Stakeholder Forestry Programme		
NAPA	National Adaptation Programme of Action		
NGO	non-governmental organisation		

This paper describes key evidence and strategic considerations for building climate resilience in South Asia. Current public policy responses are fragmented and do not address the scale, complexity or the uncertainty of current and future climate change vulnerability in the region. New approaches are needed to tackle the ‘root causes’ of vulnerability and build resilience to climate and other risks. Conventional ‘science-speaks-to-policy’ approaches cannot address current evidence gaps. We therefore propose deliberative approaches for translating evidence into knowledge, for governance and decision making, as the best way to build long-term climate resilience. This involves a diversity of stakeholders, especially the climate-vulnerable poor.

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