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Building resilience: Adaptation mechanisms and mainstreaming for the poor

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1. Climate change and development

Climate change is happening and the diversity of impacts is likely to most affect the poor in developing countries. Developing countries are particularly vulnerable because they have some of the most climate-sensitive economies and concentrations of urban poor[1]. These societies may have a limited capacity to adapt to change[2]. Subsistence societies are largely dependent on natural resources, which are affected directly by climate variability and change[3]. Interrelated drivers of vulnerability also include a reliance on the informal sector, limited formal safety nets, weak infrastructure and healthcare, frequent disasters, environmental degradation and poverty.

Climate change will compound existing vulnerabilities and has implications for poverty eradication and therefore the ability of countries to meet their Millennium Development Goals. Climate change has very real implications for the human dimensions of development. Although livelihoods have constantly adapted to change, the impacts of climate change may push people beyond their capacity to cope and adapt, because of an increasing magnitude, frequency or rate, particularly of weather-related disasters such as drought, storms and floods[4]. Climate-induced changes to resource flows will affect the viability of some livelihoods unless effective measures are taken to protect and diversify them through adaptation. Adaptation must be seen as a process that is itself adaptive and flexible, in order to address locally specific and changing circumstances.

Many of the factors that make climate change unique also make it complex. It is a multi-scalar environmental and social problem, which affects different sectors[5]. Adaptation concerns tend to be discussed largely at a global level through international policy and scenarios of change but the impacts of climate change are experienced at the local level. It is therefore critical to ensure effective participation, capacity and empowerment of poor communities. Climate change is likely to exacerbate social inequalities due to the uneven distribution of the costs of damage, necessary adaptation and mitigation efforts[6]. These inequalities require issues of equity and justice in climate change impacts and remedial measures to be addressed[7]. Effective responses require a diversity of actors and organisations across the state-

[1] Intergovernmental Panel on Climate Change 2001 Third Assessment Report. Cambridge University Press.

[2] Desanker P, Magadza C *et al*. 2001 'Africa' Chapter in IPCC (ed) Climate change. Impacts, adaptations and vulnerability. Cambridge University Press pp. 489-531

[3] See Denton F, Sokona Y and Thomas JP 2000 Climate change and sustainable development strategies in the making: what should West African countries expect? OECD Report, ENDA-TM Dakar, Senegal, 27p; and also Ashley C and Maxwell S 2002. Rethinking rural development, Development Policy Review, 19(4): 395-425.

[4] Sokona Y and Denton F. 2001 Climate Change Impacts: can Africa cope with the challenges? Climate Policy 1: 117– 123.

[5] Lemos MC and Agrawal A 2006 "Environmental Governance". Annu. Rev. Environ. Resources 30 (in press).

[6] Paavola J and Adger WB 2002 Justice and adaptation to climate change, Tyndall Working Paper 23, UEA UK

[7] Thomas DSG and Twyman C 2005 Equity and justice in climate change adaptation amongst natural-resource-dependant societies. Global Environmental Change A, 15(2): 115-124.

society divide. However, the high level of uncertainty around definitions of the magnitude and character of climate change impacts in different human and natural systems, and the fact that they might not be felt immediately, makes it difficult to mobilise political and financial will. Institutional capacity must be strengthened in order to lesson the gaps between local and national processes, and between formal and informal patterns of adaptation, as well as identify priorities. Indeed the need for 'climate proofing' applies to small (such as microcredit schemes) and large (such as infrastructure construction) development projects. Adaptation clearly needs to be considered within wider-development processes, including non-structural policy and institutional frameworks, rather than separated in isolated measures, which are funded and executed discretely. Identifying a more holistic approach to building resilience and adaptive capacity is central to sustainable development pathways under climate change conditions.

There is an increasing trend in the literature and by agencies in the donor community toward understanding how best to improve adaptation and resilience to climate change vulnerability across multiple scales. However, the institutional support and the mechanisms to support local level adaptation still needs attention. The perpetration of conflicting agendas in development practice is a major constraint to creating sustainable adaptation to climate change risk and appropriate development architecture. For example, understandings of adaptation are viewed differently by approaches that focus on disaster risk management, poverty reduction and economic development, and the climate change adaptation community. Each brings useful frameworks and lessons of where integration in governance and adaptation mechanisms work and where they do not, across different scales and timeframes. These lessons have implications for the human dimensions of development and practice in a warming world. This paper focuses only on adaptation in developing countries by exploring specific examples from recent research and assessing their impact on the effectiveness of development projects. In particular, it seeks to identify characteristics of adaptation interventions in the context of longer-term disaster risk reduction and development, and draw on the examples to explore how to improve and fund adaptive capacity and resilience at local, national and sectoral scales.

The paper considers these interrelated questions in two sections. Part I briefly introduces the key concepts and how they are used in the paper, before exploring, using illustrative examples, the resilience of adaptation strategies undertaken by the poor. Lessons from local adaptation practice are important in understanding complex vulnerability-livelihood interactions, but also for identifying the limits to local coping strategies. In considering the sustainability of strategies and limits to the ability of the poor to respond autonomously to climate change, the paper highlights the role of institutional support, national adaptation strategies and resilience at different scales. Characteristics that enhance positive development are outlined and specific elements of adaptation practice and intervention that might be important in enhancing longer-term resilience to climate change in developing countries (and under what policy options) are discussed.

In part II, climate change adaptation is contextualised within wider human development debates. Governance approaches to mainstreaming climate change concerns into poverty reduction and development agendas are considered. How can governments succeed in pro-poor adaptation measures when many already

systematically fail to meet the needs of the poor via infrastructural support, social welfare or planning? If climate change is likely to increase existing pressures, making the poor in many developing regions more vulnerable, national adaptation governance and its linkages with disaster reduction management and poverty reduction practice, must be critically assessed. Institutional mechanisms and scope for integration are discussed in terms of potential entry points for integrated action and financing. For example, the links between adaptation actions and broader development policy (such as insurance, drought and flood resistance, or social welfare programmes) that governments and other stakeholders should be taking regardless of climate change.

2. Building livelihood adaptation for the poor

2.1 Adaptation and resilience processes in development

The term 'adaptation' has become synonymous with the climate change community, with actions taken before or after climate change to enable people to best cope with the impacts. Adaptation is often promoted through governance reforms that focus on building adaptive capacity. Generally, it refers to improving the capacity (resilience), and thereby reducing the vulnerability of individuals or states, to respond to climate change impacts. Adaptive capacity is the potential capability or ability of a system to adapt to climate change stimuli or their impacts. There has been research interest on developing indicators of adaptive capacity measures. Adaptation is the ability of social and environmental systems to adjust to change in order to cope with the consequences of change[8]. It is seen as the heterogeneity of a system or the diversity amongst institutions and assets available in social systems[9]. Adaptation is not a solution for development problems, however it does offer an opportunity to rethink our approach to longer-term risk and engage different discourses.

Climate change is often considered within an 'environmental space', sometimes only superficially considered as a development issue. Adaptation is a necessity because climate change will influence current development mechanisms and the sustainability of development pathways. These pathways should enhance the capacity of communities and countries to adapt to livelihood risk and disturbance. The independent evolution of climate change and development discourses provides an explanation as to why the two areas have operated largely independently from one another[10]. Climate change has heavily relied on the natural sciences for direction, while development has used social and political sciences for policy. By contrast, there is a wealth of development literature addressing climate variability, such as in disaster risk reduction research[11]. However, this does not always translate into climate change adaptation policy. There have been recent donor-led initiatives to strengthen the links between the two communities and attempts to develop frameworks to mainstream climate change but, essentially, there remains an urgent need to continue to 'recast' adaptation as a consideration of climate change risks within development issues.

Integration began with the publication of a report on Poverty and Climate Change by ten of the leading bilateral and multilateral development funding agencies[12]. This was followed by efforts in specific sectors, such as health, agriculture, water and

[8] Burton I, Huq S, Lim B, Pilifosova O and Schipper EL 2002 From impacts assessment to adaptation policies: the shaping of adaptation policy, Climate Policy 2: 145-159.
[9] Perrings C 2006 Resilience and sustainable development, Environment and Development, 11: 417-427.
[10] Ideas developed in Huq S, Reid H and Murray LA 2006 Climate change and development links, IIED Gatekeeper Series 123; also see Swart R, Robinson J and Cohen S 2003 Climate change and sustainable development, Climate Policy 3S1:S19-40.
[11] Yamin F and Huq S 2005 Vulnerability, adaptation and climate disasters. Institute of Development Studies IDS Bulletin 36(4). University of Sussex, Brighton
[12] Sperling F (ed) 2003 Poverty and climate change: reducing the vulnerability of the poor through adaptation. World Bank, Washington.

disaster management, as well as non-government organisations.[13] While adaptation to climate change is reviewed in the context of adaptive capacity and vulnerability[14], it is already implicit in the political ecology field, which considers power, resource use, entitlements and food security. A key feature is its demonstration of how the adaptive capacity of individuals or households is shaped and constrained by social, political and economic processes.[15]

There is a specific scale problem to consider. Temporally, the impacts of climate change are uncertain and likely to be long-term whereas development scenarios are shorter-term (e.g. Millennium Development Goals are set for 2015). Spatially, science has struggled to provide information at the local or national level that will benefit development practitioners today. A number of research organisations do now explicitly incorporate development issues with climate change, including the livelihoods approach, and created thematic links between poverty and vulnerability.[16] One of the keys to catalyzing adaptation ideas will be to mainstream consideration of climate change risks into wider livelihood development policy and create incentives at the national level to do this. At the local level, the critical factor for livelihood sustainability is resilience, or the capacity to cope and adapt, and the conservation of sources of innovation and renewal[17]. For example, social networks that transfer information and financial support and facilitate collective action. Theoretically, resilience is a measure of the amount of change a system can undergo, while retaining the same controls on structure and function[18].

Strengthening the capacity of societies to manage resilience is critical to effectively pursuing sustainable development under conditions of climate change. Nonetheless, this confronts many unanswered questions, such as the issue of resilience of what, who manages and for what purpose? What are the consequences of alternative courses of action for different stakeholder groups? As competing stakeholders try to transform their livelihood strategies there will be winners and losers. While regional systems invariably yield a complex set of knowledges, 'optimal best practices' and 'appropriate stakeholders', it remains essential to draw on local evidence to assess how certain attributes of governance functions enhance the capacity to manage

[13] Simms A, Magrath J and Reid H 2004 Up in Smoke: threats from, and responses to, the impact of global warming on human development. New Economics Foundation, London

[14] Smit B and Wandel J 2006 Adaptation, adaptive capacity and vulnerability, Global Environmental Change 16: 282-292

[15] O'Brien K and Leichenko R 2000 Double exposure: assessing the impacts of climate change within the context of globalisation. Global Environmental Change, 10: 221-232; Blaikie P and Brookfield H 1987. Land Degradation and Society. Methuen, London; Sen A 1981 Poverty and Famine Oxford, Clarendon Press; Walker B. 2005. A resilience approach to integrated assessment. The Integrated Assessment Journal 5: 77-97; Adger W.N. 2000. Social and ecological resilience: are they related? Progress in Human Geography, 24 (3): 347-364; Batterbury SPJ and Fernando JL 2006 Rescaling governance and the impacts of political and environmental decentralisation, an introduction, World Development 34(11):1851-1863

[16] E.g. In the UK, Tyndall Centre for Climate Change Research, International Institute for Environment and Development, Stockholm Environment Institute, the Climate Change Knowledge Network, Institute for Development Studies.

[17] Lebel L, Anderies JM, Campbell B, Folke C, Hatfield-Dodds S, Hughes T and Wilson J 2006 Governance and the capacity to management resilience in regional socio-ecological systems. Ecology and Society 11(1):19.

[18] Holling CS 2001 Understanding the complexity of economic, ecological and social systems, Ecosystems, 4: 390-405.

livelihood resilience, particularly to climate change. Thus, it may be possible to identify gaps in the process, the role of autonomous versus planned adaptations, markers of success within complex adaptive systems and future development options. But how to define what is effective by whom and how? Identifying effective adaptation and key elements of success from case studies are crucial, as are barriers and opportunities with scope for scaling up.

2.2 Learning from local adaptation practice

Individuals, communities, nations have to varying degrees had to cope and adapt for centuries[19]. People are already adapting to climate variability and change on a daily basis and there is evidence that people act positively to enhance their resilience to livelihood stresses[20]. However, livelihoods are dynamic, complex and variable. We must continue to examine vulnerability-livelihood interactions, especially how the poor cope and adapt to on-going climate variability and adversity. This section reviews the multiple ways in which livelihoods deal with climatic adversity. Local experiences offer important lessons for national government wishing to support adaptation strategies.[21] Is it possible to characterise successful adaptation actions that reduce livelihood and community vulnerability to climate-related disasters and climate change and variability?

Short examples are used from the ADAPTIVE Project[22], which explored local level coping and livelihood adaptation to climate change in South Africa and Mozambique. The project set out to identify characteristics of successful adaptation at locations that had significantly different climate patterns.[23] These locations experienced dry regular drought (Lehurutshe District, NorthWest Province, South Africa); a drying trend and pervasive drought (Dzanani District, Limpopo Province, South Africa); increasing intensity and variability (uThukela District, KwaZulu Natal Province, South Africa) and extreme flood and drought events (Manjacaze District, Gaza Province, Mozambique). Success should reduce risks, not reduce future options, and build livelihood resilience. Successful adaptation is a normative value-laden concept and requires consideration of governance and legitimacy issues at different scales. There will always be multiple pathways within the 'response space'. Not all responses may have a positive impact on livelihood resilience, as there are spatial spillovers and negative externalities. For example, a community as a whole may be resilient but there will still be winners and losers within the community at the household level because some individuals will be better able to capture the benefits of adaptation. Autonomous decisions can also be constrained by the wider economic and socio-

[19] Tyson PD, Lee-Thorp J, Holmgren K and Thackeray JF 2002 Changing gradients of climate change in southern Africa during the past millennium: implications for population movements, Climatic Change 52:129-135; Washington R *et al*, 2004 African Climate Report, DFID, Defra.

[20] Thomas DSG, Twyman C, Osbahr H and Hewitson B 2007 Adapting to climate change and variability in southern Africa: farmer responses to intra-seasonal precipitation trends Climatic Change in press; Osbahr H, Twyman C and Thomas DSG 2007 Effective livelihood adaptation to climate change disturbance: scale dimensions of practice in Mozambique, Geoforum in review

[21] Hellmuth ME, Moorhead A, Thomson MC and Williams J 2007 Climate risk management in Africa: learning from practice, International Research Institute for Climate and Society

[22] ADAPTIVE was a multi-partner project in Southern Africa funded by the Tyndall Centre for Climate Change Research 2002-2005.

[23] See note 20.

political environment (e.g. poor access to markets, finance or information), locking individuals into particular pathways (i.e. there may be limits to the resilience of local practices to future risk).[24] Within a resilience framework, the ADAPTIVE project assessed household ability to absorb shocks and buffer disturbance, self-organise, and innovate and learn. Which processes, institutions and types of agents characterise engagements that facilitate livelihood adaptation? The next two sections illustrate these issues.

Coping with livelihood disturbance from climate variability and shocks

Coping was revealed as a reactive response over a short-time frame, with different types of coping performed simultaneously by different members of a household to interacting shocks.[25] The critical institutions that facilitate these processes are (1) informal networks of dependence developed to facilitate daily livelihood activities, including those associated with generating economic income and support (e.g. kinship relationships and close neighbours) and (2) informal networks outside the village that generate new networks and opportunities. These social structures bind individuals together and are especially important where there is a history of limited formal safety nets, as was the case in Mozambique (see Case A).

Reciprocal exchange between friends and family to access services and goods are at the heart of this coping. These are informal non-cash networks that must be regularly invested in to make them part of a risk-adverse livelihood strategy and are often exclusive, defined by kinship, neighbourhood or friendship with loose, spontaneous and changeable characteristics. In response to short-term drought or floods in Mozambique for example, households will sell livestock or practice labour exchange to manage reduced family labour supply should members have been forced to temporarily seek paid work elsewhere. The ability to participate in exchange is differentiated by household demography, with larger householders, especially those with more young men, best placed to use the system and secure livelihood stability (see Case A for the gender inequalities to coping). The proportion of the types of these informal networks reflected the level of community stability, with for example a high dependence on external networks indicating that local networks are a particular problem.[26] Maintaining external relationships bring flexibility during times of difficultly. However, certain aspects of institutional control may be highly resistant to change, especially those that perpetrate social exclusion and structure within a society. These patterns tend to be a consequence of changing economic and social history. Coping responses are only a 'snap-shot' of resilience because communities will experience a constantly changing pattern of reciprocity and informal networks. In terms of the concept of 'success' as stability, this can only exist when inclusive

[24] This approach has similarities with frameworks of entitlements (Leach M, Mearns R And Scoones I, 1999 Environmental Entitlements: Dynamics and Institutions in Community-Based Natural Resource Management, World Development, 27 (2): 225-247), Livelihoods (Chambers R, Pacey A and Thrupp LA 1989 Farmer First: Farmer Innovation and Agricultural Research, Intermediate Technology Publications), Access theory (Ribot J and Peluso NL 2003 A Theory of access, Rural sociology 68(2): 153-181) and the Pressure-Release Model (Blaikie P, Cannon T, Davis I and Wisner B 1994 At risk: natural hazards, people's vulnerability and disasters London, Routledge).

[25] Although investing in building social capital requires long-term investment, the act of coping with shocks, which draws on these social mechanisms, tends to be short term response.

[26] This was the case in villages in KwaZulu Natal Province in South Africa where exclusive political networks which provided temporary jobs or remittances alienated the youth and the poor.

networks are reinforced and options within traditional safety nets not replaced (as was experienced in the Mozambique example in Case A).

Case A. Livelihood coping in Gaza Province, Mozambique

Mozambique is one of the poorest countries in the world with more than 50% of its 19.7 million people living in extreme poverty. Development has been compromised in recent years by civil war and conflict, as well as spiralling rates of HIV/AIDS. The government has only recently addressed political decentralisation and local rights. Economic restructuring has facilitated a rapid growth rate in urban areas, but done little to support economic livelihood renewal in the rural areas. Over 80% of the population works in agriculture and fisheries but these mainly subsistence farmers are vulnerable to the impacts of climate variability and extreme weather events. Since 1980, there have been seven major droughts and seven major floods, with an average of 3-4 cyclones sweeping in from the coast each year. The country is also situated downstream of nine major drainage systems for southeastern Africa, resulting in an estimated 50% of water coming from outside the country (making the region vulnerable to flooding during intense rains). With rainfall expected decline by 10-15% and temperatures to increase by 2025, the risk of slow-onset drought is likely to increase.

The ADAPTIVE Project worked with the National Institute for Disaster Management (INGC), Department of Agriculture, University Eduardo Mondlane and Save the Children US in southern Mozambique to assess the characteristics of local responses used to cope with livelihood disturbance, particularly to climate variability and extremes in Nwadjahane village. The research identified a distinct set of generic responses that include trade-offs between reduction/depleting actions and traditional exchange (the cornerstone of resilient risk-averse livelihoods). Reciprocity is used to access labour, food, cash, information, childcare, crafts, poultry, and smallstock (resources that that are limited by formal services).

During 2003-4, ability to reciprocate through informal institutions was practiced regularly by 86% of households in the village as a form of livelihood insurance. A number of traditional practices were identified which have proved effective in helping the community maintain livelihood stability during drought and flooding. These included ‘Kurhimela’ (labour exchange by women), ‘Kuthekela’ (caring for livestock in return for the first-born), ‘Matsoni’ (labour exchange), ‘tsima’ (provision of food or alcohol by a family in return for group farm work), and ‘ganho-ganho’ (food for work provided by the State and NGOs). Effectiveness of these practices has also to be placed in context of the loss of cattle during the1980s drought, a turn-down in regional economy in the 1990s that reduced employment options and the floods in the 2000, which further increased vulnerability. The impacts even hit wealthy farmers who had chosen to specialise by focusing on one type of asset (i.e. rebuilding their cattle herds). There has been increased popularity in certain types of exchange, with more households practising informal labour exchange for example, because of limited access to technology and capital. Effectiveness should also be contextualised within ideas of differentiated dependence (coping reflects increasing dependence). For example, within the ‘moral economy’ households must practice active give and receive exchanges to maintain their safety net, but what if you are unable to participate? Women and small households found this particularly difficult and while traditional informal networks continue to protect social norms and provide effective coping at community level, they can be exploited and this helps to explain entrenched inequalities in vulnerable communities.

Characteristics of adaptive strategies across the ADAPTIVE study areas

The research assessed individual and collective actions to understand how particular institutions mediate the process of adaptation.[27] Farm activities were often reliant on individual actions but for all other adaptations collective action facilitated changes, including commercialisation and building social capital. For example, Case B illustrates the use of collective agricultural projects in Limpopo Province, South Africa, to access markets, microcredit and crop information. Longer-term adaptations could be categorised into three responses (1) changes in the farming practice in the short-term (e.g. changing crop type or variety) (2) exploiting the spatial and temporal diversity of the landscape (e.g. using irrigated, lowland or highland areas) and (3) commercialising livelihoods through individual and collective action (e.g. specialising in a particular marketable crop or livestock product) (see Case B). We used coding that allowed climate dimensions to be identified (it was not necessary to ignore other disturbances) and climate was recognised as a significant factor.[28] Livelihood adaptation is not solely being driven by climate factors; adaptations are being made with a clear knowledge of climate factors. Case B below provides insights into adaptation strategies within context of these other livelihood pressures in South Africa.

Case B. Livelihood adaptations in northern Limpopo Province, South Africa

Northern Limpopo Province has a mean annual rainfall of 400-500mm. Climate data show evidence of a growing length to the dry season, resulting in a later start to the wet season, in late October – early November. In addition, within the wet season there has been a trend towards fewer rain days in November and December and an increase in the overall occurrence of dry spells, in effect representing potentially damaging rainless spells within the growing season. Serious droughts have been frequent in the last two decades (e.g. 1982-3, 1987, 1990, 1994 and 2004). These climate characteristics were recognised by people living in Khomele village, where they were dependent on farming and remittances for their livelihoods.

Households make temporary changes to farming practice to cope with these conditions such as reducing the area of dryland cropping or changing varieties. As the practices were repeated they were adapted to manage the change seasonal variability.[29] These include grinding maize stalks as feed, cutting fodder and wild plants, selling livestock and breeding more resilient indigenous species, planting winter crops and late-maturing fruit trees, using more irrigated land and adopting resilient maize varieties. In the longer term, people have gained access to land beyond their village in an attempt to further exploiting the local spatial variability of rainfall and gain access to alternative water resources. Access has been possible by investing in existing friendship networks to form small project groups, and by drawing on extended family in nearby areas to gain access to new land. The ability to access

[27] Osbahr H, Twyman C, Adger N and Thomas DSG 2007 Successful adaptation: social networks, resilience and climate change, in review Ecology and Society

[28] Thomas DSG, Twyman C, Osbahr H and Hewitson B 2007 Adapting to climate change and variability in southern Africa: farmer responses to intra-seasonal precipitation trends Climatic Change in press

[29] Households use multidimensional coping practices rather than sequencing as generally outlined in the food security literature (i.e. reducing, depleting, temporary moving, regenerative adaptive strategies are used by different household members).

this additional land is now facilitated using the land redistribution policy of the post-apartheid government. For example, five young farmers from Khomele were successful in getting 10ha plots in the Nwanedi farm area. This has given them regular access to river water that is used to irrigate large commercial fields, a resource not readily available in Khomele.

Collective action as emerged as a key way to set up new opportunities to reduce the vulnerability to the risks associated with climate uncertainty. Khomele has a strong profile of community cohesion and consensus around livelihood issues, which helped produced to endure. Agricultural projects that utilised local knowledge and had a market base were the most successful. Small-scale horticultural projects have emerged to supplement the stable crops of sorghum and maize. Species of tomatoes were chosen deliberately for their drought resistant proprieties and short-growing times, even through overall yields were lower than other varieties in good years. The community has managed trade-offs between productivity and longer term resilience. Other projects focused on pig and cattle production to improve food security and income. Many of the projects built on existing groups of people who had built up trust over time so that experimentation and innovation were shared and viewed as risk-adverse rather than risk-prone strategies. Their endurance was dependent on positive reinforcement of traditional networks.

Facilitating sustainable adaptations at the local level

The ability to perform autonomous actions and learn using new knowledge is critical to the process of innovation and livelihood resilience. This is best achieved firstly when there is multi-level institutional involvement in new initiatives. For example, the commercial horticulture project in Case B was carried out by local communities with support from local extension services, commercial associations, local factories, the District Agriculture Department and as part of the Provincial strategy to improve food security and reduce poverty. Second, formal communication pathways were essential to achieving equitable development opportunities. Structured learning forums, training and skills exchange visits helped to transfer innovative new practice and knowledge. For example, the community in Case B was trained with extension officers on crop experimentation and taken to commercially successful projects in the region. Third, heterogeneity in stakeholders was important to the endurance of a project. In particular, individuals within each community with external networks, education or history of migrant work primarily undertook successful individual actions. These individuals were characterised by their entrepreneurial and risk-taking attitudes and were responsible for inspiring success in the village in Case B. 'Capturing' entrepreneurs reinforces young people's belief that self-development will bring opportunities (e.g. maize cooperatives in KwaZulu Natal Province in South Africa has allowed farmers to spread their risk but the initiative was set up by knowledgeable commercial farm labourers returning their community). These key individuals contribute to collective stability because they possess latent capacity to initiate new projects.

The development of formal structures and associations, specifically those that can support responses to seasonal variability, helped provide continuity in poverty reduction strategies and food security. The most successful had links with formal institutions at different scales. For example, the coping responses in Mozambique (Case A) have been supported by government and NGO development of formal

agricultural associations, labour exchange and information transfer (Case C). It is particularly important to understand these polycentric, multi-layered arrangements as they offer opportunities to enhance local adaptive capacity. For example, by promoting networks of engagement (outside the community) this can develop opportunities for microfinance and improved technical or business skills. Where positive reinforcement of local social structures occurs, it is easier for a community to further self-organise and make priorities (as well as opportunities to establish local ownership). In Case B, the collective irrigation scheme in Limpopo, South Africa, facilitated by cooperation between local politicians, traditional leaders and civic representatives, used structured forums to give legitimacy to flexible decision-making structures that promoted inclusive learning, experimentation and innovation. Although differentiated by success across location, farmer-to-farmer learning and training enables individuals to realise their own capacity to make decisions as they move from semi-subsistence livelihoods to those incorporating commercial agricultural opportunities. These characteristics of institutional support are illustrated in more detail in Cases C-E.

The concept of multiple linkages in adaptation projects are more realistic than simplistic representations of coping and adaptation, especially as actions are much less definitive in practice. Local development models need to take a holistic and multi-scalar perspective to livelihood adaptation. This approach will help to explain why adaptations at the village-scale can sometimes impede adaptation at the household-scale; adaptation is a competitive process, subtly differentiated by context, adaptive capacity and perception of risk. Trade offs between productivity and resilience mean that the most resilient systems in the long-term may not be the most productive in the short term. This trade off exists at every spatial scale. Thus, there are limits to adaptive projects and their inherent capacity to support responses to climate change for all. There are also concerns about major threshold changes in socio-environmental systems, which could fundamentally limit adaptation itself (e.g. 2% temperature rises could significantly reduce coffee exports from Uganda, the sustainability of pastoralism in Kenya or lead to the loss of many small island states). For example, research on water supply to the poor in Mexico City identifies the importance of intervention, regulation and government policy in an area that will experience serious water shortages resulting from interacting feedbacks between climate change, increasing water demand and over-extraction of limited resources.[30]

Despite the value of local coping knowledge, we need to accept that there are limits to autonomous adaptation because of numerous constraints (e.g. poverty, poor infrastructure and market opportunities), empirical evidence that suggests the most effective adaptations are multi-scalar, and that the scale of climate change may be such that new thresholds may be reached. Unequal coping processes are exacerbated where formal institutions are weak at the village level. Case A illustrated how local reciprocity remains difficult for the most vulnerable, and these problems are compounded by exclusive informal institutions. Individuals who were able to capture the adaptation process, were able to varying degrees reinforce pre-existing social hierarchies, power and entitlement inequalities. While small households practiced risk-adverse strategies, larger cash-rich households were able to invest in both

[30] Arredondo JC 2007 Adapting to impacts of climate change on water supply in Mexico City, Background paper prepared for UNDP

networks of reciprocity and more specialized livelihood strategies including commercial options. This made them better able to develop networks of engagement across different scales and gain access to a diversity of future options.

However, without formal structures this strategy also has limits. Although vulnerability to the impacts of climate change may be buffered by building a wide network of ties in the geographic sense, Case A illustrated how households that only invested in external ties or a specialized dependent livelihood strategy still risked future vulnerability, should they become unable to maintain the networks. Furthermore, that risk was not exclusive to the poor.

While there is no doubt that cooperative social networking spawns new possibilities for access to environmental resources (Case B), successful adaptation is a learned process and most easily facilitated where there are formal communication channels and responsibilities.[31] Only when individual success was captured by collective actions did individuals not impede the success of village-level adaptation or increase differentiation in capacity to adapt. For example, the limitations to coping for the most vulnerable in Mozambique (Case A) were overcome by agricultural projects that formalized information and skill transfer and gave women in particular new confidence to establish their own collective farming projects that reduced their household vulnerability to drought (see Case C).

2.3 What role for institutional support?

The question is how these adaptive livelihood strategies be strengthened (or undermined) by government action, and how lessons can be scaled up and transferred? Because the problem of climate change is relatively new, there is a danger that the 'adaptation' community could be perceived as reinventing 'development' by recommending the need for action on adaptive capacity. Although institutions of the state and civil society both constrain and facilitate adaptation, top-down solutions have rarely enhanced legitimacy and built on local lessons.[32] It is critical therefore to identify characteristics of appropriate legal, policy and institutional frameworks through which adaptation measures can be implemented. Especially those that permit evolutionary change and learning to be incorporated, and the role of structural and non-structural characteristics.

To identify appropriate characteristics, we can consider the underpinning of institutional theory. Governance, the structures and processes by which societies share power, shapes individual and collective actions and can be formally institutionalised or expressed through subtle norms of interaction.[33] Both influence the agendas that are set to support adaptation actions. For example, the Resilience Alliance[34] have explored characteristics that include: participation to build trust;

[31] Osbahr H at al 2007 Effective livelihood adaptation to climate change disturbance: scale dimensions of practice in Mozambique. Geoforum in review
[32] Nguyen Huu Ninh, Vu Kien Trung and Nguyen Xuan Niem 2007 Coastal flooding in the Mekong Delta, Background paper prepared for UNDP
[33] Young, OR 2002 The Institutional Dimensions of Environmental Change: Fit, Interplay, and Scale. MIT Press, 2002
[34] Website for Resilience Alliance www.resalliance.org/

deliberation to share understanding of the need to mobilise and self-organise; polycentric and multi-layered institutions to improve the fit between knowledge, action and the context in which societies can respond more adaptively at appropriate scales; and accountable authorities to pursue just distributions of benefits and involuntary risks enhance the adaptive capacity of vulnerable groups. This has similarities to approaches that seek to offer organising frameworks for environmental change and social behaviour.[35]

The three Cases (C-E) in this section illustrate the role of national adaptation policy and their multi-scale influence on local adaptation strategies. It is critical to identify the scalar dimensions of practice, or the processes of engagement between different institutions, policy, social networks and agents. Each Case highlights different characteristics. Case C outlines how coordinated national food security, agriculture, poverty reduction and disaster planning policy in Mozambique have helped to support emergent conditions for local adaptation strategies in rural areas. Case D explores the potential role of national adaptation planning in the water section in Malawi and the role of the NAPAs in re-conceptualising linkages between the local and national. Unlike the Mozambique example, there has been an explicit focus on investment in infrastructure as well as human capacity. Case E illustrates the success of a national policy in Mali to provide access to good climate information to farmers in order to support more effective local decision-making.

Case C. Environmental governance and national initiatives to support emergent conditions for adaptation in rural Mozambique

The Mozambique government worked hard with international donors to rebuild the county after the end of the civil war in 1992 and economic growth rates have averaged around 8%. However, the development process has been uneven with rural areas lagging behind the urban centres and livelihoods have suffered shocks from rapid economic liberalisation (especially the collapse of cashew market). The legacy of collectives and forced labour are still evident in social behaviour in rural areas. Accessing productive lowland areas can also be difficult for rural returnees and the ADAPTIVE project found the youth in rural areas frustrated by their subsistence lifestyle.

The government has recognised that disaster risk management is an important entry point for stimulating livelihood adaptation. First, a well-developed national disaster preparedness model, which incorporates actions at District levels has been implemented. Second, 'development ideologies' continue to define the Frelimo government, which has held power since independence and offered a role for coordinated oversight in livelihood renewal. Not all aspects have been positive, for example the process of decentralisation has retained a political and elitist approach and while there has been recognition of the trans-local intersections in society, the role of the traditional-local has politically 'reinvented' to support development ideologies.

It was not until 1999 that a dedicated National Disaster Management Institute (INGC) was mandated to develop disaster plans and link these actions explicitly to poverty reduction considerations. In 2006, a Strategic National Disaster Management Plan was produced, which considers specific measures to prevent and mitigate disasters

[35] E.g. Kite Framework for multiscalar practice - Campbell DJ and Olson JM 1991. "Framework for environment and development: the Kite." CASID Occasional Paper, 10. CASID, MSU.

in the future, including education and vulnerability reduction. At a national level there are institutions to link decision makers to scientists and communicate advice from early warning systems. A cross-sectoral Vulnerability Assessment Committee integrates socio-environmental information as the basis for contingency planning, especially on drought. FEWSNET and the Southern African regional Climate Outlook Forum SAFCOF (part of SADC) supports national forecasting. The National Directorate of Water, the National Institute of Meteorology and the INGC coordinate water and climate information to forecast flooding risk. The government is increasingly using the media to communicate credible information to local communities.

Within the Department of Agriculture, the PROAGRI Programme sought to engage stakeholders with the process of building resilience, especially in small-scale farming responses to slow onset threats such as drought. The programme considered interacting scales and broader development benefits such as food security and poverty-reduction. Agricultural Extension Workers and NGOs provided Service delivery. The programme helped to create choice, security and flexibility at the local level by supporting (1) forms of livelihood diversification[36] (2) collective dual land-use system to access natural diversity and (3) strategic reorganisation during the last five years of local social institutions that formalise reciprocity and facilitate innovation.

These new formal institutions in the ADAPTIVE study village (Nwadjahane) were a catalyst for local innovation (increasing activity by 50%, with 45% using new technologies). The Extension Services sought to revive local agroforestry options, and support market development, which helped empower youth groups and improve land rights. The approaches combine traditional knowledge with scientific information and ensured diffusion of ideas through 'para-extensionists' (trained groups within the community). Over two thirds of the community now access 'insurance plots' (using different parts of the landscape to spread risk) through these formal farming associations. Support from donor organisations and local NGOs facilitated credit options to these farming groups increasing willingness to take risks and innovate.

The ADAPTIVE case example highlights how adaptive responses operate at different scales through the form and timing of response and that scalar practice has helped to create emergent conditions in which people can establish their own objectives and influence. Although farming associations have increased community resilience, their ability to cope with future shocks remains uncertain. Furthermore, household level inequalities are not overcome by these policies, as there is still elite capture. It is important that the government recognise that there is more to facilitating enduring adaptations than building human capacity, problem solving and access to technology. Major infrastructural constraints and poverty continue to constrain opportunities to increase adaptive capacity. State policy in Mozambique needs to ensure that it reflects the complex scalar nature of rural livelihoods and does not reinforce entrenched inequalities. To achieve this, successful programmes such PROAGRI need to be established that consider supporting multiple livelihood renewal approaches, not just in subsistence rural agriculture.

[36] Although benefits are inequitably distributed due to household demography as explained in the previous section

Case D. National adaptation planning and implementation for water resources in Malawi

Malawi is a severely poor country in southern Africa facing an AIDS pandemic, chronic malnutrition, declining soil fertility, shortages of land and inadequate agricultural policies. About 65% of its 12 million population live below the poverty line, the majority in rural areas (90% rely on rain-fed subsistence farming to survive).[37] Exogenous economic shocks and geopolitical events in the region have contributed to Malawi's development performance[38] (e.g. the oil shock, the war in Mozambique and the decline in jobs in South Africa) but current vulnerability is also closely tied to local climate. Between 1970 and 2006, Malawi experienced 40 weather-related disasters, and 16 of these occurred after 1990.[39] In particular, the 1991-2 drought in southern Africa caused suffering to 6.1 million people and a drought and flood in 2002 caused a major food crisis. Increasing numbers of people are affected and there is a fear that food insecurity may become more widespread if drought becomes a semi-permanent phenomenon, because of future global climate change.[40] Evidence suggests that increased droughts and floods are already exacerbating existing poverty levels, leaving many rural farmers trapped in a cycle of poverty and vulnerability.[41]

Reliable water resources will be a particular problem for sustainable adaptation. The government has sought to institutionalise responses that will benefit local communities. However, water is only available from major rivers during June to December and the volume of water (in cubic metres per person per year) is well below the ideal for sustainable human development. Flooding and drought is especially problematic in the Shire Valley in southern Malawi, reducing opportunities for irrigation and sustainable agriculture or fisheries. The worst flooding events were in 1989 and 1991 but drought has become more frequent, with a recent crisis in 2002. With support from international donors, the government has generated policy to build small-scale irrigation dams across some of the major rivers and provide water to rice schemes in the lower Shire Valley and Karonga lakeshore area. Infrastructure investments include mini hydro power plants such as the Wovwe scheme, new boreholes and gravity-fed water supply schemes such as the Mpira-Balaka dam, provision of dykes and levees to prevent floods from destroying crops and irrigation systems, dimba irrigation from streams and rainwater harvesting technologies. One of the main constraints now is access to reliable climate information.

New financial initiatives have also supported farmers' adaptation decisions and addressed their limited investment capacity. Malawi has been the pilot country for index-based weather insurance provided directly to smallholders as a way of dealing

[37] Gandure S and Alam K 2006 Climate change and smallholder farmers in Malawi: understanding poor people's experiences in climate change adaptation, ActionAid Report

[38] Booth D, Cammack D, Harrigan J, Kanyongolo E, Mataure M and Ngwira N 2006 Drivers of change and development in Malawi, ODI working paper 261.

[39] EM-DAT The OFDA/CRED International Disaster Database www.em-dat.net Universite Catholique de Louvain Brussels Belgium

[40] Clay E, Bohn L, Blanco de Armas E, Kabambe S, and Tchale H 2003 Malawi and southern Africa: climate variability and economic performance, Disaster Risk Reduction Management Working Paper Series 7, The World Bank.

[41] Phiri M, Ibrahim G and Saka, RA 2005 The impact of changing environmental conditions on vulnerable communities of the Shire valley, southern Malawi, Lilongwe, Malawi.

with increasing drought risk.[42] Driven by the private sector this goes to the heart of unreliable water resources, crop failure and food insecurity in Malawi. The scheme has been established using cross-sectoral support, and especially building on the existing role of agricultural extension services (e.g. for crop type and conditions). Unlike traditional insurance, it does not lead to perverse incentives for allowing crops to fail. Only when rainfall falls below certain threshold will quick payouts to farmers be made, thus stopping the selling of valuable assets, which undermines long-term resilience. The scheme has brought together a collation of stakeholder groups at different scales and in the future may help to limit large emergency payouts and systematic failure of traditional micro-credit systems after disasters. However, it does not negate the importance of 'safety nets', especially for the most vulnerable and those without access to land, nor does it reduce the importance of establishing credit systems for farmers clubs and facilitating access to production loans.

Malawi's National Adaptation Programme of Action (NAPA) was developed by the Ministry of Mines, Natural Resources and Environment (Environmental Affairs) and completed in 2006. Total costs to implement will likely top US$22.43 million. The NAPA priority project profile is to build on existing structures and initiatives to improve community resilience to climate change through the development of sustainable rural livelihoods.[43] In particular, the government is focusing on enhancing people's capacity to cope with and adapt to drought and flood events in vulnerable areas such as the Shire Valley. Interventions focus on the non-structural elements of adaptation, including capacity building, skills transfer, the need for education, the dissemination of climate information and incorporation of traditional approaches to weather forecasting. International donors have invested in the Malawi Meteorological Department but it still needs to improve its weather forecasting techniques and ensure better information dissemination (which can be supported by regional initiatives and training).

Skills will also be shared on water conservation techniques, such as use of new technologies for canal, spray and drip irrigation and the potential of recycling water (including inter-basin transfers with more storage facilities). The promotion of practices are similar to Mozambique with a focus on increasing the diversity of resilient crops, agroforestry, breeding of rabbits and guinea fowls, and livestock production of animal breeds that are drought and disease tolerant. A revival of agroprocessing is aims to develop alternative livelihoods in addition to farming. However, the priorities are a reflection of the interests of the Department of Agriculture, and it is unclear how market access will be improved, the concerns of urban poor met, or if the Malawian government will create contingencies for climatic variability within the budget (as they have done with PRSPs). It is critical the national adaptation processes enlist support from NGOs and community based organisations, as there are many current barriers. The political culture has both disempowered and corrupted the civil service, progressively undermining the capacity to generate coherent, technically-grounded policy approaches that can be realistically implemented in the long-term. Thus, limited delegation and reporting of the role of district level is evident. It is essential that there is improvement in developing local technical assistance to support these specific adaptation initiatives.

[42] Hellmuth ME, Moorhead A, Thomson MC and Williams J (eds) 2007 Climate risk management in Africa: learning from practice, International Research Institute for Climate and Society (IRI), Columbia University, New York, USA.

[43] Njewa E 2006 Presentation of Malawi Planning for Water Resources, UNFCCC African Regional Workshop on Adaptation 21-23 September 2006 Accra, Ghana.

Case E. Supporting climate information to cope and adapt in Mali

In Mali, rainfed agriculture is the mainstay of most people's livelihoods, but it is highly vulnerable to the frequent droughts in the region. Most of the country is arid/semi-arid and less than 4% can be used to grow crops. Recognising that rural communities need help in managing rainfall risks, the National Meteorological Service launched a climate information project after the drought in the 1970s. Led by AGRHYMET, with technical support from international agencies, it was the first service in Africa to supply climate-related advice and recommendations directly to farmers, and to help them to measure climate variables themselves, so that they could incorporate climate information into their decision-making. A multi-disciplinary group includes members from the meteorological services, the Ministry of agriculture, agricultural research institutes, rural development agencies, farmers and the media. The group acts as a 'boundary institution', bridging the gap between the climate and agricultural communities by translating climate information into useful information and advice for farmers.

The Malian government assumed full responsibility for the 'agrometeorological project' in 2005. Seasonal forecasts are produced by ACMAD using data from international sources for 10-day bulletins to the government for planning. Daily to 3-day weather forecasts are prepared for target areas and broadcast to farmers by radio. The information is combined with advice from Agricultural Extensions workers on when to prepare the land, sow and apply fertilisers or pesticides. Today, farmers consistently report higher yields of maize, sorghum, pearl millet, groundnut and cotton from fields where information is used in decision making, with corresponding increases in farm income of up to 80%. The Organisation de la Haute Vallée du Niger has experienced the highest yields. Addressing soil fertility becomes more urgent where water availability is limited. More than 2000 farmers work directly with the project and many others access climate information through these representative farmers. They make better management decisions that lead to higher yield and incomes, take more risks, invest in new technologies; and actively seek information from other sources to improve future decision-making.

The continuity of national policy has created significant benefits for farmers, reducing their exposure to risk. Success has been defined by political support from the government; long-term financial support from the principal donor, a farmer-centred approach, which has led to the development and delivery of climate products and services that meet user needs; and effective communication channels, especially between representative farmers and multi-disciplinary working groups. The project is continuously being scaled-up and evaluation workshops held every two years. The approach will need to be scaled-up to include more staple food crops to have a significant impact on food security and more importantly address the needs of livestock producers, a much more economically important group. As a project, its endurance will also be defined by access to markets and improved levels of education and training in marginal areas.

The case examples illustrate different aspects of how national adaptation interventions can have positive influences on enhancing local adaptation actions. The weighting given to structural and non-structural components of policy investment is dependent on country and sector. However, in all cases, addressing the underlying causes of vulnerability in the context of sustainable livelihoods is the first step. For these Cases to build longer-term sustainable adaptation, they must do more than support short-term coping capacity within a specific sector. Instead, they must

address social transformation and address the foundations of inequality. While diversity and heterogeneity at the local level is important, extremes of inequality increase vulnerability. For example, traditional pastoral systems in eastern Kenya have sophisticated coping mechanisms but persistent inequality and poverty have translated into limits for adaptive strategies and conflict resolution.[44] The cases also illustrate that adaptive capacity does not need to be built through new 'adaptation' tools because local people and governments know how to do this. The development community has been building resilience through empowerment, participation, accountability and democratisation, as well as coordination and financial transformation to support microcredit and new technologies.[45] Adaptation pathways are successful when part of longer-term activities, which build livelihood stability, self-organisation and innovation.

Amongst the plethora of disturbances, climate does matter to livelihood decisions and the recognition of subtle climate-led changes in livelihoods and common forms of response at the local level indicate the importance of providing development options that consider the role of climate. If targeting the poor, these should clearly be focused on agricultural and water sectors because of their dependency on natural resources (addressing different scales of adaptation would require other sectors to be targeted e.g. energy). The examples highlight some useful policy options that would help to enhance successful adaptation:

- ***Climate tools:*** there is a need for improved tools for climate change data analysis to provide information that is credible. Reinforcing and sustaining climate observation networks is essential if the full potential of climate information is to be realised for individual sectors. However, outputs are most effective for livelihood decision-making when integrated into multi-disciplinary frameworks. The example from Mali illustrates the success of good climate tools and information in improving adaptive strategies for rural farmers (Case E).
- ***Reinforce local support networks:*** informal institutions mediate livelihood stability and it is critical that new initiatives in any sector do not replace or challenge these systems. Although, it is possible to build adaptation options without high levels of community stability, these are unlikely to be resilient in the longer-term. The Mozambique example (Cases A and C) illustrates the importance of recognising traditional social arrangements and coping.
- ***Ensure multi-level institutional involvement in adaptation initiatives:*** this requires investment in institutional capacity at all scales, but especially at the district-local level and participation by local communities. This helps to generate 'networks of engagement', which are critical to shaping human capacity, by incorporating local knowledge and empowering those most affected by the impacts of climate change. The establishment of new agricultural associations in South Africa and Mozambique illustrate how adaptation initiatives are, in a large part, due to multi-level institutional support (Cases C and D).

[44] Orindi V and Nyong A 2007 Pastoral livelihood adaptation to drought and institutional interventions in Kenya. Background Paper prepared for UNDP

[45] Nguyen Huu Ninh, Vu Kien Trung and Nguyen Xuan Niem 2007 Coastal flooding in the Mekong Delta, Background paper prepared for UNDP

- ***Build communication channels and forums:*** to support information/skills transfer and social learning. Improved communication offers opportunities for equitable pathways and decision making by poor people. Success depends on structured forums for sharing knowledge, technologies and skills, especially those that improve education and reinforce traditional networks. All case examples illustrate that this characteristic was best approached as a specific sector-based problem.
- ***Acknowledge the importance of heterogeneity of stakeholders:*** especially at local level where it is essential to capture 'key brokers' or entrepreneurs. This counters traditional aid approaches that target the most vulnerable. Equally, at the district and regional scale, it is important to create decision-making structures that bring together interdisciplinary stakeholders. Evidence suggests this helps to ensure reform is implemented in a particular sector.[46]
- ***Develop innovative approaches to financing adaptation and building opportunities for resilient decision-making***: For example, access to micro-credit options that support local collective adaptation. The funding of relief efforts to support stability and coping are dealt with best through the reform of existing disaster relief funds. Instruments for the disbursement of adaptation funding need not deal solely with climate change aspects, indeed it would difficult to see how these would be defined as separate from development initiatives? However, the move to finance 'specific' adaptation projects in developing countries through the Adaptation Fund is an international priority. It is important to ensure that the private sector is not discouraged from investing in developing countries.[47] The Adaptation Fund will be replenished predominately through the private sector contributions generated in developing countries, and it is aimed at supporting developing countries. However, it is unlikely that the adaptation fund will provide for current demands. Capturing private sector funding may secure funding closer to the figure of US$41bn estimated by the World Bank for adaptation (which does not include retrofitting). Index-based weather insurance and better access to microcredit might help to stimulate local level innovation. Currently these mechanisms still exclude the most vulnerable groups (e.g. pastoralists).

There are wider implications from these local lessons. National and international responses need to deal with 'the local' in governance approaches (i.e. generate practices that do not lose sight of the diversity and subtle differences in place-based opportunities for success). It is clear that the process of adaptation, even for successful pathways, will be competitive. Furthermore, not all development outcomes will be 'win-win' for development and climate change, despite sharing many of the same goals to reduce social and environmental vulnerability. Where are conflicting interests, trade-offs will need to be addressed[48]. For example, development plans

[46] Lemos MC 2007 Drought, governance and adaptive capacity in NE Brazil: a case study of Ceará. Background paper prepared for UNDP.

[47] See Okereke C, Mann P, Osbahr H, Muller B and Ebbling J 2007 What lessons from COP12 in Kenya, Tyndall Working Paper; and Muller B 2006 Adaptation funding and the World Bank Investment Framework Initiative, Background report for the Gleneagles Dialogue Governments Working Groups Mexico.

[48] Klein, R.J.T., 2002: Climate Change, Adaptive Capacity and Sustainable Development. Paper presented at an expert meeting on Adaptation to Climate Change and Sustainable Development,

may increase dependency on climate-sensitive resources, such as rain-fed agriculture, or reforming of water rights can sometimes increase the vulnerability for the poor. There is perhaps a danger of overemphasising local resilience as support for local adaptation is critical now. The role for national bodies should be to support scaled planning frameworks that help to integrate risk management, development and adaptation concerns. The examples illustrate that socio-ecological resilience to climate change can be boosted in specific sectors. The wider governance opportunities for recasting adaptation within the development discourse are addressed in the next section.

Organisation for Economic Co-operation and Development, Paris, France, 13–14 March 2002, 8 pp; Burton I and van Aalst M 2004 Look before you leap: A Risk Management Approach for Incorporating Climate Change Adaptation in World Bank Operations. Prepared for the Global Climate Change Team, The World Bank, 57p

3. Governance for mainstreaming climate change concerns into poverty reduction and development agendas

3.1 The need for an integrated policy approach

Part 2 highlighted the importance of considering local livelihood adaptations to climate change within the context of broader development activities. However, most governments and government agencies in developing countries, and the majority of local level development groups do not adequately address this integration. This may seriously limit the long-term sustainability of current development pathways because future risks from climate change may negatively influence outcomes and create 'maladaptative' societies, which is more vulnerability to climate futures.

It is important that attention on the 'adaptation deficit' is the focus rather than attribution in pro-poor adaptation governance. The challenge is to identify how best a government may develop the appropriate governance architecture, which supports flexibility and livelihood resilience and copes with climate variability and shocks. Mainstreaming adaptation within national development policy is especially important for marginal groups to be able to respond to changing climatic risk. There is a cross-scalar character to climate change (spatially, socio-politically and temporally) that adds significant complexity to governance solutions. The development community has been considering for many years how to address poverty and enable the poor to cope with livelihood disturbance and different risks. However, trends towards participatory development, investment in social networks, and provision of information and new institutions for resource management are a failure unless simultaneously investing in the causes of poverty. Underlying causes of poverty will not facilitate adaptive capacity to be generated in the long-term. Therefore, investment in governance needs to go hand in hand with material development, structural economic reform and the politics of accountability.[49]

This section attempts to review what mainstreaming means in terms of operational, fiscal and integrated policy. Examples illustrate how operational capacities for building adaptation and resilience have been integrated successfully into policy frameworks for poverty-alleviation and disaster reduction. There are overlapping objectives within the adaptation, development and disaster risk management communities for example, which provides an obvious entry point for analysis. Actions that build adaptive capacity across different scales (e.g. strengthening institutional networks or transfer of natural resource management information) are mainly the same as those needed for poverty reduction. However, governments do not always build upon these synergies because responsibility for climate change policies tend to fall to environmental ministries while the importance of climate change as a force on the development agenda is not always well communicated to other departments. There are also a number of unanswered questions about the scale of response, the flexibility of a system to incorporate social learning and the institutional process of delivery itself, such as who defines effectiveness and what role local people play in decision-making?

[49] Lemos MC and Agrawal A 2006 Environmental Governance, Annual Review of Environment and Resources 31: 297-325

3.2 Adaptation governance into development practice: new synergies and conflicts

This section critically reviews two examples of government policy that attempts to mainstream climate change concerns into the national development agenda and activities that aim to create linkages between policy and livelihoods of the poor. The first example comes from Kenya (Case F) and the second builds on the Malawi case (Cases D and G). The paper will then synthesise the barriers to mainstreaming responses to climate change within development planning, positive lessons, as well as explore opportunities for policy synergies at local and national levels, in terms of policy, operational and fiscal perspectives.

Case F. Integrated responses to drought in Kenya

Kenya is prone to flooding and particularly drought; two recent periods of intense drought have caused severe crop losses, famine and population displacement in the country since 2000. With climate change, Kenya faces increased risks. While global climate models suggest that the region from Lake Victoria to the central highlands east of the Rift Valley is likely to experience increases in annual rainfall, regions in the arid east and north of the country are likely to experience decreases. Increased temperatures are likely to exacerbate the drought conditions already experienced and in the future may have a significant impact on water availability. More unpredictability in seasonal rainfall will cause an increase in short heavy rainfall periods leading to flooding, landslides and water pollution. These may be worse during El Niño years.

Increased risk of drought and persistent vulnerability of the poor is likely to impact on poverty-reduction initiatives, national agricultural economy and food security, particularly in the arid and semi-arid regions. The pastoral community may be worst affected.[50] Although mobility and migration are high, this can translate into pressure during drought on both the environment and services. Increased risk of drought will also negatively affect Kenya's wildlife and hence the tourist industry, as well as reduce water supply and hydroelectric power generation.

Nevertheless, Kenya may be well placed to adapt to these challenges. There are strong existing institutional structures that support information transfer and inter-agency planning. For example, the Kenyan Food Security Structure brings together government, scientists, NGOs and donors in managing drought response and planning. A National Disaster Policy and the creation of an overarching national authority within government offers coordination and long-term oversight for mainstreaming future climate change risk, including funding incentives such as a Disasters Trust Fund. The comprehensive network of research centres in Nairobi has led to proactive collaboration between some scientists and users of climate information, especially for training workshops and development of risk assessment tools via International Climate Prediction and Applications Centre. Most significantly, there is a growing recognition that community-based participation and holistic approaches to disaster risk planning and capacity building are central to long-term solutions, with a process of decentralising the identification of cross-sectoral priorities and engaging communities. One specific example of coordinated planning at different administrative scales has been the government's Arid Land Resources Management Project, which support rural livelihoods in the arid areas and is

[50] Orindi V and Nyong A 2007 Pastoral livelihood adaptation to drought and institutional interventions in Kenya. Case study paper for UNDP.

supported by donor agencies and NGOs. The project is unique as a government Special Project because it places livelihoods, economic diversification and adaptation to all risks at the centre of its approach. The government has received further funding from the World Bank to expand its influence because of the project's success.

There are other mechanisms for mainstream climate change concerns at the national level. The government is establishing forums responsible for identifying priorities for integration and adaptation, supported by UN agencies. For example, the policy development of a National Platform (or coordinated meeting committee between government and international agencies) creates opportunities and incentives for national ownership and improved communication on responding to risks in Kenya. This is complementary to multilateral organisations' international programmes on climate change adaptation and development. Another example is the creation of an Inter-Ministerial Committee for Climate Change by the Kenyan Environment Ministry. This committee provides a further mechanism for inter-ministerial liaison. Furthermore, international climate change commitments create incentives for compliance in adaptation policy and mainstreaming by the government (for example Kenya is preparing their Second National Communication to the UNFCCC, which considers future climate change risks on development and cross-sector solutions including education, energy and agriculture). Finally, Kenya has set poverty reduction targets, associated with the MDG and its national economic development strategy incentive, which have begun to create opportunities for private sector involvement.

At the local level, numerous appropriate technology programmes support capacity building of rural livelihoods. The Kitui Sand Dams project is an specific example of an effective and manageable approach to storing and conserving water for use during the dry season. Sand Dams are a small-scale community-led technology promoted by the SASOL Foundation. The approach builds the adaptive capacity of people, which is seen as vital to improving current conditions and preventing further livelihood deterioration under future climate change. The methodology encourages stakeholder dialogue, provides database development and brings long-term sustainability improvements.

Case F highlights some specific approaches to mainstreaming by the Kenyan government that focus on coordination, placing livelihood of the poor at the centre of the approach and providing economic diversification and adaptation funds. However, the county faces a number of constraints that will continue to hinder the process. A research report made for the Vulnerability and Adaptation Resource Group, a partnership between major donors and NGOs, identified a number of specific issues.[51] There is inadequate data provision for risk assessments over different timescales and a need to improve networks for information exchange and capacity building at the local level. Uncertainty in future impact and the lack of trust in science by users, both at community level and by policy makers, partly results from poor communication. Poverty, poor infrastructure and high vulnerability to disasters are fundamental constraints to the development process. As the case example illustrates, there have been some advances in institutional coordination. Economic planning will need to continue to consider the impact of climate change risk on all sectors and limited funds

[51] Osbahr H and Viner D 2006 Linking climate change adaptation and disaster risk management for sustainable poverty reduction: Kenya country case study. EC Report, VARG

for Special Projects will restrict their success. Piecemeal cooperation with donors and regional partners and agency-centred planning have not enhanced the ability of the government to coordinate its response and develop multi-layer of risk tools. Short-term funding horizons, diverted resources to emergency relief and difficult political dynamics, including lack of leadership and formalisation of policy with proscribed windows are a common problem for many countries. A case review of Brazil outlines similar problems in Brazil for example.[52]

Five specific opportunities provide entry points and mechanisms for improved mainstreaming in Kenya. These are: (1) the application of advanced technology and identification and evaluation of risk; (2) forums for communication between scientists, decision makers, NGOs and communities; (3) the development of a coordinating framework to facilitate oversight and national ownership; (4) the development of structures that facilitate continuity of policy and promote flexibility of approach; and (5) funding priority, regional partnerships and coordinated financial tools. Mainstreaming disaster risk reduction and adaptation brings multiple benefits and is politically attractive because it can help poverty reduction, reduce the high costs of disaster response and empower marginal communities. The National Economic Recovery Strategy serves to tackle underlying vulnerability and poverty, which is especially important for slow-onset disasters like drought. Budgetary allocations to 'climate-proofing' the development agenda will increase awareness of the importance of disaster risk reduction in adaptation projects. These five areas of opportunity in Kenya are discussed in more detail below.

The focus on improving technology for the identification and evaluation of risk will require investment in user specific models and application products. National meteorological services can take a lead in developing these linkages. Existing networks and ground-truthing activities help to aggregate other types of data into integrated early warning systems. Improvements in downscaled climate models which provide better national information for decision making is currently being developed through regional collaboration for data integration and exchange. Improved collaboration and communication between different stakeholders can be developed through existing structures designed to raise awareness (e.g. within Ministry of Environment, climate change department and Inter-Ministerial Committee for Climate Change). These existing forums and centres bring together expertise (e.g. UN-ISDR hosted workshops, training forums, invest in 'translators', working manuals, media, technical committees) and support regional links. It remains essential to extend existing efforts to engage communities, through the extension services provided by the Ministries of Agriculture, Livestock and Water and NGO projects. Projects that protect livelihood assets and build local capacity (e.g. Special Projects in arid lands and water management) will enhance cross-sectoral and multi-scale coordination.

There are a number of opportunities to establish coordinating frameworks at national scale, through the implementation of the recommendations in the National Disaster Policy, which would coordinate stakeholders and initiatives operating at different scales. Building on cross-sectoral liaison within existing disaster and hazard structures

[52] Lemos MC 2007 Drought, governance and adaptive capacity in NE Brazil: a case study of Ceara. UNDP case study paper.

and monitoring research and NGO outputs would encourage collaboration rather than duplication in activities. Institutional structures to implement these frameworks need to ensure continuity of policy. This requires clear responsibility, investment in extension services and partnerships with local communities. Flexibility in approach can be promoted through decentralised responsibilities and skills, and by allowing risk plans and monitoring to be updated regularly (for early warning systems, District level coordination through Steering Groups or Technical Committees within the Kenyan Food Security Structure for example). At the national level, development of the National Platform forum and National Adaptation Programme of Action (NAPA) are tools to mainstream climate change adaptation policy, initiate systematic development programmes and enhance national partnership with UN agencies. The Inter-Ministerial Committee for Climate Change should be used to generate a culture of mainstreaming risk and adaptation by capacity building within government and establishing consistency in government contact.

It is critical to identify mechanisms to increase funding priority, regional partnerships and coordinate financial tools for integration in Kenya. The National Disaster Policy aims to introduce a Disaster Trust Fund, explore risk transfer mechanisms (e.g. through insurance) and enhance formal donor partnerships. Sharing costs and expertise at regional and District level can be improved by regulation, building on regional partnerships and engaging NGOs and the private sector (for example, Kenya's Special Projects). Institutional capacity building and collaborative projects increase awareness of international funding and strengthen links to development banks and donor agencies. The Global Environment Facility has been used to address concerns from the national adaptation plan.

Case G. The challenge of multisectoral coordination to overcome drought and floods in Malawi

Inappropriate government policies have increased vulnerability and undermined attempts to adapt in Malawi. Food security is defined largely by the availability of maize and policies to intensify production have been encouraged. The rapid economic growth after 1964 was based on unsustainable development policy and rapid economic liberalisation did not address the underlying structural problems to poverty. For example, the loss of agricultural subsidies to farmers in 1994 and the privatisation of seed companies increased the costs of short-season hybrid maize seed and fertilisers. However, less capital-intensive local varieties have become generally unavailable now, which favours commercial farmers over poor smallholder farmers.

The impacts of climate change in Malawi exposes these underlying causes of food insecurity. For example, without livelihood alternatives, there are often inappropriate land use practice and deforestation, exacerbating drought and localised flooding. Weak enforcement of Malawi's forestry laws has led to local rights abuses by powerful tobacco estates that clear indigenous forests. The government ideal of agricultural commercialisation as a route to development has failed the poor. For example in 2004, Malawi was at the edge of an abyss with a collapse in the national economy and an absence of productivity enhancing measures for smallholder agriculture. Increasingly large numbers of people forced to move because of poverty and regular flooding of their farms are now seeking employment on small-scale

sugar and tea plantations. However, there are limited jobs and income opportunities, increasing negative social consequences.

Existing local government capacity cannot currently support the challenges smallholder farmers face in adapting to climate change. Local government is limited by support for the formulation of policies, a lack of knowledge of disaster and environmental management policies, a serious lack in funding, capacity building and implementation advice. Development and adaptation to climate change remain addressed as separate issues by the government and there is a lack of intersectoral coordination for the implementation of climate-related activities. Planning and management of climate change and disaster management is currently carried out on a sectoral basis, with limited involvement from local communities. This will ultimately hamper effective development and capacity to adapt to future impacts of climate change. The National Adaptation Programme of Action (NAPA) for Malawi is the central guide to adaptation priorities and a priority for the water sector to ensure community resilience is given in section 2. However, the NAPA exists in isolation to policies being developed in agriculture and environment for example, and NGOs have raised concerns that health and gender, as well as district priorities, have been ignored.

It is imperative that a multi-sectoral governance approach is developed in Malawi, and that those who are affected most by climate change are included in this process. However, the roots of poverty are grounded in the very nature of political and social order and limited progress in constructing a 'developmental state' in Malawi. While this has brought benefits to the middle classes, democratisation has not brought rapid benefits to the poor. This partly because policies have not been pursued consistently and partly because the private sector has not been encouraged. Moreover, society in rural Malawi finds unity and collectivism in the value system an appealing way to cope with uncertainty, although social relationships are still characterised by inequality. Traditional attitudes are a barrier to entrepreneurial innovation.

The lack of public policies to facilitate the large infrastructural investments that Malawi needs (such as roads, schools, healthcare, energy and water supply and agricultural extension services), means that local entrepreneurs prefer turnover in the service sector and there are few foreign investors in the sectors that would support the poor. Recent political realignment and a new president offer a window of opportunity to promote more developmentally-oriented policies and procedures that give consideration to climate change risks. It is critical that these barriers are overcome and the opportunities as described in section 2 acted upon. There needs to be greater decentralisation, better use of local staff and less implementation of elaborate performance assessment frameworks that hinder operational and fiscal innovation.

The Malawi case example describes a quite different picture to Kenya, with less progress in integration. Malawi needs to reduce vulnerability to climate change by increasing awareness, ability of the poor to access technologies and improve practical action on developing flexible economic livelihood opportunities. For example, poverty is a major cause of deforestation in the drylands with 90% of the population dependent on wood fuel. Deforestation has negative feedbacks on land use cover, the rural economy and causes sedimentation in waterways. Yet, there are limited funds to implement policy and land allocation to the rural poor and reforms are slow.

There a number of specific opportunities, however, that could be used to support adaptive pathways for the rural poor, in particular those that build on existing service delivery mechanisms and policy proposals in the Malawi Poverty Reduction Strategy plan. The plan focuses on improved resource management, technological advancement, and social and economic development. Based on pro-poor growth, human capital development, improvement of quality of life and good governance rules, the government has prioritised basic infrastructure, such as sanitation, roads, dams, electrification and schools (although it is unlikely the costs will be met). It is also important that District authorities enforce 'no development' in areas vulnerable to regular floods and mudslides.

In addition, the Poverty Reduction Strategy Plan sets money aside for 'social safety nets', which ensure that poor households can rebuild their livelihood assets after a disaster and not become trapped in a cycle of vulnerability. Contingencies will need to be included for climatic variability and diversification encouraged. It is essential that there is better integration between the national adaptation plan and government development sector-specific objectives, perhaps by focusing on specific themed issues that cut across different sectors (e.g. in energy). The Malawi adaptation plan has a strong agricultural focus, with specific actions to improve dissemination of information (e.g. improved crop/agroforestry varieties, and livestock breeds, which are drought and pest resistant), build communities grain storage and enhance food distribution. These initiatives aim to build on existing local knowledge (e.g. promote the inclusion of *faidherbia albida*, a tree that sheds leaves during rainy season releasing nutrients and allowing crops to grown under its canopy). Reduced corruption would increase funds towards these extension services, with mechanisms for climate information access and better services to rural areas. Their value is demonstrated by the increased agricultural production where input services have risen, even in areas that were previously declining.

What general lessons can be learned from the case examples?

Overall, the assessment of climate change adaptation, disaster risk management and poverty reduction integration in Kenya and Malawi suggests that the climate change community has failed to leverage adaptation yet in a way that takes on the fundamentals of poverty and politics. The risks of climate change must be communicated as a development issue, in development terms and with clear analysis of the economic implications of climate related risks on development processes. There are some general lessons to be concluded about the constraints and mechanisms for integration that could enhance adaptation to climate change.

Existing constraints to integration are primarily in areas of identification of risk and communication of the impacts, the coordination between different parts of government and limited funds to turn policy into practice. For example, inadequate provision of high-resolution meteorological data for detecting trends and validating models in Kenya means that there is insufficient incorporation of the implications of climate change in risk assessments. In Malawi, limited physical (e.g. hydrological) and socioeconomic datasets for assessing risk limits the identification of practical adaptation options and understanding of future risk. In Malawi in particular, there was weak coordination mechanisms regarding climate change adaptation, under-development of a preventive, disaster risk reduction approach and discontinuity in

policies and structures. Both cases illustrated that most local level projects to address climate change adaptation are fragmented institutionally and these tend to be donor-driven. Disaster emergency response also continues to divert funds away from the local development agenda.

A number of mechanisms and incentives to act as entry points for integration can be seen in both case examples. Improving the science base for forecasting and modelling climatic conditions at different spatial and temporal scales can be used to relate hazard information to vulnerability factors. The structural changes in Kenya illustrate how improved procedures for hazard diagnosis and risk assessment and the regular updating of disaster risk assessment and management guidelines provides flexibility over time. Building on existing coordination structures will enhance communication between science and users, both at the nation level by capturing political momentum after major disaster events or community project activities that focus on addressing underlying vulnerability. While there is not one solution for these problems, providing alternative livelihoods and coordinated structure has been central to successful dryland projects (e.g. Kenya attracted funding for long-term risk management in the Arid Land Resources Management Project, while the dryland Omayed Biosphere Reserve in Egypt now supports pastoral practice).

Integration can support improved governance and infrastructural prioritisation. The complexity and multiscale character of climate change requires hybrid modes of governance across the state-market-community division. Multiscale governance mechanisms can counter the fragmentation that is characteristic of sectorally based decision-making, or indeed of decision making that is organised by territorial, social and political divisions. The involvement of public-private networks in multi-scale governance is aimed to enhance the representation of the diversity of interests that may be affected by climate change (e.g. within the political process of agricultural governance in Brazil or water regulation for Mexico City). At the same time, integrated strategies are conducive to compromise-seeking and social learning, often enabling less formal modes of decision-making, greater transparency and higher levels of representation. Hybrid forms are complementary to the dynamic and fast changing nature of contemporary environmental governance in developing countries.

Moreover, building adaptive capacity is hardly a new development approach but should be treated holistically. Interventions that consider climate risk can build on existing policies that consider risks to livelihoods and be embedded in existing delivery systems. Climate change adaptation should be grounded within a concern for vulnerability reduction, which brings multiple benefits. It is important to offer convincing demonstrations of on-the-ground livelihood activities, especially where single development pathways have been counter-productive to marginal livelihoods. For example, in Egypt approaches for managing dryland biosphere reserves provide opportunities for local communities to develop integrated technologies and alternative livelihoods whilst still maintaining their cultural and societal fabric.[53]

Cross-scale governance mechanisms are often shaped by non-state actors, such as NGOs, transnational organisations, multi lateral organisations, intergovernmental

[53] Salem B 2007 Biodiversity management and livelihood development in the drylands of Egypt. Background paper prepared for UNDP.

organisations or market-oriented actors (e.g. companies). The reconfiguration of environmental governance so that the state is no longer the only actor viewed as capable of addressing externalities has enormous implications for adaptation and development. The promotion of individual incentives, new property rights and markets in relation to water and carbon, and encouragement for the corporate sector need to be carefully implemented to ensure they do not have negative impacts on the poor or increase inequality in the allocation of environmental resources. For example, those who are able to access resources and expertise in relation to these new opportunities will be more likely to derive benefits from them. The commodification of nature and increasing intergenerational equity should also raise concern. As redistributive policy making becomes necessary (i.e. for adaptation) it is unlikely that either the market or hybrid forms of governance will be enough to accomplish it. This raises a number of questions. How should we rethink governance structures for integration and how will these alter development frameworks? Can practical recommendations for integrating adaptation into wider strategies for human development be organised into practical actions? Strategic frameworks for integrating adaptation currently tend to focus on (1) understanding current vulnerability-livelihood interactions and how the poor already build resilience through current capabilities (2) the barriers and enabling factors that have facilitated implementation of adaptive measures (3) the institutional processes through which adaptation measures can be implemented and (4) how climate change adaptation strategy can complement development policy. The follow sections offer specific policy points that highlight mechanisms by which adaptation concerns could be integrated more effectively to ensure sustainable development outcomes.

Invest in 'boundary institutions' that help to bring climate information to bear on sectoral planning and decision making

These institutions can act as intermediaries between scientists and sectoral managers, 'translating' knowledge into practical guidance for the organisations that wield decision-making authority and can help clarify the needs of decision makers. For example, in Kenya measures to integrated the Food Security Structure with longer term livelihood planning. It is important to strengthen services that can package and translate scientific data. Emphasis should be placed on training professionals, relating scientific information on risk, vulnerability and adaptation options in a form that is accessible and meaningful to decision-makers especially in key sectors such as health, climate forecasting, agriculture and water. Budget provision could be directed toward training in-house staff or toward building the services of institutions that already have expertise to filter hazard data and turn it into useful information. For example, creating forums for communication at the local level will strengthen the integration of climate information and advice on adaptive measures into local contexts and build trust in external information. This may be fostered by development of skills and capacities at the local level, including systems of training of 'trainers' or 'para-extensionists' to interpret risk information. The Kenya Arid Land Resources Management Project advises District Steering Groups and provides support to Agricultural and Pastoral Extensions Services.

Invest in improving information on climate, models and vulnerability

A continuous priority in many developing countries is maintaining and strengthening meteorological observations. There is a need to increase policy level awareness of the importance of continuous climate data records for risk evaluation and prevention, and strengthen support for improved climatic data coverage across space and time, and regular updating and monitoring. However, in many cases, the problem is not lack of data but problems of securing access to global, regional or national datasets, especially for independent scientists and local stakeholders. Efforts should be made to reduce barriers to utilization of existing datasets. At the same time, consideration should be given to assessing and, where appropriate, utilizing alternative data sources, such as local and traditional knowledge, which can provide initial insights into (changing) hazard exposure and conditions of vulnerability. Many of these needs can be overcome by collaboration (e.g. through the development regional climate science networks in East Africa). Likewise, collaboration can help to build capacity in and between developing countries, in order to model long-term climate changes and downscaling output.

Output must be oriented towards achieving development outcomes, even by meteorological services. Risk is not just an outcome of physical climate/hazard processes; risk is the combined product of physical exposure to hazards and social vulnerability (i.e. characteristics of people and society that shape human vulnerability). In order to understand the character and dynamics of risk, there is a need to create opportunities for better integration of physical and socioeconomic data, including information relating to population vulnerability, sectoral economic risk and critical infrastructure, and awareness of trends that affect vulnerability over time. Risk is also likely to vary greatly from place to place and better location-specific analysis would capture the context-specific dynamics of risk under a changing climate. This would improve decision making, especially for smallscale farmers, as in Mali. It would also support sustainable land use planning, a critical requirement for an adaptation tool in vulnerable urban areas.

Identifying appropriate adaptation options requires a consideration of risk over different timescales. Risk management strategies will vary by activity and livelihood sector thus making flexibility central to approach. For example, planting practices can change from season to season, but shifts in crop cultivation also require appropriate market access and change in human behaviour, which require longer-term preparations and multiple livelihood support. The success of the Arid Land Resources Management Project and Livestock Services in Kenya now offers a model for dryland action. Risk assessment tools that work over different timescales should be targeted at or used to identify key sectors for investment, such as the water sector in drought-affected areas. The tools that work best tend to be demand-driven and shaped by user needs.

Encourage institutional innovation and coordination

There are already centres of excellence in developing countries that can play a key role in sharing knowledge. While solutions will differ by country and cultural setting, it is important that institutional arrangements are put in place that enable networks and partnerships to develop and implement innovative, problem-focused climate risk management programmes. There is a need to strengthen and develop multi-sectoral structures and networks that improve awareness of disaster risk and climate change

and facilitate the integration of policies and measures. It is important to build on existing institutions and networks, rather than seeking to create new ones.

Coordination and integration should ensure feedback between national and local activities. At an international scale, the strengthening of regional partnerships can enhance political momentum for national coordination. For example in helping to improve structures that are mandated to provide long-term planning oversight and consider changes in risk exposure over time. Political leadership is a characteristic of lasting momentum towards integration of adaptation and development. Prioritisation will require a strengthening of incentives for integrating risk management perspectives into economic planning and development policies, especially through better regulation. Mechanisms for promoting mainstreaming of adaptation and disaster risk reduction across policy in the long-term will vary according to political/institutional context. At the national level, it may be important to identify a clear leader on disaster and climate risk management efforts with influence on budgeting and planning processes to increase emphasis on a continuous approach to vulnerability reduction. In many cases, this falls within different Ministries so it is necessary to use National Platforms to facilitate this process. It is important that Ministries responsible for budgetary allocation are involved in the process of mainstreaming (as now recognised in Kenya).

Strengthen local level capacity to initiate and implement adaptive measures

Largely, policy work exploring the human dimensions of climate change has tended to be donor-driven, and work is needed to build the capacity of both local authorities and communities to initiate and implement adaptive measures. However, it is important to evaluate critically the applicability of local knowledge in the context both of development aspirations and of long-term changes in hazard intensity. Promoting systematic knowledge sharing to identify priorities, promote the rapid and effective uptake of innovative practices, technologies and results will help strengthen the sustainability of projects that tackle long-term goals and avoid exclusion of the needs and priorities of marginal groups.

At the local level, climate risks are experienced as a product of climate variability. Climate change introduces a trend that is superimposed on this natural variability, leading to changes in average climatic conditions and exposure to extreme events over time. Given that climate risks interact with other environmental and socioeconomic risk factors, it is crucial that efforts at the local level focus on addressing the current adaptation deficit to climate variability, as well as climatic trends that are already having an impact. In this context, there is a question as to when climate change concerns should be introduced as an additional or separate issue at the local scale. The challenge for overarching policy interventions and planning processes (especially the focus on ‘adaptation projects’) lies in helping communities and households to address current climate risks, while avoiding solutions that become maladaptive in the medium to long-run. In most cases, attention to climate change risks in practical projects on the ground cannot take too narrow an approach if it to lead to actions that are truly sustainable in a development context. Underpinning this view is the belief that promoting livelihood resilience will be a fundamental advance toward adaptation for low-income populations. Linkage of climate change adaptation, disaster risk management and poverty reduction may be put into practice most effectively in

initiatives that target a specific poverty issue or development goal. Cross-cutting themes on issues such as water resources and climate change, or dryland livelihood development, can bring a range of different stakeholders and institutions together. Reducing poverty and inequality through increased development assistance will help individuals and communities become less sensitive to climate change and variability.[54]

Identifying entry points for adaptation

A key step is to demonstrate, through operational work, that disaster risk reduction addressing climate change is possible and beneficial. In this respect, it is important to find potential 'entry points' that can showcase both how action is feasible, building on current capacity, and how benefits can be linked to current vulnerabilities and to high-level policy goals, such as poverty reduction strategy targets and the Millennium Development Goals (MDGs). The Hyogo Framework for Action, adopted at the World Conference on Disaster Reduction in Japan 2005, offers comprehensive disaster reduction policies that should be implemented at local and national levels as an urgent adaptation measure. NAPAs for developing countries can also be used to identify priorities for investment. The next step is to quantify the economic impact of climate variability and change and the benefits of climate information in climate sensitive sectors.

3.3 Stakeholder responsibility and mechanisms to fund adaptation

The development community makes assessments based on ideals from different actors. There is a need to clarify such perspectives; where does information come from and how does it get used? We should careful of displacing local perspectives with technological and bureaucratic constructions. There needs to be more effort to build institutional capacity in developing countries in order to rebuke false notions and promote south-south exchange. Where ideas come from has implications for development pathways. There is a role for the oversight offered by donor agencies because those who are adapting, especially at a local level, cannot always prioritise outside their own individual experience. However, there is a need to understand better the choices over different timescales and by different geographical regions. These differences go to the heart of the divide between the policy community, who need to make decisions for the near-future, and the climate science community, which urges caution about decisions based on current uncertainty and which may lead to 'mal-adaptations' or future 'dangerous development'. In reality, it is clear that there are lessons that we can learn now from local level case studies. Intuitive decisions should be supported to improve risk management frameworks for the poor today.

The cross-scale nature of the climate change problem is the central challenge for donor and NGO approaches. Is society inherently resilient and able to adapt, or do the impacts of climate change mean that we need to scale up our thinking beyond traditional development approaches? We should not over-emphasise adaptive society because the impacts of climate change may mean that thresholds beyond which

[54] Eakin H and Luers A 2006 Assessing the vulnerability of social-environmental systems. Annual Review of Environmental Resources, 31: 365-394.

people can cope will require development interventions to support local experiences in a sensitive manner. The question is then how to scale our responsibility up to reach the millions of communities necessary in the next ten years? Donors would agree that there is a need to find ways of energizing behavioural change through the good use of climate information for development decision-making at all scales. This will require greater rural extension, capacity building and communication efforts.

High-level policy dialogue can complement bottom-up approaches within countries, giving greater visibility to in-country expertise. Given that increasingly development assistance is channelled through programme budgets rather than individual projects, the role of donor agencies in the dialogue on climate risk management has to be considered. Donors will continue to use existing policy mechanisms to facilitate policy windows and forums for discussion (e.g. for national government plans and reforms, such as Poverty Reduction Strategies, NAPAs, the UNFCCC process, or National Platforms). However, the use of conditionalities by donors in order to promote, often complex, reforms can generate nominal compliance. There is a need for better interaction between government and donors. Development policy and advocacy has not been consistent through time or across the donor community. This is especially the case in agriculture, where individual donor agencies have changed their approach and advocacy messages. Short-termism, competitiveness and politics characterise donor approaches as much as governments. There are three responsibilities to consider:

1. **Improved continuity and engagement** are vital for long-term change, based on an understanding of the local political economy. Proactive engagement by donor advisory staff in identifying the specific issues on which incremental changes in incentives for change exist are critical. Whilst developing countries need to prioritise and implement their National Adaptation Programmes of Action, international donor agencies need to assess the extent to which their investment portfolios in developing countries might be at risk due to climate change and take steps to reduce that risk. Many donor agencies are developing risk-screening tools.
2. It may be easy to be cynical about new aid policy agendas around adaptation and development (e.g. building country policy ownership, aligning programmes with PRSPs, adopting programme modalities such as SWAps and budget support) but the case study evidence suggests that they have made some progress. For example, Special Projects and Food Security Structures in Kenya are funded by donors but managed by national government. **Aid harmonisation**, informed by joint agreement on donor response in each country, needs to be addressed but this again reflects the scale of action. For example, a co-ordinated effort on a continental scale might alter the incentive structure facing the leaders of individual countries in a way that donor action at the country level cannot. It is also worth distinguishing traditional programme aid with objectives linked to specific projects (e.g. GEF) or macro-economic stabilization and directly related policy reform, and new-style direct budget support viewed as a means of financing the implementation of a PRSP and enhancing relevant government capacity. Increasing policy ownership requires identifying viable entry points for these new agendas within the structural determinants of the weak policy capacity of a state.
3. **Flexibility** - the need for an approach that includes learning, where incentives to use information are built-in and programme designs allow low-cost switching of method or components when initial assumptions are called into questions. This

will be a vital characteristic of developing responses to the uncertainties around climate change.

The boxes below outline two examples from donor agencies to illustrate their attitude towards these three responsibilities and perspectives towards integration and policy collaboration.

The UK Department for International Development is increasing its capacity to address climate change; the UK White Paper 3/G8 describes a new priority for climate change. DFID will also complete climate risk analyses for six major aid recipients in 2007 (Bangladesh, China, India, Kenya, Ethiopia, and Ghana). More generally, the 2002 Monterrey meeting of world leaders led to the 2005 Paris Declaration on Aid Coordination and an 'un-tying of aid', which has facilitated better coordination between donors. Major new promises at Gleneagles suggest increases to ODA of $50 billion by 2010 (above $107 billion in 2005) and further EU15 promises raising it to $66 billion by 2015. National Development Plans are central to how ODA funds are distributed and therefore policy priorities can be driven by recipient countries. DFID sees adaptation as a long-term investment. First, improving information, identifying risk and establishing the conditions for individuals to act (including regulatory frameworks). Second, adaptation will include "targeted resilience-building" through measures like domestic spending for ODA, prices, and investments. There has been a recent shift in offering more fundamental support for national budgets, especially for building governance capacity and flexible structures, although half the spending is made through the EU. "Pure adaptation measures" can only be a small fraction of total livelihood adaptation, although operational definitions are unclear about what will be 'good'. Examples of adaptive approaches to development will continue inform future development planning, however, these will need to demonstrate the added development value and impact to operations, in order to create the right development architecture. There is also an increasing effort to ensure that sections of DFID that support disaster risk management and those that focus on adaptation find collaboration opportunities.

From 1984 to 2005, the World Bank spent $26 billion to rebuild after disasters. The value of an integrated risk and natural disasters approach is that disasters expose existing adaptation deficits, in particular, the failure of development planning to address long-term adaptation to risks and climate change. The costs of adaptation may be higher and impact on any development reform the Bank funds. There is an economic case for funding preventative adaptation efforts and the World Bank has been involved in awareness raising, the development of new concepts and methods, and the funding of pilot projects experimenting with adaptation interventions, as well as mechanisms for mainstreaming these strategies. In particular, there has been a focus on poverty reduction and new investment frameworks, which in 2006 included the consideration of climate risks in the energy sector planning for the first time. Risk Screening Tools, the development of process indicators and the shift in funding towards support for adaptation to climate change has allowed country-level efforts in the Caribbean, Columbia, the Andes, Kiribati, and Africa. Recent funding has focused on integrated pilot projects that deal with the impacts of climate change on rural livelihoods in a holistic way (e.g. the Arid Land Resources Management Project in Kenya).

Valuing adaptation

Funding for adaptation and development interventions are vastly insufficient to address the scale of the problem. Costs are uncertain, but may range from US$9-40 billion a year, merely to address current investments. It is politically very unlikely that bilateral donations could ever generate the sort of money needed to cover the cost of adaptation in developing countries. To value adaptation, a financial/business case for adaptation in national budgets must be highlighted. Planning and Finance Ministries need to be explicitly involved in this process rather than priorities made by environmental ministries. Financial incentives need to be improved for disaster risk prevention as a complement to emergency relief. Arguably, demonstration of the cost effectiveness of adaptation is a prerequisite for concerted action and investment. Improvement is therefore needed in the tools for evaluation and the ability to direct funds available in national budgets for preventive and adaptive aspects of disaster risk management. Application of tools such as cost-benefit analysis to evaluate activities with long-term and complex social benefits is problematic because it is difficult to cost cultural benefits that may increase inherent adaptive capacity in the future. This is a specific area of further research and pilot studies are needed to test the applicability of these and related methodologies.

There is a clear distinction between ODA and international transactions, and a need for educating developing countries on where and how to get international funds, especially given inequity in power and capacity between LDCs. The balance in power over who is responsible for mainstreaming decisions must be considered more honestly. There are a variety of financing sources, including the funds of the UNFCCC and trust funds of donor agencies. There are four funds under the Framework Convention on Climate Change and the Kyoto Protocol: the Special Climate Change Fund, the Adaptation Fund, the Least Developed Countries Fund, and the Adaptation Trust Fund, which total about $200 million total. The history of aid suggests that national budgets will not be a reliable and adequate source of funding for adaptation to climate change. As a result, these funds have begun to engage with ideas of international tax, but may need to go further. Funding adaptation is no different from development planning, and may be more urgent. Yet at a national level, developing countries that are more powerful are successfully capturing the vast majority of development aid, CDM projects, and adaptation aid. Improving this inequity requires an informed understanding of the geopolitics of aid and international negotiations over climate and trade.

The Adaptation Fund of the United Nations (UN) Climate Change regime is in many ways unique. It is outside the direct sphere of influence of countries, specifically the United States. It is able to generate money through a two-percent levy on the emission permits (‘Certified Emission Reductions’ CERs) generated by emission reduction projects under the Kyoto Protocol’s Clean Development Mechanism. These projects are carried out in developing countries predominantly by private sector investors, and the 2 percent share of the CERs generated by the projects is to be collected directly by an intergovernmental agency (the CDM Executive Board) and monetized by the Adaptation Fund. In other words, it is in essence an international private sector tax, which could set a future precedent. The revenue generated until 2012 is projected to be between $160m to $950m, while the funding presently given to or pledged by donor countries to the other two climate change funds is around $170m. Alternative

sources of revenue are key to overcoming the 'adaptation deficit', particularly in developing countries. As a financial instrument dedicated to specific adaptation activities, measures will need to be put in place to assess eligibility and legitimacy of project applications.[55] But who will define this? And can the fund deliver the dual needs of development: funding for general development assistance to reduce vulnerability through budget support and funding for specific adaptation projects and risk spreading financial arrangements? If funding is provided for specific projects, and not poverty reduction and livelihood development would the adaptation be sustainable? Resolving the threats associated with one hazard will not necessarily help vulnerable groups over come lack of basic entitlements.

In general, it has to be recognized that public sector financing will not suffice to reduce vulnerability to disaster and climate risks. Foreign direct investments often dwarf official development assistance and it is important to explore how the private sector can engage in adaptation mechanisms. It is important that governments develop policies to promote private sector investment in adaptive projects and influence development practices through improved awareness, incentives and regulation. For example, considering the role of risk transfer and credit schemes in buffering against climate risks as is being piloted in Ethiopia. In this context, insurance products, especially weather index insurance systems (e.g. providing payments during drought), can play a viable role if tied to efforts aimed at vulnerability reduction. Donors can play a role in helping governments think beyond aid by capacity building within Ministries. Governments will need to consider new financial instruments such as weather derivatives, weather market capacity securitisation or reinsurance. The private sector could also usefully engage with government at different scales to achieve provide advice and support in developing countries[56]. There are questions about whether funds to private sector will be supporting adaptation that would have occurred anyway, and that early adaptors will accrue private benefits from their preventative actions? However, these questions emphasise the need to consider options at multiple scales.

[55] For example, Saudi Arabia, in a recent submission to the UNFCCC Secretariat, Saudi Arabia, claims that "all the detailed activities and programs being developed under the five-year work program for adaptation represent concrete actions that should take priority for funding," and, in particular that funding is needed for the theme of economic diversification sub-theme addressed within the five-year programme of work in order to: "improve the quality of models, in particular those that assess the adverse impacts on social and economic development as consequence of the responses to climate change, taken into full account the legitimate priority needs of developing countries with specific emphasis on countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products."[FCCC/SBI/2006/MISC.7 Views on specific policies, programme priorities and eligibility criteria and possible arrangements for the management of the Adaptation Fund: Submissions from Parties]

[56] Hultman NE and Bozmoski AS 2006 The changing face of normal disaster: risk, resilience and national security in a changing climate, Journal of International Affairs 59 (2): 25-41.