**Climate Change Adaptation, Adaptive Capacity and Development Discussion Paper**
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## 1. Introduction

The integration of climate change (CC) adaptation and adaptive capacity issues within development processes is now a central issue for development policy and practice. This paper aims to tease out how adaptation, adaptive capacity and development inter-relate, and to explore the way forward in terms of building response capacity. It is important to understand these linkages, because of the implications for poor peoples' livelihoods and the future financing of development in low income countries in the context of projected CC. Also, CC adaptation is a dynamic field of activity, with lessons emerging all the time. This paper attempts to: unpack the concepts currently underpinning CC adaptation; to conceptualise the potential responses in planned development by 'international development actors', as opposed to development in the sense of the wider processes of social, economic and ecological change; to identify the ways forward for building response capacity in terms of governance and capacity building; identifying some of the future challenges and key questions arising.

## 2. Key concepts in the response to climate change in a development context

Human-induced climate change science has emerged from meteorological and other bio-physical sciences, with the contribution of response concepts and terminology from environmental sciences, and more recently inter-disciplinary approaches involving the social sciences. The concepts are rapidly evolving through increasing engagement by diverse stakeholders. Many of the definitions we have used come from the IPCC (see appendix 1) as they represent the widest consensus on CC terms available, but there are varying interpretations across the literature, causing some mystification in the CC debate.

Responses to CC have been grouped into two main categories: mitigation (addressing causes) and adaptation (addressing effects), with the former receiving most of the attention until recently. As the potential significance of the resulting changes and the links with human causes has become clearer, demands for assistance for the most vulnerable/least resilient have become louder (Nelson et al 2007) leading to adaptation moving up the agenda. The previously overlooked interactions between mitigation and adaptation are also receiving greater attention, because of the potential synergies and trade-offs implied for policy decisions (IPCC, 2007[4]).

> Box 1: Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory, autonomous and planned adaptation.(IPCC AR4 Glossary 2007).

Conceptualisations of adaptation are emerging from three research domains: i) Risk/ hazard/disasters; ii) political economy/ political ecology and iii) ecological resilience (Eakin and Luers 2006[5], Nelson et al 2007). In each case the unit of analysis (the 'exposure unit'), the considered attributes (and nature of vulnerability) of that unit and the focal questions vary.

- In the **risk/hazards literature** the biophysical threat (e.g. floods, hurricane) is the point of departure and a particular exposure unit (e.g. place, sector) is assessed, in terms of vulnerability, according to its exposure to a hazard (what are the hazards, what are the impacts, where and when?).

- During the 1990s this perspective was criticized as vulnerability became increasingly associated with resource allocation, social privilege and political disempowerment. The **political economy literature** (drawing on work such as Sen's endowments and entitlements approach to food security[6] focuses on the attributes of the exposure unit (e.g. individual, household, community) and the socio-economic processes which delineates its vulnerability according to its capacities, sensitivity and exposure to risk[7].

- Parallel to the above line of thinking, the concept of **'resilience of socio-ecological systems'** has emerged since the 1980s[8]. Here the exposure unit is the ecosystem or the human-environmental system and focal questions are; 'Why and how do systems change'?, 'What is the capacity to respond to change'? and 'What are the underlying processes that control the ability to adapt?' Key attributes considered include: thresholds of change, reorganization, capacity to resist, cope or recover from shock and stress; to learn and adapt (see Eakin and Luers 2006 for an overview).

Box 2: Resilience: 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 (**IPCC AR4 Glossary 2007**)

There appears to be an increasing consensus that these different approaches to analyzing adaptation each offer useful insights to adaptation policy and practice.

Box 3: A donor perspective: DFID: What is development?
"When we talk about international development we are referring to efforts, by developed and developing countries, to bring people out of poverty and so reduce how much their country relies on overseas aid. Many different things can contribute to development which reduces poverty, such as settling conflicts, increasing trade, tackling climate change, securing more and better aid, and improving health and education". Hwww.dfid.gov.ukH

So how does the emergence of the discourse on CC response, relate to **'international development'?** Although the 1987 Brundtland definition of sustainable development - *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*- has been influential, it has also been a loose, umbrella term, accommodating diverse interpretations. The degree to which development agencies have mainstreamed 'sustainability' within their activities has been variable. Pro-poor economic growth is widely considered to be central for achieving poverty reduction, but the sustainability of carbon-based development is now under greater scrutiny, with implications for donor policies. The search is on for finding appropriate policies *and* the political will to implement 'climate-resilient development'[9] - although for many developing countries other (more short-term?) priorities currently take precedence. Will a focus on 'climate proofing', 'mainstreaming' and 'adaptation' sufficiently focus attention on the radical, transformative strategies and processes needed to achieve decarbonised, sustainable development[10]? When and where will *incremental* changes be sufficient? When will more *transformative* approaches in policy and practice be required?[11] The sufficiency of market-based solutions and western notions of 'progress' as the way forward for

reducing emissions and facilitating adaptation are increasingly being examined and critiqued.

## 3. The evolution of planned climate change adaptation

Adaptation to climate change can be spontaneous or planned. The latter – whether seen as a normative goal, or as a process of policy changes or practical actions - is rising up the international development agenda. From an initial focus on top-down analyses of CC impacts, attention has shifted to vulnerability assessments (again conducted in a top-down manner) and more recently to both top-down and bottom-up adaptation planning (e.g. National Adaptation Programmes of Action or NAPAs[12]). The next generation is likely to see more policy changes and greater action on the ground (See table 1 below).

**Table 1: Evolution of Planned Adaptation within developing countries**

| **Phase** | **Main focus** | |
|---|---|---|
| *Phase 1:* | *CC Impacts* | *Top down (analytical)* |
| *Phase 2:* | *Vulnerability* | *Top down (analytical)* |
| *Phase 3:* | *Adaptation Planning (NAPAs, etc)* | *Top down & Bottom up (planning)* |
| *Phase 4: Next Generation/future initiatives* | *Development and mainstreaming adaptation policies and activities* | *ACTION* |

Source: Adapted from discussions between Adele Arendse, SSN and Saleemul Huq, IIED.

Earlier adaptation studies identified some of the distinguishing features of adaptation, such as the purpose, focus, scale, timing, temporal scale, nature (e.g. technical fix or political process) and spatial scope. Distinctions drawn include: Autonomous versus Planned; Spontaneous versus Purposeful; Automatic versus Intentional; Natural versus Policy; Passive versus Active; Strategic[13]. The difference between *coping strategies* and *adaptation strategies*, is that the latter implies activities with longer-term implications, more likely to involve more fundamental changes in the type of livelihood activity or location.. More recently policy frameworks and tools are being developed to guide adaptation planning, embedding a vulnerability focus rather than a purely impacts orientation (e.g. Eriksen et al 2007, Ramamasy and Baas, South*South***North**[14]. See box 4 below).

Box 4: Developing adaptation policies and plans

Five key components of adaptation responses[15]:
a) Scope & design adaptation project, integrate into national policy/planning, deveop implementation plan.
b) Assess current vulnerability (to climate risks, factors determining vulnerability, effectiveness of current adaptation efforts?)
c) Assess future climate risks (development of scenarios of future climate, vulnerability, and socio-economic and environmental trends to assess future climate risks);
d) Formulate an adaptation strategy (to current vulnerability and future climate risks – identify and select set of adaptation policy options/measures, and formulate of these into a cohesive integrated strategy);
e) Continue the adaptation process – implementing, monitoring, evaluating, improving, sustaining the initiatives launched by the adaptation project.

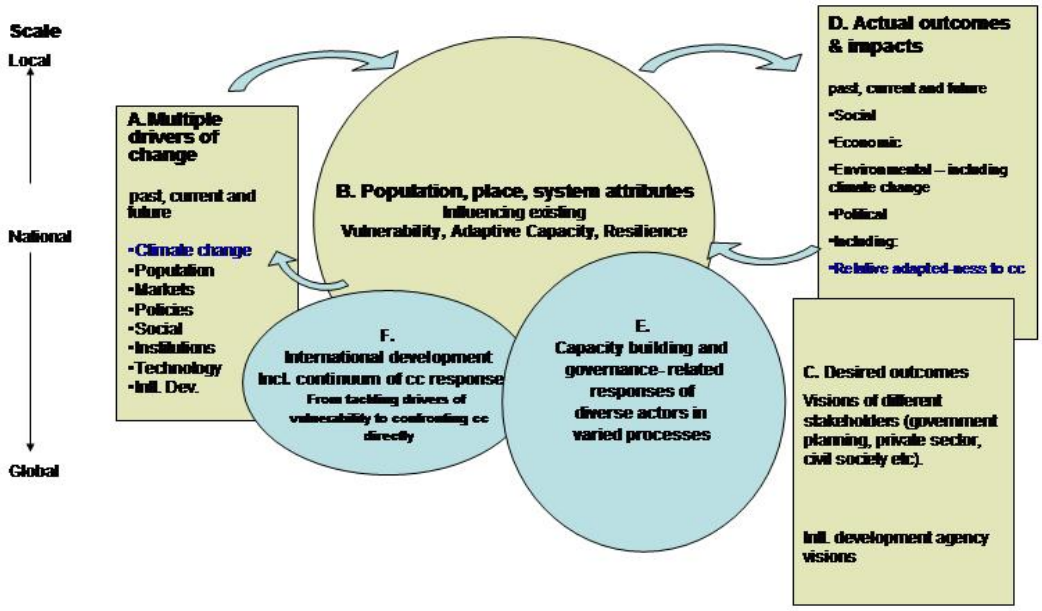
An approach to developing agricultural adaptation options to climate variability and CC in drought-prone areas (Bangladesh)[16]. It involves four key steps:
i) identify improved adaptation options that are locally available and based on new research;
ii) analyse adaptation options based on their constraints and opportunities;
iii) validate and prioritize adaptation options against a set of key criteria;
iv) consolidate the most suitable options into an adaptation options menu.

Efforts are beginning to identify a *pro-poor* adaptation research agenda[17], whilst others are focusing on researching flexible, adaptive co-management and governance of socio-ecological systems (see the Resilience Alliance website[18]). Current planned development interventions may incidentally achieve adaptation ends in '*serendipitous* adaptation', whilst other activities are bolted on to development initiatives to 'ensure success under a changing climate' in an approach called '*climate-proofing'*. Other activities are *discrete* initiatives which specifically aim to achieve CC adaptation objectives (WRI, 2007, p13). Activities can include: changes natural resource management and agricultural practices, building institutions, launching planning processes, awareness raising, promoting technology changes, establishing monitoring and early warning systems, empowering people (literacy, gender empowerment, income generation), promoting policy changes, improving infrastructure, providing insurance mechanisms, and disaster relief[19].

**4. Visualising the interactions between climate change and development**

This section considers the complex, dynamic processes of change involving people and environments in specific contexts - within which the 'changing climate' is projected to play an increasingly important role. System, population and place attributes, as well as processes and outcomes at various scales can be considered in adaptation analyses (Nelson et al 2007). *Figure 1* attempts to visually represent the complex interactions – between CC adaptation, adaptive capacity, planned and unplanned development (including capacity building and governance) – all at different scales.

**Figure 1 CC & Development interactions: *CC, adaptive capacity, planned/ unplanned development, capacity building and governance***




The diagram aims to show how development agencies currently fit into this dynamic picture, as a means of encouraging discussion about the way forward. The diagram

highlights capacity building and governance related activities in relation to CC adaptation – some undertaken by different organisations and people.

**Multiple drivers, including CC,** (also known as stressors**) (A)** exert influence on a **population** (e.g. village, social/cultural group of people, 'community', communities), **place** (e.g. rural or urban locality) or **system** (e.g. territory with socio-cultural-environmental or ecosystem attributes), **(B).** These drivers are dynamic, complex, inter-active, unpredictable, sometimes discontinuous (eg extreme events, markets, civil unrest). Key drivers of change include: population demographics, markets, social and cultural trends and shifts, institutional change, technology, policy formulation and implementation. Local socio-environmental pressures are diverse and immediately felt (e.g. flooding, illegal logging, cattle rustling, wild animal impacts).

The interactions between and relative influence of climate and other stressors will vary over time and spatially. The situation may be **rural or urban**, the latter potentially extremely vulnerable (e.g. coastal cities). These stressors are part of what makes people more or less poor and affect system vulnerability and resilience. The internal attributes of the population, place, or system **(B)** affect their relative vulnerability, sensitivity, adaptive capacity and resilience.

Box 5: Adaptive Capacity
(In relation to CC impacts).

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. (**IPCC AR4 Glossary 2007)**

The interactions between the external drivers and the internal attributes lead to **actual outcomes or impacts (D).** The overall process which brings about these ends i.e. the interaction between the drivers of change and the population/place/system is the development *process* – as understood as the historical trajectory of change or 'immanent development'. The *outcomes/impacts* can be understood as the goals or desired ends of planned development – a manifestation of state (and other actor's) policies (e.g. improved or worsened livelihoods/ poverty/ wellbeing/ inequality/ environments)[20]. The outcomes feedback into the multiple drivers of change in an inherently dynamic, inter-connected process involving different scales, landscapes and environmental processes, power relations, time scales and beliefs.

**The desired outcomes (C)** of different stakeholders vary, some of which are more clearly articulated and influential than others in policy and decision-making. Whose desires become reality is largely determined by the governance context (i.e. the wider power system of rules, institutions and norms, within which different actors jostle for position, influence and voice). This power system and the negotiations of actors form part of **(B). International development agencies (F)** are currently engaged in a continuum of activities, some of which focus on tackling vulnerability whilst others are more clearly climate-risk focused. Development agencies also form desired outcomes (e.g. articulated in policies and MDGs) **(C),** influencing **(D).**

International development agencies are engaged in **capacity building**, amongst other things, and increasingly are looking at influencing **the governance context (E).** However, other organisations and groups are also influencing local capacity and influencing governance (e.g. private sector) and much of this is overlooked in CC assessments.

## 5. Vulnerability and resilience in relation to climate change

The concept of 'vulnerability' has been prominent in disaster risk reduction for some time, gaining even greater currency in the light of CC, but it is loosely defined and greater precision could be found through analysis of the *causes* of vulnerability - rather than as a vague description of 'problems for people' [21] Vulnerability is not merely a function of climate, but is shaped by *social determinants* which determine a person's bundles of rights and claims to resources that can be employed to secure livelihoods[22]. What is required is a concept that can be used in a *predictive* manner – to identify those likely to suffer from specific hazards, climate variability, and longer-term CC impacts[23].

Five key interconnected components of (individual and household) vulnerability can be identified in relation to hazards, but these can also be applied to CC): **strength of livelihood, baseline status or well-being, self-protection, social protection** and **governance**. The strength of livelihood influences individual vulnerability, well-being and self-protection, but the pattern of livelihood access across different social groups is related to the predominating governance system. The latter affects asset and income distribution and the likely success of the livelihood strategies for different people. Social protection is strongly determined by the governance framework, including the way civil society operates. Resilience can be seen (within this actor-oriented analysis) as the inverse of vulnerability[24].

Vulnerability and resilience concepts that underpin development responses must integrate sophisticated analyses of *equity, rights, power and gender* if they are to be effective. Intra-household and intra-community inequalities are of critical importance in mediating outcomes for individuals, not least because of gender disparities[25]. Wealth or network/social group membership confers resilience for some, but may contribute to the lack of resilience of others. The well-known risks of community-based approaches (elite capture of benefits, increased internal tensions, and risks of reprisals once development agencies disappear) must be explicitly recognised in CC adaptation with an unpacking of the *changing incentives* which connect people in particular places. External interventions focused on improving the voice and representation of less powerful groups in decision-making (the 'demand side of governance') can play a role in helping to challenge power relations that that generate vulnerability in the first place, including a focus on resource management and livelihood issues. Disaster and climate adaptation interventions should seek recovery but also improvement - rather than creating 'a reproduction of pre-disaster 'patterns of differential vulnerability'[26]. Some issues cannot be resolved at local level, requiring cross-scalar interventions and multiple stakeholder involvement.

## 6. Vulnerability and poverty: overlaps and differences

Tackling poverty has long been the goal of international development, although theories and progress have varied. In relation to CC, *poverty and vulnerability are not the same*. Some people will be vulnerable to projected CC impacts such as sea level rise, because they live in low lying coastal areas, but may not be poor in terms of income or access to assets. There may also be poor people living in areas which are not expected to be as affected as other areas. There is clearly going to be an overlap between poverty and vulnerability, but not all adaptation measures will reduce the vulnerability of the poor and in some cases they could exacerbate existing

vulnerabilities. Adaptation actions (e.g. building dams/irrigation systems to stabilize water supply) may disadvantage some groups, such as those that due to the new infrastructure, lose access to important water resources that they use in coping with drought (Eriksen et al 2007). Consideration is also needed of how CC and adaptation responses will affect the *inter-generational transfer of poverty* – will they entrench or challenge these processes, decreasing or improving chronic poverty?[27].

Box 7: Poverty and Vulnerability linkages in relation to CC

- any new risks from CC to current ways of securing well-being;
- the particular strategies or adaptive capacity of poor people in the face of climate stresses;
- the causes of vulnerability, or specific factors and conditions that make poor people vulnerable to climate stress.

Rather than a narrow focus on *impacts,* development agencies should have a broader approach focused on the socio-environmental causes of vulnerability to climate, and on effective strategies, focused on the poor.
Source: Eriksen at al 2007/ GECHS[28]).

Where a *'socio-ecological systems resilience'* analysis is incorporated in the analysis[29] this raises issues of the feedbacks, thresholds and potential surprises within ecological systems, of the integrated co-evolution of society and nature (rather than separate pathways), and of the potential equity trade-offs across generations, (because whilst some populations may be seen as vulnerable now to existing and projected changes, a systems perspective highlights the *unknowns and surprises* that can occur in socio-ecological systems. This adds a further element to the decision-making mix – achieving high adapted-ness now and reducing vulnerability now, may not allow for the flexibility in the system to support those who become vulnerable in the future as new, unseen threats emerge[30]. Because of the complexities, uncertainties and trade-offs involved, issues of equity, rights and power are of critical importance, as well as increased ability to integrate understandings of socio-ecological systems resilience and transformations within policy-making and practice.

**7. The role of international development agencies**

The responses of international development agencies to CC are gathering steam, but what exactly is the distinction between development and adaptation? Is there a difference between 'good development' (as currently and variously understood by different actors) and adapting to CC? Some argue - such as UNDP - that CC requires us to "**do development better**', with an urgent need to 'develop national capacity to support cross-sectoral policy processes as the foundation for sustainable development in coming decades', but also to **'do development differently'** - to 'reduce climate change risks through *systemic* changes to planning and practice' [31].

A critical distinction between development and adaptation surrounds the *framing of problems and priorities*, rather than in the *methodologies* and approaches currently used: 'Rarely do adaptation efforts entail activities not found in the development "toolbox." (WR I 2007). The uniquely "adaptive" elements of most efforts are those involved in defining problems, selecting strategies, and setting priorities—not in implementing solutions. In line with current approaches to development, adaptation efforts are highly integrated. Most projects utilize multiple strategies and address multiple sources of vulnerability, many cross sectoral boundaries and address more than one impact associated with climate change[32]'. .

Responses from the development community can usefully be imagined as a continuum of activities[33]: at one end, activities are focused on tackling vulnerability without specific focus on CC impacts (although the outcomes may buffer communities against CC); through activities that foster 'response capacity. See table 2 below.

**Table 2: Continuum of adaptation**

| | Addressing drivers of vulnerability | Building response capacity | Managing climate risk | Confronting climate change |
|---|---|---|---|---|
| Features | Overlaps a lot with development practice. Activities take little or no account of specific cc impacts. Examples include livelihood diversification, literacy projects, women's rights, HIV.AIDS projects. | Building robust systems for problem solving & capacity for more targeted actions. Overlaps with institution building & technological approaches familiar in planned development. Examples include developing robust communications & planning processes, improvement of mapping, weather monitoring, & NR management practices | Climate information integrated in decisions to reduce negative effects on resources & livelihoods (CC effects not easily distinguished from hazards effects within the historic range of climate variability). Disaster response planning activities, drought-resistant crops, & efforts to "climate-proof" physical infrastructure. | Highly specialized activities exclusively target distinct cc impacts, falling outside the realm of (current) development. Benefits felt *only* in the event of cc. Communities that relocate in response to sea level rise, and responses to glacial melting |
| Examples | Crossbred goats & graze free feeding training with women (Karamoja Agro-pastoral programme, Uganda. Diversifying livelihood strategies in flood prone areas (Bangladesh, SSN). | Participatory reforestation, Rio de Janeiro hillside favelas, to combat flood-induced landslides (City authorities, Brazil). Reinstating pastoral networks in arid regions for appropriate rangeland management (National University of Mongolia).. | Monitoring salinization of drinking water & drilling new wells (Tanzania, SSN). .Teaching farmers to collect climate data & integrate it in planting decisions (Gov. of Mali & Swiss Agency for Development & Cooperation). | Managing coral reefs where widespread bleaching (WWF, Indonesia). Reducing the risk of glacial lake outburst floods from Tsho Rolpa Lake (Gov. of Nepal). |
| Vulnerability Focus ◄——— Focus ———► Impact | | | | |

Source: Adapted from WRI (2007, p18)

**7. Building response capacity: Governance and capacity building**

Building response capacity for dealing with the impacts of CC will involve a whole range of activities, but will centrally involve efforts to improve *governance* through the development of robust, flexible institutions and adaptive management capacity (see box 8 below).

> Box 8: Governance is about 'more than government. It is about politics, understood as all the activities of cooperation, conflict and negotiation involved in decisions about the use, production and distribution of resources – i.e. the relations of people, resources and power in diverse institutional contexts.[1]
> DFID 'Thoughts on Governance' (undated). See www.dfid.gov.uk

So what will '*make governance better in the light of projected CC?* More than the traditional emphasis on the capacity and authority of governments, strengthening

governance relates to the state-society nexus or the 'political settlement between states and (empowered?) citizens in different political contexts'. Governance-related activities by development agencies focus on promoting accountability,, transparency, responsiveness and developing common interests is critical for development, but particularly given the complexities and scale issues of CC. *Bad governance leads to vulnerability* amongst citizens (see the Burmese state response to Cyclone Nargis as an example). Improving governance implies technical capacity building, but that alone is insufficient. Increasing *citizen demand* for good governance where required (by supporting self-organisation, building negotiation and advocacy skills, supporting access to information etc) will enable affected groups to challenge the vulnerability-causing activities of the more powerful. Incentives for good governance are heavily influenced by the international economy, the behaviour of other governments and the private sector (DFID, undated).

*Multi-stakeholder participative learning* and decision-making processes will play a key role in the search for equitable, adaptive management in the context of uncertainty (See Nelson et al 2007, Weathering the Storm, Howden 200?[34]) because the weighing up of different options and competing interests requires *new spaces for democratic engagement between state and society*. Support for multi-stakeholder processes of learning and adaptation are thus needed, but with specifically targeted steps that enable poorer people to participate. Difficult decisions are entailed as measures taken now in 'no regrets' adaptation strategies[35] and that fit within immediate national development priorities)[36] may help to protect vulnerable groups from future impacts of CC, but may exacerbate existing inequalities: 'one group's adaptation, is another group's hazard' (Kates, 2000, cited in Huq et al, 2003, p18[37]). Finding optimal ***governance*** arrangements at local, national and regional levels is likely to involve investigation of the politics of policy reform and implementation in developing countries, exploring new governance structures and consideration of how rights frameworks facilitate adaptation by poor people (e.g. through redistributive mechanisms such as social protection, global agreements to facilitate international migration)[38].

Greater promotion of the principles of *good environmental governance* is especially important in areas of *high natural resource dependency.* Previous natural resource management policies assumed that ecosystem dynamics are linear, predictable and controllable and have approached human and natural systems as being essentially separate entities, rather than as 'strongly coupled, integrated systems' which are complex, evolving. Their management entails uncertainties and surprises; 'societal development inter-relates with nature in strongly reflexive and dynamic ways' [39]. There is a move away 'from regulatory models for governing natural and cultural resources. New concerns with adaptive processes, feedback learning, and flexible partnerships are reshaping environmental governance….and ideas about collaboration and learning are converging around the idea of adaptive co-management'[40] (Armitage, Berkes and Doubleday, 2008). Rather than 'an efficiency-driven, command-and-control approach', management approaches are being sought that can accommodate uncertainty and can sustain social-ecological systems, especially during periods of transformation following disturbance' (Folke, op cit) entailing 'a social context with flexible and open institutions and organizations that allow for learning and build adaptive capacity without foreclosing future development options' (Folke, et al, 2002, p3).

*Capacity building* will be needed at all levels, across sectors and in different forms to respond to the challenges of CC. Capacity building is an integral part of international development, although there are a wide range of interpretations – narrower ones focusing on training, broader ones on human resource and organizational development, and institutional/legal transformation. To achieve governance that promotes equitable, climate resilient development will involve capacity building as defined broadly (see box 8 below).

Box 8: Broadly defining Capacity building

- *Human resource development*, the process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively.
- *Organizational development*, the elaboration of management structures, processes and procedures, not only within organizations but also the management of relationships between the different organizations and sectors (public, private and community).
- *Institutional and legal framework* development, making legal and regulatory changes to enable organizations, institutions and agencies at all levels and in all sectors to enhance their capacities.

Source: Global Development Research Centre http://www.gdrc.org/uem/capacity-define.html

The challenges and uncertainties of CC science create difficulties for decision-makers and planners, and greater capacity is required in a range of areas, for example:

- understanding and processing the complex scientific data and modelling, to link this into policy-making and planning[41];
- understanding the drivers of change and the attributes of socio-ecological systems;
- understanding the determinants of vulnerability;
- identifying/ developing technologies and institutions that can lead to positive outcomes for the poor, as well as wider society;
- providing spaces for democratic engagement by non-state actors in participatory planning etc.
- climate science, especially in Africa: 'development of the scientific and economic capacity to identify critical thresholds and to better understand and cope with climate variability, as well as development of climate forecast tools and data sets that capture incremental changes in risk over the scales needed for adaptation planning' [42]
- understanding of how the availability of more accurate, localized, climate impact information and risk assessment may change decision-making by farmers and local people and what are the barriers for use by policy-makers?[43]

Capacity building is a *long-term, continuing process*, (which is consistent with a CC adaptation perspective), requiring engagement from all stakeholders (ministries, local authorities, NGOs and water user groups, professional associations, academics etc). Private sector entities are playing a role (e.g. companies strengthening their own organizational capacity and infrastructure development of mobile phones and other Information Communication Technologies [ICTs], which may contribute to strengthening communication and the institutional environment). Although not necessarily having an explicitly pro-poor focus or goal, their activities have implications for well-being and equity for local people facing climatic changes.

*Technology* will play a major role, of course, in climate change adaptation[44], but technology and institutions co-evolve (e.g. mobile phones have radically changed the way many people interact in many parts of Africa). Technology will play a key role in capacity building (e.g. ICTs improving access to information) and conversely capacity building will enhance the development and use of technology appropriate for climate change adaptation.

Future *adaptation funding* will provide *opportunities for capacity building*. 'As new sources of adaptation funding are created, there is an opportunity to improve upon existing mechanisms. To do so, supporting vulnerability-reduction and capacity-building activities at the heart of enabling effective adaptation is critical, though the "additional cost'" due to climate change may not be clearly identifiable' (Hamill et al, 2007). However, the financing of CC adaptation is still extremely limited. Mechanisms for dispersal of funds have been criticized in some quarters and the extent to which non-state actors post 2012 can play a role in disbursing funds is still to be negotiated.

**8. Key issues and future challenges**

In terms of responding to the immense challenges ahead, a whole range of questions arise in terms of the way forward. Several of these are discussed below, although obviously they are not an exhaustive list.

**Question 1: How can development agencies work better with other actors?**

- How can greater *coordination* of adaptation approaches, policies and initiatives across different sectors be achieved? For example, adaptation funding is currently being directed through overseas development assistance and this is not always well connected to environment ministries that are leading on CC adaptation (Hamill et al, 2007).

- What are the appropriate *roles* for and contributions of different agents of development? Who is best placed in different scenarios to provide capacity building support? For example, has the role of the private sector been adequately analysed? What more could the private sector do to promote pro-poor adaptation and development (and to reduce activities that exacerbate vulnerability) and what would be the necessary incentives for achieving this?

**Question 2: What changes are needed in development practice?**

- What kinds of changes (incremental or more fundamental?) are needed in development practice that will enable pro-poor adaptation to CC and socio-ecological resilience?

- Do development timelines need to change? *Development timelines* (i.e. the timescales by which governments and development agencies tend to operate) are often criticized for being too short, but does this become ever more the case in the light of climate change?

- What changes might be needed in terms of *funding mechanisms* that would better enable pro-poor CC adaptation? Can non-state actors be given space to

support CC adaptation through new carbon based funding sources and through overseas development assistance? What does increasing delivery of ODA as direct budgetary support – as opposed to development projects - mean for CC adaptation for development agencies?

- *Access to climate knowledge:* Are Southern actors currently able to influence the adaptation agenda and funding arrangements? Who holds and controls 'climate knowledge'? There is insufficient capacity and access to scientific CC information in many developing countries and this may have consequences for the ability of actors in the global South to frame the agenda for responding to CC and for making appropriate decisions in policy-making and planning.

- How can the insights from systems resilience thinking be better integrated with actor-oriented approaches in policy-making and practice?

- How can adaptation work with communities and stakeholders at different levels be *scaled up*? Immense challenges remain because of the sheer number of people who could be considered vulnerable to hazards and to slower onset changes.

- *CC variability as an entry point to learning:* Does a focus on CC variability and extreme events provide a platform for multi-stakeholder learning about how to respond to longer-term climate change?

**Question 3: How can development agencies and governments better address equity in adaptation efforts in both policies and practice?**

- How are the impacts of CC distributed between different social groups in different contexts? Greater understanding is needed of how CC will affect specific groups such as indigenous peoples.

- What are the *equity impacts* of adaptation initiatives? How can such initiatives help tackle discrimination and inequalities based on gender, ethnicity, class etc?

- What kinds of initiatives are required to foster the *demand side of governance* and promote CC adaptation? What lessons are being learned regarding adaptive co-management and multi-stakeholder participation in environmental governance more broadly, and with what implications for CC adaptation?

- How do *local perceptions* of risk vary from that of outsiders? Much greater analysis is needed of how perceptions of the climate and environment as a whole vary across cultures, including perceptions of climate risks and the causes of climatic events ('the cultured climate'), and of the scope of possible options for securing livelihoods.

- How can *adaptation funds be made available in equitable and just* ways? What kinds of capacity building are needed to enable local people to claim their rights?

## Appendix 1: IPCC [45]

| Term | IPCC AR4 Glossary 2007 |
|---|---|
| Adaptation | Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory, autonomous and planned adaptation: |
| Adaptive capacity | (in relation to CC impacts) 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. |
| Capacity building | In the context of climate change, capacity building is developing the technical skills and institutional capabilities in developing countries and economies in transition to enable their participation in all aspects of adaptation to, mitigation of, and research on climate change, and in the implementation of the Kyoto Mechanisms, etc. |
| Climate | Climate in a narrow sense is usually defined as the 'average weather', or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. The classical period of time is 30 years, as defined by the World Meteorological Organization (WMO). |
| Climate change | Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), which defines 'climate change' as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'. |
| Climate proofing | Not included |
| Climate variability | Climate variability refers to variations in the mean state and other statistics (such as standard deviations, statistics of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability). |
| Develop-ment | Sustainable development -Development that meets the cultural, social, political and economic needs of the present generation without compromising the ability of future generations to meet their own needs. |
| Mitigation | An anthropogenic intervention to reduce the anthropogenic forcing of the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks. |
| Poverty | Not included |
| Resilience | 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. |
| Vulner-ability | Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of *climate change*, including *climate variability* and extremes.<br>Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its *sensitivity*, and its adaptive capacity. |

## Endnotes

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2 Natural Resources Institute, University of Greenwich

3 SouthSouthNorth

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