

Access to assets: Implications of climate change for land and water policies and management

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David Brown, Tom Slaymaker and
Nanki Kaur Mann
Overseas Development Institute

Contact: Rachel Slater (r.slater@odi.org.uk)

Background and Acknowledgements

Over the last few years, our understanding and certainty about how the climate is changing and the possible impacts this could have has grown hugely. In response there are increasing efforts to ‘mainstream’ what we know about these impacts into development policy and planning processes. Given the fundamental links between agriculture and poverty reduction and agriculture’s dependence on the climate, understanding in more detail about linkages between agricultural policies and climate change is important and urgent.

This paper is one of a series of five outputs produced under a small project for the Renewable Natural Resources and Agriculture Team of the UK Department for International Development (DFID). The objective of the project was to identify the implications of climate change for key areas of DFID’s Agricultural Policy and the Renewable Natural Resources and Agriculture (RNRA) Team portfolio and to produce a series of practical outputs to assist the RNRA team in programme implementation and communication.

The five papers are as follows:

1. A rough guide to climate change and agriculture
2. Climate change: Implications for DFID’s Agricultural policy
3. Climate change, agricultural growth and poverty reduction
4. Climate change and agriculture: Agricultural trade, markets and investment
5. Access to assets: Implications of climate change for land and water policies and management

The papers are written by a team of researchers from ODI’s Rural Policy and Governance and International Economic Development Groups. The authors are grateful to DFID for their funding of this project. The arguments presented in the papers are those of the authors and do not necessarily reflect the policy position of DFID.

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Abbreviations

CDM	Clean Development Mechanism
DFID	Department for International Development, UK
FAO	Food and Agriculture Organisation of the United Nations
GCM	Global Climate Models
GDP	Gross Domestic Product
IPCC	Intergovernmental Panel on Climate Change
LDC	Least Developed Countries
NAPAs	National Adaptation Programmes of Action
PRSPs	Poverty Reduction Strategy Papers
REDD-DC	Reduced Emissions from Deforestation and forest Degradation in Developing Countries
RNRA	DFIDs Renewable Natural Resources and Agriculture Team
SWAps	Sector-Wide Approaches
UNFCCC	United Nations Framework Convention on Climate Change

1. Summary

The effects of climate change are as yet uncertain, though they are likely to exacerbate the risks to the poor which are already evident in the processes of globalisation. This is particularly the case where, under agricultural growth strategies, powerful players (agro-industries and tourism operators, for example) make new claims over scarce land and water. Heightened conflict for natural resources, and a worsening asset situation, both put the welfare of the poor at risk. The non-climatic effects of climate change (for example, the increased financial flows which are likely to occur, associated with mitigation instruments (CDM and emissions trading, REDD-DC, and voluntary carbon schemes outside of the compliance regime) are likely only to reinforce these conflicts, as the demand for land and water is also exerted by external interests, both national and international.

One consequence of the present preoccupation with climate change is to heighten the focus on the technical dimensions of change. But this is likely to be refracted through a political lens, as growing competition over scarce resources spills over onto the political arena. The political premium that is derived from the positive presentation of climate-change related activity means that these political dimensions are not likely to be well-represented in national strategies. A major challenge for UK's Department for International Development (DFID) is therefore to make sure that political issues are addressed in ways that are compatible not only with its international mandate, but also the pro-poor dimensions of its national partners' aid policies and the time frames imposed by climate change.

The means to ensure that power relations are adequately accounted for in policy processes are already familiar to development assistance and include:

- ⇒ Mainstreaming climate change into development policy.
- ⇒ Adopting a rights-based approach in order to:
 - Strengthen the negotiating position of the poor
 - Reinforce their assets base.

This paper supports the call for the 'mainstreaming' (integration) of climate change within development policy. Addressing the impacts through mainstreaming climate change is likely not only to benefit development interventions aimed at reducing poverty but also to enhance the capacity of communities to cope through more robust adaptation options. It may also help mitigate the effects. The means to do this are through integration with development plans, particularly through the vehicles of: Poverty Reduction Strategy Papers (PRSPs); UNFCCC National Adaptation Programmes of Action (NAPAS); and sectoral decision-making tools such as Sector-Wide Approaches (SWAPs) (Klein et al. 2007, Berry et al, 2006).

As is already established in DFID policy, such mainstreaming needs to be underwritten by a firm commitment to a rights-based approach to development (Moser and Norton, 2000; Adger, 2006). Given the low level of security of the assets of the poor, a solid rights regime is likely to be an essential prerequisite if new policy developments are to deliver social justice in such an uncertain environment. It also has the advantages, when

compared to the other aid modalities and strategies (such as PRSPs and SWAps) of encouraging a longer-term perspective, more compatible with the likely rhythms of climate change, as well as addressing the wider international interests that are likely to arise in a context of increasing international investment in climate change adaptation and mitigation.

The above issues are explored in this briefing paper primarily in relation to two priority sectors: land tenure/management and water resources. Case studies are described which indicate the significant challenges that remain to pro-poor development in both sectors, challenges which derive as much from the political economy of resource exploitation as from the nature of the climatic constraints.

The overall message to DFID is that climate change presents a valuable opportunity to secure policy reforms which are already on the development agenda but have hitherto been difficult to achieve. There is a strong case for land and water to be given real priority in the coming decades.

2. Introduction

'A warmer world with a more intense water cycle and rising sea levels will influence many key determinants of wealth and wellbeing, including water supply, food production, human health, availability of land, and the environment.... The poor will be hit earliest and most severely.' (Stern Review, 2006 p.84):

'Agricultural assets' refer to all those forms of capital (material and social) which are important to agricultural enterprises, and over which the farmer exerts direct control. A distinction is thus made with forms of social capital which are outside of the influence of the farmer, even though they may impinge on the farm enterprise. However, the boundary is not hard and fast, and there are several areas in which farm level control overlaps with wider resource management issues (water for irrigation is a particularly clear example, where status factors and power relations may significantly influence access to resources, outside of and perhaps in defiance of nominal entitlements).

Predictions of climate change are marked by considerable uncertainty and variability (Parry et al 1999; Papers 1 and 2, this series). Two phases are normally recognised, broadly pre- and post-2020, with the more severe effects being anticipated to come after this watershed. The basic scenario includes:

- a) Increased volatility of climate
- b) Increased frequency of extreme climatic events.

It can be assumed that these effects will also lead to increased uncertainty in farmer decision making and increased volatility in agricultural prices (Paper 2). While the outlook for the tropical regions is almost certainly more negative than for the temperate regions, there remain huge uncertainties in the predictions of likely effects in the tropics and in the incidence of extreme climatic events.

Climate variability is not a new phenomenon (see Bryson and Ross, 1977). By and large, these trends have been in evidence since the early 1970s, but only latterly associated with anthropogenic causality.

Using three modelling scenarios (with four main sets of variables), Fischer et al (1994) estimate the additional numbers of people at risk of hunger by 2060, in global terms, as a maximum of 1.446 billion, and a minimum of -12 million (i.e. a small diminution in the aggregate numbers). Eleven of the twelve alternative scenarios are negative, however, with percentage increases in numbers at risk ranging between 3% and 225%.

There is a strong justification for treating changes in patterns of agricultural assets as a critical dimension of the challenges that these statistics highlight. Agriculture currently accounts for 24 % of world output, employs 22% of the global population and occupies 40% of the land area. 75% of the poorest people in the world rely on agriculture for their livelihoods. (*FAO World Agric. Report*, Bruinsma ed 2003 p.67):

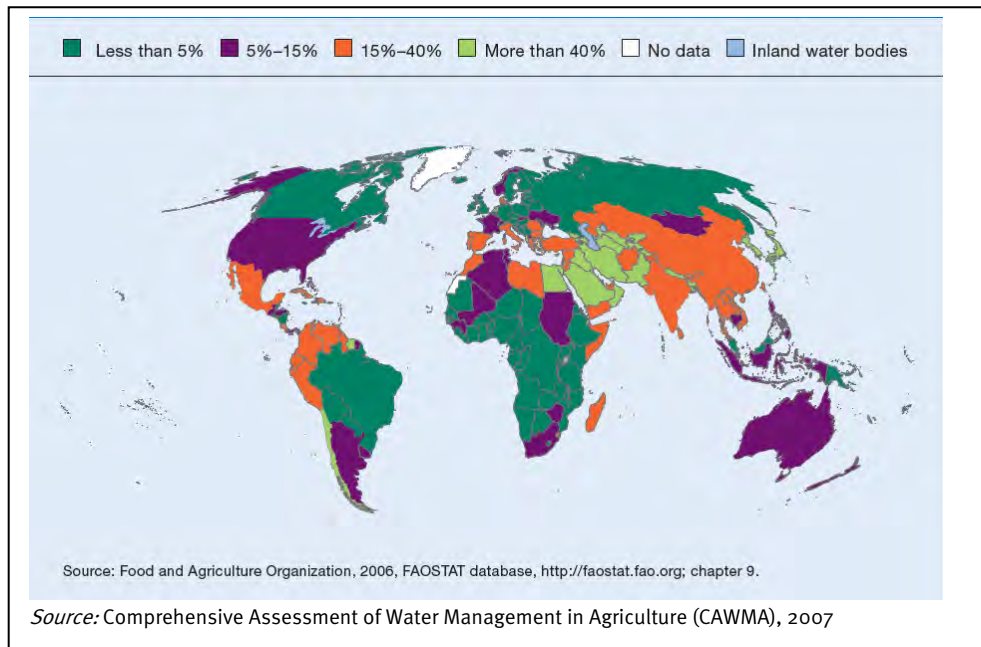
The global picture is partly positive, with some areas (particularly in the northern hemisphere, but highland areas more generally) likely to benefit. FAO (2007 pp.3-4) summarises the findings of Harrison:

- Aggregate global impacts are likely to be small, in terms of changes to agricultural GDP (-1.5~+2.6%)
- Developed countries would probably benefit, overall, from climate change
- Developing countries other than Latin America would suffer. Africa would probably suffer most (decline of 2-9%, on 3 of the 4 GCMs), though Asia might also be effected (-4% for high emission scenarios).
- North America and the former USSR would gain under all scenarios. Western Europe would lose in all scenarios.

As has been established in previous briefings in this series, what is known already with regard to agriculture is that:

- Tropical geography has high vulnerability
- LDC economies have heavy dependence on climate, because of their high dependence on agriculture and water;
- Predominantly rain-fed economies are the most vulnerable (Box 2.1), although a range of other factors including forms of land tenure and technology need to be taken into account (see, for example, Liverman, 1990).
- Certain specialised environments (such as areas dependent on melt water) will also suffer.

Box 2.1: Area under irrigation as a share of cultivated land



In terms of the impacts of climate change on access to assets, a growing field of literature has established that climate change will increase vulnerability of already marginalised and at-risk communities and/or individuals (O'Brien and Leichenko, 2000, Leichenko and O'Brien 2001). For example, Kurukulasuriya and Ajwad (using the Ricardian technique, which acknowledges the flexibility of farmers in response to changes in their environment, and accounts for the costs and benefits of adaptation)

estimate the effect of climate change on smallholder agriculture in Sri Lanka. Climate variables explain about half the variation in net revenues, and are assessed as having a significant impact on smallholder profitability. At national level, a change of net revenues of between -23% and +22% is predicted under various scenarios, with the largest negative effects in the dry zones, and with potential positive effects in the intermediate and wet zones (2007). Studies using similar methodologies have been undertaken in a number of other tropical countries, and generally show a high probability of negative effects on the poor (see: www.ceepa.co.za/climate_change/pn.html).

Such findings relate to a context where the rural poor already have the lowest asset holdings and the least security in their tenure of those assets. Thus, the prospect is one of further and significant diminution of assets held by these groups, accumulation of which is a pre-requisite for growth and poverty reduction.

The situation is of particular concern in Africa. This is because of both the overall vulnerability of the continent, the generally low levels of mastery of surface water flows, the location of many of Africa's poorest in marginal areas, and their very high dependence on climate-sensitive natural resources, where their access is often insecure. Unlike (for example) Asia, there is no real prospect of any departure from continuing high dependence on natural resources for most of the African population and relatively little adaptive capacity, given present patterns of industrial investment, technology and education.

The indications are that those semi-arid African countries with the hottest climates (for example, the Sahelian group) will be likely to suffer most under climate change, whereas those with cooler climates (e.g. Ethiopia, South Africa) will be less affected (see Box 2.2). Enclave Sahelian economies are likely to be further disadvantaged by their non-competitiveness in export markets, due to high transport costs. However, modifications of the environment for crop production are potentially very severe in many environments in Africa under the impact of climate change (for an example, see Box 2.3). This may have radical implications for the character of the crops cultivated (as regards lengths of growing cycle, etc.), with important knock-on effects for land and labour markets.

Africa is also vulnerable in other terms. It is the continent with the least developed private sector, and thus most dependent on the performance of the state in the delivery of services. State performance has, with few exceptions, been poor in recent decades. The costs of remedial measures to control uncertainty, such as introducing irrigation infrastructure, are also high in Africa, both in absolute terms and by comparison with other regions. (see Stern, 2006, pp.94-101)

The fourth Intergovernmental Panel on Climate Change (IPCC) Assessment Report on Climate Change Impacts, Adaptation and Vulnerability, endorses this gloomy outlook, and confirms Africa's vulnerability, because of multiple stresses and low adaptive capacity (2007). It suggests that:

Africa

- ⇒ Between 75-250 million people may be exposed to an increase in water stress, with likely adverse effects on livelihoods;
- ⇒ The area suitable for agriculture, the length of the growing seasons and yield potential, particularly along the margins of semi-arid and arid areas, will decrease;

- ⇒ Yields from rain-fed agriculture could be reduced by up to 50% by 2020 in some areas;
- ⇒ Fisheries yields will decrease;
- ⇒ By the end of C21, adaptation to sea-level rises could amount to 5-10% of GDP.

Asia

- ⇒ Declining freshwater availability could adversely affect more than a billion people by 2050;
- ⇒ Crop yields could increase by up to 20% in East and SouthEast Asia, but decrease by up to 30% in Central and South Asia, by 2050;
- ⇒ The risk of hunger will remain very high in several countries.

Box 2.2: Farmer Perceptions of Climate Change Impact

Using a large dataset on farming activities in 11 African countries, and a perception based (and thus, somewhat hypothetical) methodology, Maddison et al estimated the following impacts of climate change on crop productivity. Predictions were negative in all cases, but more severe in the more arid environments:

<i>Country</i>	<i>Change</i>
Burkina	-20
Cameroon	-17
Egypt	-5
Ethiopia	-1
Ghana	-14
Kenya	-10
Niger	-31
Senegal	-19
South Africa	-3
Zambia	-6
Zimbabwe	-5

Source: CEEPA, 2006

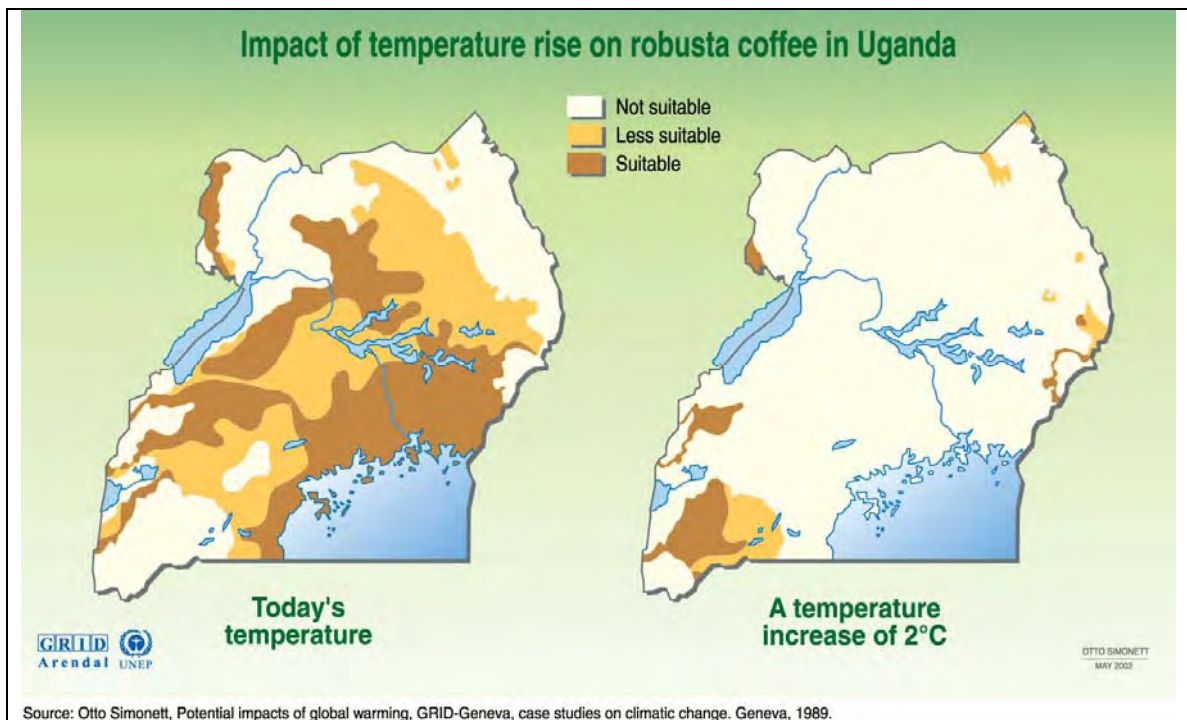
For the rural poor, particularly the African poor, it is arguable that climate change will accentuate trends which are already of concern and which result from population and other changes, and should be treated largely as a reinforcement of those existing trends. The fact that the effects will be uneven, both inter-regionally and locally, requires an additional degree of caution. The possibility is raised that even if the overall trade outlook is positive in terms of volumes and prices, this may mask a severely declining situation in certain producer states and in vulnerable areas. This justifies a heightened concern with agricultural staples, and close monitoring of changing patterns of assets and entitlements as well as availability.

New dimensions?

There are some new dimensions to be taken into consideration, and these have particular pertinence to the assets theme. What is new is not just the potential extent of the variability in climate, but also the massive new financial flows it may engender – giving international businesses a new interest in poor areas, with the power either to revive or destabilise rural economies (and several scenarios in-between). Most notable in

this reference are the effects of mitigation strategies on international financial flows from north to south, which are likely to be substantial (on some predictions, equivalent to present levels of ODA, depending on how the market progresses (Environmental Finance, 2006)), and the consequential growing demand for land, labour and water to satisfy externally imposed interests. In addition, there will be increased pressure and opportunity to frame and manage the resulting resource constraints and conflicts in ways that support those interests. A significant impetus could well be given, for example, to state-sponsored plantation projects on quasi ‘public’ and ‘waste’ lands, and to exclusionary conservation schemes.

Box 2.3: Potential impacts of temperature rise on crop production



3. Frameworks for analysis

3.1 The environmental and the political

Approaches to climate change, in terms of the adaptation that is likely to be required, typically focus on the implications at the technical and economic levels. Thus, FAO (2007) identifies two main groups of climate change impacts:

1. Biophysical impacts

- i) Physiological effects (both qualitative and quantitative) on crops, pastures, forests and livestock;
- ii) Changes in quality and quantity of land, soil and water resources.
- iii) Increased weed and pest effects
- iv) Changes in the distribution of impacts (spatially and temporally)
- v) Se-level rises, and increased salinity of oceans
- vi) Sea temperature rises affecting fish stock locations.

2. Socio-economic impacts

- i) Declines in yields and production
- ii) Reduced marginal GDP from agriculture
- iii) Fluctuations in world market prices
- iv) Changes in geographical distribution of trade regimes
- v) Increased numbers at risk of hunger and food insecurity
- vi) Migration and civil unrest

Relevant as these impacts are, they tend to underplay the likely political dimensions and consequences. Quantitative changes in land and water resources could well impact differently on different social categories of a population, according to their varying levels of power in society and the portfolios of assets that they hold. Responses are unlikely to be passive, but will encourage collective action.

An important argument of this paper is that the technical challenges require political responses and these will be, variously, national, regional and global in their expression. Aid donors such as DFID will need to work with their national partners to address, and seek to resolve, these political issues as part of their climate change responses. There are also international dimensions to be taken into account, relating to the deployment of adaptation and mitigation finance.

3.2 Risk and vulnerability

Risk and vulnerability are key concepts in addressing uncertainty in agriculture. The concept of vulnerability has the advantages both of engaging with an existing stream of DFID research and also of offering a framework that links the environmental and the

political (and also growth and poverty reduction) in ways that are very germane to the climate change debate (see Box 3.1).

Box 3.1: Climate Change and Vulnerability

Vulnerability is an established theme in the lexicon of the DFID RNRA team, and thus making the connections to climate change is doubly beneficial (see e.g. Working Paper of October, 2004). There is a strong emphasis in existing work on the dynamic aspect of vulnerability – issues of risk and resilience, assets and entitlements which can be applied directly to the likely climate change scenarios (Moser and Norton, 2001, p. 5). In terms of agriculture, Reilly and Schimmelpfennig (1999) differentiate yield vulnerability, farmer or sector vulnerability, regional economic vulnerability, and hunger vulnerability. They see vulnerability of farmers to climate conditions as countered by the capacity to take anticipatory actions – such as planting drought resistant seeds, cultivating the least flood-prone areas, changing the crop mix, or seeking off-farm income.

Renewed focus on the issue is justified in the present context by a number of factors:

1. Climate change, like globalisation and liberalisation of trade, is likely to expose poor agriculturalists to increasing risk;
2. This is likely to come about through a reduction in assets owned by the poor, both in quantitative and qualitative terms, and in terms of diversity of assets.
3. Reducing agriculture related-risk and vulnerability both fulfils a social protection role (vital in conditions of environmental stress) and also enables the poor to engage more fully in markets, thus building up their assets.
4. New tools are available to address risk and vulnerability, and facilitate poverty reduction thereby (for example, social protection and insurance schemes).

Conceptualization of climatic vulnerability has centred on concepts such as marginality, susceptibility, adaptability, fragility, and risk. The most vulnerable are those who are most exposed to disruption, with only limited capacity for adaptation and least resilience to recovery (Leichenko and O'Brien, 2001).

Vulnerability is influenced by the build-up or erosion of the elements of socio-economic resilience. Resilience – the capacity for 'robustness', that is, the ability to absorb disturbances without radical change – tends, in smallholder agriculture to be closely related to multiple enterprises and ability to secure access to and master key inputs such as land and water. In relation to the issue of climate change, vulnerability has been analysed as a function of three components (Adger, 2006):

1. Exposure of a system (in the sense of the extent to which it experiences environmental or socio-political stress, in terms of magnitude, frequency, duration and extent).
2. Sensitivity of the system (the degree to which it is modified or affected by perturbations).
3. Adaptive capacity of the system (its ability to evolve in order to accommodate environmental hazards or policy change and to expand the range of variability with which it can cope).

Thus, resilience should be sought after in agricultural policy, as a way of lowering vulnerability.

The climate change scenarios which have been used to develop 'story lines' of possible future worlds (see Paper One) also provide interesting insights into vulnerability issues. Thus, Parry et al, (2004) point out that A1 and A2 SRES scenarios will increase disparities between developed and developing worlds. While there are difficulties in using SRES for impact and adaptation assessment - chiefly the problem of scale, per Paper One (Arnell et al, 2004), it can still be surmised that the vulnerability of already vulnerable groups is likely to increase under both scenarios. Some interesting work is also being carried out on the linkages between the impacts of climate change and globalisation and their cumulative effects (the notion of 'double exposure'). Economic globalization in particular is exposing many rural regions to global markets, leaving many areas, sectors, and social groups doubly exposed to the impacts of globalization and climate change, with new sets of winners and losers - 'double winners' and 'double losers' - emerging in the process (see Box Twelve, below; see also Huq et al, 2006). For example, climate

change could well increase the supply of wage labour (and in all probability depress its price), as the more marginal lands become non-viable. However, the same forces could well reduce demand for labour on heavily water dependent agro-industrial enterprises, exemplifying the negative effects in tropical environments of double exposure to climate change and globalisation (O'Brien and Leichenko, 2000). Similarly, in Andhra Pradesh, a combination of growing competition from imports and stagnating market prices with worsening incidence of drought has left many farmers doubly vulnerable. Lack of institutional support in the areas of extension and water harvesting have inhibited them from moving into other economic crops. (TERI, 2003)

Climate change figures only secondarily in the schema of 'agriculture-related risks typically faced by the rural poor and of risk-reducing measures', in the 2004 DFID discussion paper (it features as one of three sub-components of 'environment-related - generic - risks'; among the risk-mitigation measures listed are: investment in 'bite-sized assets' which can be liquidated in a crisis situation; weather-focused crop insurance strategies; investment in communal assets such as irrigation; investments in risk-predicting efforts). There would be a case for revisiting this schema.

The issue of vulnerability is explored further in the sections on land and water, below.

3.3 Asset security

A related concept is asset security. One of the bases of growth and poverty reduction is security in terms of access to assets. This security encourages agricultural communities to undertake growth-oriented production patterns and leads to a 'multiplier' effect that facilitates poverty reduction. It is likely (based on projections) that climate change will have a significant impact on the two main asset bases that support agriculture – land and water. The exposure of these systems in terms of magnitude, frequency and duration of predicted impacts (for example, of droughts) is high. Further, existing evidence suggests that these bio-physical climate change impacts will have significant impacts on socio-economic systems, in terms of substantially increasing burdens on those populations that are already vulnerable to climatic extremes and other risks posed by globalisation. Institutions have a role to play in increasing or decreasing these impacts.

3.4 Coping mechanisms

In many areas likely to be affected by climate change, climate variability is not a new phenomenon and structures to enable farmers to cope with its risks may already be in place. For example, in a study of migration in dryland areas in Northern Ethiopia, Meze-Hausken (2000) notes that recent climate-related migration patterns are simply an extension of a long term trend which can be traced back to the 1970s, and that community-level coping strategies are already well developed. Likewise, Snidvongs (2006) finds that in the lower Mekong Basin, coping structures already exist. However, these are principally found at the household level, and are typically lacking at the national level. This point may have more general validity. Coping with climate variability is often already effective at the household or farm level, though less effective at national level (or sub-national, river basin or community level). Higher level structures could mediate increasing competition for resources, protecting poor households against marginalisation by powerful actors, and coordinate responses to increasing climate variability to reduce the risk that household decision-making (typically focused principally on economic opportunities rather than climate-related risk) results in 'maladaptive' practices. Again, this argues for an institutional response.

4. The sectors: Land

A wide variety of relationships to land exist in the developing world, with diverse agro-ecological, economic, social and historical origins. Variations exist as regards:

- a) Forms of ownership (community tenure, private ownership)
- b) Forms of derived land rights (e.g. share-cropping, cash tenancies)
- c) Stability of claims (e.g. migration and its relationship to the agricultural cycle, length of use rights)
- d) The importance of state, customary and market-based institutions in allocating land rights.

4.1 Land & vulnerability

The DFID Policy Paper documents the quantitatively and qualitatively declining land base available for agricultural use on a global scale (2005:p. 24, Box 2.1). The typical context in the developing world is one in which land availability is already – and increasingly – heavily constrained by factors both internal and external to the rural economy. For example:

- Low tenurial rights and security
- Population increases (leading in many areas to declining farm size)
- Growth strategies favouring individuated-tenure propitious for business investment and high value export crops
- Urbanisation and peri-urban growth
- Fertility declines, as fallows shorten.
- Salinification of irrigated lands
- Consolidation of agro-enterprises as a response to growing global markets.

The poor are likely to be particularly disadvantaged, with low security of tenure, de facto and de jure. Women's land access is particularly problematic. Often no barriers to land purchase exist for either sex, but few women have the economic means to benefit. Land is otherwise often obtained by women on a limited usufruct basis through marriage, which can leave them landless on divorce, and denies them collateral.

Farmers in peri-urban areas are vulnerable, with increasing frequency, to loss of farms for infrastructure development and urban expansion. Land acquisition by the state often goes uncompensated, justified by a disregard of the validity of customary tenure under state law, as well as by an often mistaken claim that rural lands have infinite capacity to absorb the dispossessed. The lack of written formalisation of rights severely disadvantages the poor.

Declining land availability, as expressed in declining farm size, is also an important consideration in many areas, which belies optimistic views of the efficiency of the small farm enterprise to cope with risk and vulnerability (Ellis, 2005). Ellis raises the issue of

the threshold at which farm size constitutes part of the problem of rural poverty rather than part of its solution.

Rental markets are a common feature of the land management system, though often unacknowledged in public policy, and tenants and share-croppers may be in a particularly weak position where governments intervene to develop new land markets and regulations (see Box 4.1).

At the same time, there is also extensive evidence of malfunctioning land sale markets for bona fide ‘modern’ investment, and strong pressures for reform coming from business quarters. For example, obtaining property transfers in a sample of 10 countries in Africa took an average of 173 days (range 20-382 days), costing an average of 13% of the property value (range 4-34%). The average for the whole of sub-Saharan Africa was 116 days (3.4 x the average for the OECD countries) and cost 14.4% of the average property value (3x the OECD value) (World Bank 2005, quoted by Toulmin, 2006).

Box 4.1: Land rental markets

Land rental markets in national policy statements

1. Rental markets are all but invisible in many public policy statements, and were often unacknowledged in the first generation of PRSPs (Ghana and The Gambia being cases in point). Existing (‘informal’) rental markets are often not on the official agenda, except as problems to be overcome.
2. Rental markets may lower transaction costs for the poor, and leave them less vulnerable to inefficiencies in the operation of public sector land institutions and credit markets.
3. However, where the state seeks to encroach on them, then this is often bad news for the poor, and may presage increased taxation and decreased security.
4. In addition, rental markets can be associated with severe social tensions where land shortages building up; failure to acknowledge them in public policy can exacerbate those tensions.

Land rental markets in Southern Ghana

5. The case of Ghana is a particularly interesting one in this respect. Land and labour markets are highly complex there and have been so for centuries, fuelled initially by the prosperity which came from the country’s resources of gold. The cocoa boom of the early years of the 20th Century led to a significant increase in agricultural migration, and a proliferation of different rental arrangements, often involving share cropping. These have proven both robust and dynamic. As land has become scarcer, the terms of the share cropping arrangements have tended to change in favour of the landowner.
6. Cash payments for land by migrant farmers are an area of contention, as the migrants of longer standing often claim to have purchased their lands outright, and to make payments to traditional authorities only as a form of customary tribute. However, this is contested by land ‘owners’, who argue that the land was transferred only for limited purposes (e.g. cocoa farming), and the tribute payments recognise this fact. This issue is a particularly sensitive one in areas where descendants of land vendors now find themselves with inadequate land for their own needs, and are looking to find ways to recover land ceded by their ancestors.
7. The governmental land titling system in Ghana has long been recognised as a problem area, with a proliferation of institutions (successive governments have tended to add new structures, rather than to try and reform the old ones), and unresolved tensions in the relations between the customary authorities (the stool chieftaincies) and the government. An internationally supported programme of land reform is currently under way. While the

outcomes of this are yet to be seen, it is clear that some customary authorities and government agencies view this as an opportunity to reform the land rental markets, and there are already pressures to extract additional rents from tenant and migrant farmers (a variable category in economic terms, but one which includes many of the rural poor).

Land & vulnerability under accelerating climate change

To these pressures must be added new ones relating to climate change adaptation and mitigation, particularly:

- *Adaptation:* Changes in land area available for agriculture (as above), most probably, declines in terms of both quantity and quality.
- *Adaptation:* changes in patterns of demand for land and water, linked to new technologies (GM crops; new varieties)
- *Adaptation:* population movements and migrations, changes linked to growing urbanization.
- *Mitigation:* New demands for land, articulated by urban-based elites and carbon investors, to be taken out of short-term production in the interests of long-term carbon sequestration (plantation forestry).
- *Mitigation:* Reductions in the areas available for livelihood activities (assuming the current drive for forest conservation for ‘reduced emissions from deforestation’ (RED) leads to the formulation of new international financial instruments); this is likely to have major implications for access rights of the poor.
- *Adaptation and mitigation:* payments for environmental services offers one innovative way forward, though this may imply very high transaction costs and could well increase pressures to centralise control of land.

Problems such as these have already occurred in existing carbon offset projects, from which lessons can be learnt. One example is a forest restoration project in Uganda that has been criticised for evicting farmers from reserve areas without notice and restricting access rights (Lohman 2006).

The need for land reform?

The most obvious conclusion to be drawn from all of these climatic and non-climatic concerns is that land reform policies will need urgently to be implemented in many instances to ensure that land markets function to support the most productive actors. The identity of the latter would have to be contextually determined, but could well include important categories of the poor. However, recent land reform programmes have rarely favoured the poor, and may actually have worsened their plight (Hamner et al 2000).

Increasing the profitability of agricultural lands and the opening up of new land markets are threatening to the poor in at least 5 ways:

- Increased demand for land
- The disproportionate purchasing power of the cash rich
- Increased pressure to individualise tenure

- Increased pressure on those with derived rights to either cede their lands or pay increased rents
- Inability of the poor to defend their rights.

Land tenure reform policies risk benefiting entrepreneurs and speculators to the detriment of the small producers, on whose abilities the viability of many agricultural economies largely rests. They tend also to undermine the forms of communal and community tenure which provide what limited guarantees the poor have of security of access, in favour of more individual forms of tenure. While individual tenure may encourage increased investments in the land (offering secure returns) for certain types of entrepreneur, they do not necessarily reinforce a confident investment culture among those most in need of support (Toulmin, 2006). Their social effects may also be questionable, particularly where the poor are effectively disenfranchised without any prospect of compensation.

Land titling has recently been promoted as a solution to land crises, but this has a chequered record for the poor (Toulmin, 2006). A well-publicised example is Hernando de Soto's championing of an approach which seeks to use land titling as a vehicle for social transformation of the poor, drawing on evidence from the slums of Lima, Peru (Box 4.2). This has attracted considerable donor support. However, a long-term perspective is needed to ensure that the benefits claimed for such titling are in fact realised by the poor. Equally likely is a scenario of progressive capture of the assets by the capital rich, benefiting only one generation of the poor, but consigning their descendents to increased social exclusion. Account needs also to be taken of the view that the problems of land access for the poor are not only related to land acquisition, but also land retention – the underlying problem being that peasant agriculture is insufficiently lucrative to allow the individual peasant to defend their land rights (Khan, 2006).

Box 4.2: Hernando de Soto and the Institute for Liberty and Democracy (ILD)

Over the last decade, the Peruvian writer and activist, Hernando de Soto, has achieved major international prominence for his radical thesis regarding the role of land property and titling in promoting development and underdevelopment. Through popular works such as *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else* (2000), he argues that:

- Property law is what makes the market economy work
- Property is not just an ownership issue, nor can it be created by purely technical means (titling).
- To become political, rather than technical, the starting point has to be the property which the poor already have, but which is held in a vacuum by its location outside of the formal legal system. This is the 'mystery of capital' (i.e. how to convert assets into capital).
- What is needed is to bring the poor and their assets within the formal economy, through systematic land titling.

He claims that the ILD can do this on a mass basis, and at a fraction of the cost of conventional titling programmes. ILD only works with Heads of States (this assures it of high political exposure) and offers a packaged approach to development. The simplicity of de Soto's ideas and their messianic qualities have brought him a ready constituency in the developing world and among its multi-lateral and bilateral donors.

The model:

This is a politically attractive model, particularly to non-reformist regimes:

- i. It is 'no-cost' in political terms; De Soto claims that his model makes capital 'mind friendly'
- ii. The model is reformist and not radical, and compatible with the political *status quo*.
- iii. It reduces some complex issues of cause or effect to simple causalities (it lends itself readily for public relations purposes).
- iv. It is not an economic model in any meaningful sense; it does not deal directly with income distribution effects and pro-poor safeguards.

Some issues and questions:

a) The extent of the evidence

De Soto's ideas have been subjected to some fierce criticism on the validity of his own claims. It is argued, for example, that the only success story for the ILD has been in the peri-urban slums of Lima, and that even there, the extent of ILD involvement has been more limited than de Soto acknowledges. Its applicability to agricultural land is highly questionable. Banks are often reluctant to accept such primary economic assets as collateral, on the grounds that they cannot easily be seized in the event of default, and thus, the main motor to link titling to economic development is brought into doubt.

b) Other barriers to pro-poor change

The ILD approach focuses solely on individual rights, to the exclusion of collective rights. This ignores the positive role which collective action may play both in helping the poor defend their land rights and, as a result, giving them the confidence to invest in improving their land (Khan, 2006; Toulmin 2006). At the same time, there are situational factors which need to be considered. In a country like Ghana, for example, where there is no law of adverse possession, the majority of the poor might well suffer from a policy which threatens to give ownership rights to squatters and tenants in pilot locations. This could result eviction on a mass scale elsewhere, as owners sought to safeguard their holdings.

c) The evidence of international land policy

There is also growing evidence from international development-oriented research that things are more complex than de Soto's writing suggests. Most significantly, the World Bank's own land policy has tended to move away from de Soto's approach (Deininger, 2003). The Bank's current thinking is that:

- Formal title may be less cost-effective than communal tenure systems (partly for the reasons enumerated immediately above);
- Titling programmes need to be judged for their equity as well as efficiency;
- The potential of land rental markets has often been significantly under-estimated, and its benefits to the capital poor ignored;
- Land sale markets only enhance efficiency and equity if integrated into broader strategies to develop rural factor markets in appropriate ways. On their own, they do not provide any guarantee of pro-poor development.

All of this suggests that land markets cannot be relied on to operate unaided in pro-poor ways, and will need considerable attention and support if the effects of climate change on land assets are not to impact negatively on the poor. Political factors as much as economic ones are likely to intervene to distort the functioning of land markets. Thus, promoting a policy of easing land sales to the poor (per DFID 2005, p.4) may provide no guarantee of long-term land security nor will it necessarily encourage the poor towards adaptive management in the face of climate-induced environmental change. Without supporting measures, it could equally well end up facilitating land acquisition and speculation by the rich. These additional means do not necessarily require a movement

towards individuated land markets based on market sale, but they will almost certainly require active measures to protect the poor from further marginalisation.

4.2 Policy Implications – Land Sector

What can be done in such a context to encourage a socially just but also sufficiently fluid and responsive market for productive land, which operates in a way that does not consign rural dwellers to a spiral of distress sales, landlessness and chronic poverty?

Whatever policies are put in place, these will have to be cognizant of the wide variety of relationships of the poor to land, and the need for a high degree of situational specificity in the actions proposed. They will need also to be sufficiently dynamic and flexible to accommodate considerable unknowns.

The 2003 World Bank policy research report, ‘Land Policies for Growth and Poverty Reduction’ offers much useful advice on possible ways forward in circumstances such as these (Deininger, 2003). In particular, it advises caution over land titling, and underlines the virtues and potential of the thriving rental markets of various types (ranging from share-cropping to annual rents paid post-harvest. Even though often far from perfect, these rental markets would appear better adapted to the means of the poor than sales markets, and they have also shown their resilience in changing production conditions which are likely to be typical of the era of climate change.

Forms of land holding in a context of climate change

Based on levels of landholding, in a context of likely declining access, a basic policy distinction needs to be drawn between:

- *Agricultural groups that own land* (but may become vulnerable due to loss of income as a result of shifting agro-climatic zones);
- *Agricultural groups that do not own land* (the landless).

Farmers (both land owners and the landless) may well become vulnerable due to the impact of climate change in terms of shifting agro-climatic zones and pockets of productivity. However, this category is characterised by variable assets and in consequence, has access to different socio-economic options. Thus, they will have varying capacities to cope with or adapt to vulnerabilities. Policies will have to address all sections. They should be adaptive; learn from local experiences of adapting to variation; be robust enough to absorb shocks and at times, secure welfare in adversely affected areas.

A particular area of concern is how the landless will be impacted by direct changes in agro-climatic zones? Will they lose labour opportunities? Will they lose their access to rented land? Or will they be likely to benefit – in the sense that since they have least to lose, they are potentially the most mobile and adaptable (provided, that is, they are given access to other skill sets)? The developing balance between industrial and agricultural sectors will obviously be critical in this respect, though, as earlier noted, most African countries are likely to remain highly dependent on agriculture throughout the coming decades. Enclave countries in Africa are clearly in a radically different

situation from, say, the emerging economies of South East Asia, and much more exposed to the vagaries of climate.

Difficult trade-offs may well exist between different claimants. For example, patterns of long-term migration may argue in favour of preserving rental markets, to support the interests of the primary rights holders. On the other hand, there are equally strong arguments in favour of the interests of derived rights holders in such situations and this category tends to be among the poorest of the poor.

Share cropping represents an interesting case, though often maligned as retrograde and anti-competitive – even, inherently exploitative – by its detractors. Such views need to be treated with caution. It is not necessarily the case that share cropping will prove contrary to the interests of the poor in situations of climatic uncertainty. Indeed to the extent that agricultural yields and prices fluctuate increasingly widely about the norm, they could prove risk-reducing for the poor. Careful monitoring of the effects of climate change on share-croppers is thus essential. This requires a policy environment, which is informed and open as to the realities of economic life.

More generally, it seems clear that, if land markets are to develop in ways that do not actively penalise and impoverish the poor, then the latter should at least NOT be actively structurally disadvantaged. At present, they are often unable to assert their rights, and even less able to defend them when they are challenged.

To a significant degree, the policy framework is already in place within DFID to channel its response to the climate change threat, and to respond to what is likely to be an extreme instance of an already familiar scenario for pro-poor agricultural development – high variability of the environment in which livelihoods are pursued, and heightened vulnerability to shocks. This framework is provided by the current aid architecture and strategy, underpinned by a continuing commitment to a cross-cutting rights-based approach to development. The former will be addressed in Section E; the latter is reviewed below.

The existing land distribution system and projections of land availability in most countries offer little prospect of target setting in terms of rights to actual land ownership, but they do suggest the need to strengthen the political process in at least three key respects, all of them relating to the capacity of the vulnerable to make land claims effectively. This capacity is recognised as ‘a significant livelihood capability for most people’ (Moser and Norton, 2000; p.x). This would imply reinforcing ongoing efforts to use the leverage available to DFID and other official development assistance agencies to:

- ⇒ Improve the equity and effectiveness of legal and regulatory frameworks
- ⇒ Strengthen the functioning of the judicial process, and the equity in its operation
- ⇒ Facilitate the defence of smallholder rights, through information generation and institutional means (recognition of negotiating rights of tenants associations and pro-poor NGOs, etc.)
- ⇒ Widen understanding of the provisions of international law, and capacity for international regulation (Moser and Norton, 200: p.xi)

Concretely, this would involve (for example):

- a) Clarifying and rendering more transparent the rules for access to resources, and helping to ensure that at the least, these do not disadvantage the poor, and at best, they actively strengthen their claims;
- b) Strengthening tenurial claims (these may involve full tenurial rights, but security of access is often the over-riding requirement);
- c) Empowering collective institutions for the promotion of their interests and defending their rights, and generally enhancing the ability of the poor to make claims effectively;
- d) Seeking to enhance the security of the tenurial and access rights of the poor in the face of the specific threat to their security that may come from climate change mitigation measures and strategies of avoided deforestation (REDD-DC);
- e) Setting national standards for the negotiation of rental and share-cropping agreements, which acknowledge the need for flexibility in the agricultural economy while also identifying clear channels and procedures for redress in the event of disputed claims;
- f) Ensuring that international actors in the climate change process work within international and national frameworks that are supportive of local rights

The approach would not ignore the need to reinforce the assets base of the poor, by (for example):

1. Helping to diversify their livelihoods assets;
2. Increasing the proportion of assets which are not directly dependent on climatic conditions;
3. Improving their access to the tools which will enable them to take the risks needed to adapt to changing conditions - credit schemes, climate change-related information and crop insurance, for instance.

However, in line with current DFID strategy, the focus should arguably be primarily on the policy level, and not on the technical means of delivery.

Such an approach offers significant benefit in governance terms (accountability and transparency) and it also encourages pro-activity and self-management on the part of the poor in situations of uncertainty – in summary, it reinforces the move in the political status of the poor from ‘subjects’ to ‘citizens’.

The context here is not only that of state and traditional rights, in a national framework, but also the growing relevance of international law and international regulation (both ‘hard’ and ‘soft’ law). The justification is two-fold:

- o In low governance situations with little central government buy-in to the rights of the poor, strengthening international social policy may provide the only channel available to progress their interests in ways that do not increase their vulnerability (Moser and Norton, 2001, p.14).
- o There is, at present, the prospect of much increased involvement of international actors in land allocation issues in developing countries, under the influence of climate change mitigation, and thus a need to develop appropriate international standards and codes of conduct to guide such investments.

The value of such a perspective on donor strategy is underlined in Box 4.3 and considers alternative approaches to development in Bangladesh, which can be broadly characterised as ‘the technical’ and ‘the political’ (or ‘rights-based’). The effectiveness of a rights-based approach by comparison with the more technically-oriented alternative cannot be assumed (influencing is, by its nature, less concrete than new technologies and may be more difficult to deliver), though the approach has the advantage of strengthening local institutions, which should bear fruit whatever the environmental changes which actually come about.

Consequently, the conclusion to be drawn is of the need to shore up and defend the rights of the poor – even if this requires some trade-offs with short-term growth (see DFID 2004). However, against any negative effects on growth must be offset the positive benefits of increased stability and responsiveness to change. Land rights are unusual in their resilience, leading to a problem of ‘policy overlay’ whereby pre-existing claims are rarely over-ridden by new legislation and interests, and both traditional rights and government institutions tend to proliferate and overlay each other. Thus, only where the slate can be wiped clean of pre-existing rights, will a simple passage to an open market situation be conflict-free. Otherwise, land reform policies are likely to generate considerable social tension particularly when their effect is to disadvantage the majority.

The need to focus attention on socio-economic and political factors, particularly user rights, is also the message of the next section, which deals with the other major rural livelihood asset, access to water.

Box 4.3: Climate Variability in Bangladesh – alternative aid strategies

Bangladesh is particularly vulnerable to the effects of climate variability and change. 63% of the labour force is employed in agriculture, and the sector accounts for 35% of GDP. The country already suffers frequently from natural hazards and disasters (there were 93 major disasters in the decade to 2000, resulting in almost 200,000 deaths and US\$6 million in damage to the economy, with agriculture suffering most). Climate change modelling predicts increased but less well-distributed patterns of monsoon rainfall, along with higher temperatures and more frequent and intense droughts. Large areas of the country are vulnerable, with the riverine and coastal areas of Bangladesh, known as ‘chars’, being particularly at risk. These are home to the poorest and most vulnerable communities in the country, over 80% of the population living in extreme poverty.

One response to these conditions, typified by the approach of the FAO and Asian Disaster Preparedness Centre (Selvaraju et al, 2006), is through an assessment of the potential for livelihood adaptation to climate variability and change in the more drought-prone areas in the north west of the country. The study notes the chronic vulnerability of livelihoods in such drought-prone areas, and advocates a variety of responses in both the short and long term. These include:

- Physical measures to increase irrigation and water capture
- Changes to agricultural practices – for example research on, and promotion of, drought-tolerant seed varieties
- Changes to socio-economic practices – such as livelihood diversification and policies to enhance adaptive livelihood opportunities
- Strengthening of local institutions such as local disaster management committees and financial institutions
- Awareness raising and advocacy on climate change issues

Somewhat similar ground is covered, with an interestingly different slant, by DFID in its ‘Chars Livelihoods Programme’ (2002). This programme (which runs from 2002-2010) seeks to deliver

'Improved livelihood security for poor and vulnerable women, men and children living within the riverine areas of 5 districts' by 2015, focusing on three main areas of output:

- 'Reduced vulnerability of char dwellers through targeted provision of *infrastructure and services*', increasing the capacity of local councils to respond to local needs and demands, and to deliver improved services and infrastructure.
- '*Poor char dwellers able to effectively sustain their livelihoods and engage in the local and national economy*' by broadening economic opportunities and strengthening productive livelihood strategies (including targeting vulnerable groups of female headed households and adolescent girls).
- 'Poor chars dwellers effectively influence local and national policy and *service provision as citizens*', addresses the issues of 'voice', including participation in local-level planning and accountability mechanisms for government services, and the development of a platform for evidence-based influence to ensure national policies and structures reflect the needs of poor and vulnerable chars dwellers.

5. The sectors: Water

5.1 Climate change and water resources

The impact of climate change on the hydrological cycle has been extensively modelled, and various possible scenarios identified relating to changes in the spatial and temporal distribution of water resources and seasonal availability in a given locality (Paper One this series, Peskett, 2007). Such scenarios have important implications for world food supply, demand and trade (Paper One this series, Slater, 2007). However, the impact of these general processes of global change on access to assets will be strongly mediated by socio-economic and political factors operating at national and local levels. Key challenges in the water sector, in the context of poverty reduction, include:

- a) Declining overall asset base
- b) Declining access of less powerful groups
- c) Increased water-related risk and vulnerability

Dimensions of access to water

The notion of a 'global water crisis' pre-dates more recent narratives relating to climate change (Nicol, 2002), but the focus of water sector debates has moved beyond physical availability and the concept of (per capita) water scarcity, to centre instead on issues of water governance – i.e. putting in place the political, social, economic and administrative systems needed to develop and manage water resources effectively (see UNDP, 2006; CAWMA, 2007). Specific concerns in the context of increased climate-related variability include managing growing competition for water resources (between sectors and between socio-economic groups) and promoting access on a more equitable and sustainable basis.

Access to water and vulnerability

Studies have shown that access to water is generally not sufficient for increased agricultural productivity, which is contingent on other inputs including land, credit and access to output markets (Commission for Africa, 2005; Westby et al 2005). However, there is a growing body of literature which suggests that improved access to water (secure, affordable, reliable supplies and protection from water-related shocks e.g. floods and droughts) is an important factor determining the resilience of poor agriculturalists in the face of increased risk and vulnerability, and their ability to engage in market opportunities where these exist (Lipton et al, 2003; Hussein & Hanjra, 2004; van Koppen et al, 2005).

Supply side issues

Rainfall, temperature and other weather conditions are key factors influencing variability in agricultural production and food insecurity across the globe, and economic growth in many predominantly agricultural countries remains strongly coupled to rainfall patterns. Variability and unpredictability of rainfall are in many cases more difficult to deal with than absolute shortages. The strongest relationship between agricultural production and climate is observed in rain-fed agriculture, which is also likely to be the hardest hit by

climate change. Irrigation acts as a buffer against rainfall, although the water resources available for irrigation may itself be adversely affected by climate change over the longer term.

In many cases, climate change is likely to exacerbate ongoing processes of environmental change (e.g. degradation of surface and groundwater sources) and this implies an incremental worsening of existing asset inequality.

These changes could well be on an unprecedented scale. For example, Barnett et al (2005) show that in a warmer world less winter precipitation falls as snow, and melting of winter snow occurs earlier in spring, leading to a shift in peak river runoff from summer and autumn – when demand is highest – to winter and early spring. Changing patterns of melting snow and ice in the Himalayas will alter river regimes across Asia significantly, impacting on water supply in poor rural areas of India and China which are home to around one-sixth of the Earth's population. Such challenges clearly need to be addressed at different levels.

Building capacity to manage and cope with changing patterns of availability (local, national and international levels) will be critical. The concept of “water stress” (i.e. withdrawal to availability ratio) is likely to be more helpful than that of “water scarcity”, which is relative and contested. Establishing effective management structures for coping with longer drier dry seasons and shorter wetter wet seasons and (re)allocation of limited resources among competing/conflicting uses during times of shortage represents a key challenge. Adaptation to changing patterns of resource availability may take the form of infrastructural adaptation (e.g. water storage infrastructure and flood protection) and/or institutional adaptation (strengthening institutions to better manage and allocate changing resources and cope with increasing risks).

Issues of subsidiarity (i.e. at which level it is most appropriate to carry out different aspects of water resources management) remain largely unresolved for low capacity, decentralising environments such as those typically found in sub-Saharan Africa (Mtisi & Nicol, 2003). Though South Africa has succeeded in establishing new institutions to manage water on the basis of hydrological rather than administrative boundaries, progress elsewhere has been slow. In India, water remains a state-level subject but resource planning issues frequently cut across state boundaries presenting a major coordination challenge (IISD, 2006). Separation of political and technical aspects of resource management is likely to become increasingly difficult as responses to climate change move up the political agenda. Many of the climate change impacts identified have a trans-boundary or regional dimension, highlighting the need for coordinated strategies to address issues at international and regional scales. Strengthening institutional arrangements for managing trans-boundary waters is likely to become increasingly important in reducing water-related shocks and stresses. The concept of ‘benefit sharing’ – i.e. sharing the economic benefits of water resources development, rather than the water itself – is being promoted under the Nile Basin Initiative as a means to help overcome intra-regional inequalities in agricultural production and food security in the Horn of Africa but has yet to be operationalised (NBI, 2007). At present it remains unclear whether climate change will provide the catalyst for greater cooperation or conflict over transboundary waters (IISD, 2006).

Enhancing water resources availability through storage : Development of hydraulic structures to store, enhance and convey water resources is back on the development agenda and presents a number of challenges for public donors like DFID (see Box 5.1).

Box 5.1: Hostage to hydrology?

The return of large storage to the development agenda is an interesting example of ‘big solutions’ to ‘big problems’. Recent World Bank publications suggest that water resources management is a key determinant of prospects for growth and poverty reduction (Grey & Sadoff, 2005 ; Grey et al, 2006) and argue that investment in water management institutions and hydraulic infrastructure is an essential pre-condition for ‘harnessing hydrology’ in LDCs. It is suggested that, despite significant investment in water resources management, countries like India remain ‘hampered by hydrology’. Meanwhile in many of the world’s poorest countries the combination of high climate variability and low levels of water-related investments means economic performance is closely related to rainfall and growth becomes ‘hostage to hydrology’. The recent Country Water Assistance Strategy for Ethiopia, for example, estimates that the current economic cost of hydrological variability is over one third of the nation’s average annual growth potential (World Bank, 2006). The La Nina drought of 1998-2000 and El Nino floods of 1997-1998 are estimated to have reduced Kenya’s GDP by around 16% and 11% respectively (World Bank, 2004) - agricultural losses accounted for around 15% of drought damages (10% crops, 5% livestock). Similar analysis conducted in Mozambique suggests that water related shocks and stresses (floods and droughts) may account for up to one third of GDP (World Bank, 2005). The authors propose using per capita artificial water storage capacity as a proxy indicator of capacity to manage (climate-related) variability and on the basis of this analysis suggest the need for significant investment in water storage infrastructure, particularly in sub-Saharan Africa. Critics have argued that the social, economic and environmental costs associated with construction of large dams outweigh the projected benefits in terms of ‘water security’ and that the distribution of costs and benefits tend to be highly uneven. In any case the potential benefits of enhanced storage will depend on parallel improvements in access to water supply infrastructure and access to markets - in Ethiopia, for example, access to water is just one of many factors underlying low levels of agricultural productivity and growth in recent years (Teshome, 2006). The key challenge for public donors therefore is achieving the right balance between investment in infrastructure necessary to manage increased climate related variability and investment in effective water management institutions required to maximise poverty and growth impacts.

5.2 Demand side issues

Access to water and resilience in the face of increased risk and vulnerability

Access to water is a key factor determining the resilience of poor households in the face of increased risk and vulnerability, in terms of both labour savings and productivity gains. Inequitable access to irrigation infrastructure acts as a key constraint to poor households participating in market opportunities where they exist (Hussein & Hanjra, 2004). Physical dimensions of access, including distance of land holding from the water source and volume of water supplied to downstream users during periods of water shortage, may become increasingly significant, especially in those areas which are heavily dependent on a single source. But overall, social and institutional aspects of water management are likely to be more important in determining the impact of increased variability on poor water users (Bruns et al, 2005 & 2000).

Narain (2003) quoted in IISD (2006) suggests that households engaged in agriculture can employ a range of *strategies in response to water scarcity*. These include the following:

- a. 'Improving access to available water (such as makeshift storages, digging deeper tube wells, exchanging irrigation timeshares, buying groundwater, and engaging in water theft)
- b. Reducing demand for water (such as switching to less water consumptive crops, adopting more efficient irrigation practices, and altering dates for agricultural operations)
- c. Coping with the adverse impacts of periodic drought (such as credit, sale of valuables and livestock, use of stored seeds and food grains)
- d. Diversifying sources of livelihood (such as alternative employment opportunities, migration)

Adaptation strategies to climate change

The vulnerability of farmers to climate change will vary greatly between locations, and even from one community to another, depending on the degree of climatic alteration experienced and other physical and socio-economic factors which relate to adaptive capacity. Similar factors affect the adaptation strategies employed by farmers, which are, themselves, very variable. Snidvongs' study (2006) of farmer adaptation in the lower Mekong Basin found that farmers in poorer communities with weak linkages to urban areas adopt farm-based strategies to cope and meet basic needs, while those in communities with a greater resource and capacity base show a different profile of responses, often involving financial investment and use of improved technologies to access markets and diversify household incomes. Where urban—rural linkages are stronger, migration for urban employment becomes an important strategy.

Changing demand for water

Agriculture remains the world's largest water consumer, but there are multiple competing uses – principally urban and industrial water supply. Managing demand for water, and establishing appropriate incentives for efficient and responsible use of limited resources, represents a key challenge. In many cases, this implies the reallocation of water from agriculture to other sectors and/or more efficient use of agricultural water. The nature of demand is changing, partly as a result of demographic changes and structural transformation of rural areas. However, the notion of ever-increasing absolute demand is misleading, and associated global projections of future 'water scarcity' are unhelpful in trying to understand the causes, effects and different components of demand for water – an understanding which is key to effective demand management.

Box 5.2: The challenge of managing groundwater in India

The growth-oriented 'green revolution' in India has driven widespread groundwater depletion, exacerbated by policies to provide free or subsidized electricity to pump water for agriculture, which have encouraged perverse patterns of water-intensive cropping even in water-scarce areas. This groundwater depletion also has equity implications, as the increasing cost of extracting water from greater depths may restrict access by smaller, poorer farmers. Climate change is expected to affect monsoonal patterns, and broadly reduce water availability in India through changes in

precipitation patterns, evapotranspiration and groundwater recharge (IISD, 2006; Gosain et al, 2006). Farm productivity is closely coupled to rainfall, and without access to irrigation water reductions in rainfall will have a direct impact on crop yields. The political decision to subsidise agricultural water may thus compound the risk of adverse climate change impacts on poorer farmers, who already have difficulties in access to water, by allowing the effective monopolization of a notionally free common-property resource by those who have enough money to extract it. It is not only restricted access to groundwater which will leave the poor most vulnerable to climate change. The poorest already typically occupy the most marginal lands in areas prone to drought, flooding and other hazards which they are already poorly equipped to cope with.

Controversial proposals have recently been made for inter-basin transfers from water-rich to water-scarce areas. It can be argued that such transfers increase equity in water access, but as well as the political controversy which surrounds them (particularly strong in the source basin) there are serious concerns about their environmental impacts. Inter-basin transfers for irrigation also risk creating an illusion of plenty which could perpetuate the perverse cropping of water-demanding crops in water-scarce regions and hinder or delay the adoption of water-efficiency measures.

Mitigating water related disasters

The number of people at risk of flooding could be five times greater than those susceptible to sea level rises (Paper One this series, Peskett, 2007). Managing floods and droughts and mitigating the impact of water-related disasters requires an integrated approach to maintenance of (enhanced) flood control infrastructure at a local level (often linked to food for work programmes), plus renewed attention to safety in the development of large irrigation schemes and monitoring of pollution of water courses as agricultural discharges become less dilute. Recent experience in Mozambique shows that reducing loss of life associated with periodic large flood events is much less difficult than managing the displacement and loss of agricultural livelihoods (Cosgrave et al, 2000).

5.3 Policy Implications – Water Sector

The cost of effective water management is far less than the cost of avoided water-related disasters, destruction of crops, displacement of populations and loss of life and livelihoods. However, the public good aspects of water resources management are typically underprovided for due to neglect by developing country governments and public donor agencies. Increased climate-related variability is likely to raise the profile of water management issues on the development agenda.

Water resource management is a cross-cutting issue. As such, establishing mechanisms for more effective coordination across sectors will become increasingly important, in both identification of areas or sectors experiencing water stress (i.e. withdrawal to availability ratio) and targeting of vulnerable communities or households, among others.

Agricultural policy and programming needs to actively support efforts to promote efficient and responsible use of water resources, either through the development of market incentives or through modification of land-use patterns, crop selection, conservation tillage etc. For example, important questions surround the social and

environmental impacts of using limited water resources for production of biofuels and other crops for export to industrialised countries (see Paper 2).

Agricultural policy needs to take account of the shifting balance between rain-fed agriculture and irrigated agriculture in the face of climate change. Supporting development of small scale productive uses e.g. micro-irrigation or water for livestock linked to domestic water supplies (multiple use systems and services) is likely to be more important in terms of promoting household food security than development of large irrigation schemes.

Importance of flexibility: Given the level of uncertainty, policies and institutions that facilitate adaptation to climate change and variation must be inherently adaptive themselves (IISD 2006). Moench et al, (2003) point out that policies that are not adaptive tend to be 'tightly focused and may be essential for specific tasks – but are unable to govern or guide the complex, surprise laden process of water governance central to long-term management at a regional, basin, aquifer or even a local level'. The authors state that in contexts characterised by variability, uncertainty and change, 'specific solutions are less important than the existence of processes and frameworks that enable solutions to be identified and implemented as specific constraints arise and contexts change'. Flexibility in responses and in the processes facilitating such responses is thus essential.

Water policy and institutional reform remain important to promote efficient and responsible use of limited resources. Reform objectives typically centre around allocative efficiency (i.e. allocation to sectors with the greatest economic and social returns) in the context of a more integrated approach to water resources development and use (as proposed in the Dublin principles). Water governance structures already exist in some form and in order for reforms to improve the livelihoods of poor rural people, their voices and concerns need to be heard and acknowledged as part of the process building on indigenous knowledge and practices.

The need for long-term donor support: A recent study of efforts by ADB to establish 'Apex bodies' in Thailand, Bangladesh and Sri Lanka highlighted the dangers of trying to 'projectise' reform processes (Newborne, 2005). 5 year sector reform programmes are generally unrealistic; 10-15 year reform programmes have much greater chance of success. In agrarian societies, such as Sri Lanka where irrigation authorities are politically powerful, there is often considerable resistance to reforms designed to improve efficiency of agricultural water use (Samad, 2005). External donors can play an important role in helping to push through difficult reforms which local politicians do not want to be associated with, but donor understanding of local political economy and exactly where and when to push is generally lacking (Bandaragoda, 2006). This implies the need for long term donor support to processes of policy and institutional change. The key challenge is generating consensus around the logic of reform, identifying practical entry points for engagement and maintaining sufficient flexibility to respond quickly to changing political contexts.

Integrating land and water governance: Careful sequencing and coordination of policy reforms in land, water and agriculture is required in order to promote efficient and responsible water use through appropriate incentive structures. In many countries

access to water is closely linked to land tenure but this is not always taken into account in land reform initiatives. Agriculture is not only the largest user of water resources, accounting for 70% of global freshwater withdrawals, but also one of the least efficient – FAO (2003) estimate that average water use efficiency in irrigated agriculture in developing countries is approximately 38%. In the context of increased climate-related variability, improving efficiency will become increasingly important in order to secure access on a sustainable and equitable basis. Non-water sector policies and agricultural subsidies can distort and undermine efficient and effective functioning of water markets, often with negative consequences for poor agriculturalists (Box Nine).

Coordination Issues: coordination between sectors and institutions (vertical and horizontal) is essential in order to effectively address the impacts of climate change and build resilience in physical and socio-economic systems. However, existing institutions are often not geared to address water management in a coordinated fashion, and intersectoral linkages (for example between the water, agriculture, industrial and urban planning sectors) are typically weak. In the context of climate change and risk management and adaptation this poses a significant concern. A study by VARG (2006) looking at Kenya, Mexico and Vietnam highlights the potential detrimental impact (in terms of effective mainstreaming, technical responses and coordination) of fragmented institutional structures in addressing the implications of climate change. In these countries, the ministries of environment are responsible for climate change adaptation whereas disaster risk management is the responsibility of ministries/departments dealing with civil defence and/or agriculture, rural development and food security. As well as the coordination challenges which result, VARG suggests that when climate change policy is located within the environmental sector, it is likely to become technically-focused and isolated from the development agenda, undermining effective mainstreaming. In Mexico, the study finds that different forms of technical expertise are concentrated within different institutions, which can make coordination difficult, and risks duplication of efforts and costs which can undermine adaptation efforts. It also highlights that multi-sectoral committees established to improve integrated management may not be successful in accessing national level planning and budgetary processes.

Reviewing public investment in water infrastructure: The World Bank has recently published reports suggesting that increased storage is the only way to address the vulnerability of national economies in Ethiopia and Mozambique but the question of large dams remains highly controversial. The Commission for Africa report (2005) provides a good summary of more general debates on irrigation in Africa and argues that the problem is not just one of water availability but rather access to water supply infrastructure and markets. Private investment in irrigation of non-staples for export markets has been constrained by global food prices but irrigation can also significantly enhance the yields of staple crops. There is a strong argument to be made for public investment in irrigation of staples for local markets/food security. The Commission for Africa recommends doubling the area of arable land under irrigation in Africa by 2015 as part of a wider set of measures to promote agricultural and rural development. The emphasis is on small scale irrigation which is more flexible and responsive to changing context; appropriate technologies are already in use in East and Southern Africa. Irrigation can be increased without significantly disadvantaging other users of water through the introduction of various measures such as micro irrigation, water harvesting,

watershed management & transboundary water management (Westby et al, 2005) but all of this requires increased public investment.

Integrating resource management within PRS frameworks: Integrating ‘non-spend’ issues like water resources management and environment within PRSPs has proved difficult and there may be important lessons for efforts to ‘mainstream’ climate change. Bird and Cabral (2007) note that the shift towards General Budget Support does offer opportunities to promote environmental objectives, by creating space to mainstream the environment as a development and growth opportunity, reducing the financial burden on environmental agencies and improving budgetary discipline, transparency and accelerated reform within sector ministries. However the environment may be afforded little priority in national agendas and the challenge is raised that attribution of environmental impacts resulting from GBS is likely to be very difficult. In order to support environmental programmes through GBS, Bird and Cabral recommend that donors work to: encourage multi-stakeholder policy debate; build analytical capacity within sector agencies e.g. to carry out environmental assessments; develop political incentives for positive environmental outcomes; and strengthen country representation in international environmental processes.

Box 5.3: Integrating water issues within PRSPs

First and second generation PRSPs, which placed particular emphasis on budgetary and administrative reforms, are generally considered to have been successful in improving policy and planning processes. However a number of concerns have emerged in relation to the content of poverty reduction strategies. Specific concerns relating to the water sector include the following:

- *Poverty-growth analysis remains shallow:* A growing criticism of PRSPs is that they have generally failed to consider the full range of policy options required for growth and poverty reduction, including trade-offs between options. In particular there is very little intra- or inter-sectoral coordination, and weak understanding of how water sector policies affect outcomes in other sectors.
- *Social sectors are favoured at the expense of productive sectors:* Various commentators (e.g. Driscoll & Evans, 2004a) have noted that the linkage of PRSPs to HIPC has resulted in bias towards the social sectors (e.g. health and education) at the expense of productive sectors (including water). The MDGs, for example, have resulted in high visibility to water supply and sanitation (WSS) at the expense of Water Resource Management (WRM) issues, although success in relation to WSS targets is clearly dependent on attention to the latter. In terms of advocacy, water supply and sanitation services are ‘heart string’ issues around which it is easy to mobilise political support. Wider issues surrounding WRM policy reform, however, are more complex and deeply political due to entrenched interests of existing users with regards to irrigation.
- *Investments have been short-sighted:* First generation PRSPs have tended to focus on short term needs rather than medium term goals. PRSPs are typically seen as a policy process which guides expenditure and thus tend to focus on investment options rather than policy options for achieving investment objectives. Generally the water sector remains very narrowly focused on technical aspects of infrastructure development and resource management, with little exposure to debates in other sectors on poverty reduction and growth.
- *Difficult Choices are being avoided:* The way that PRSP processes force sectors to compete for the attention of Ministries of Finance tends to focus attention on how water sector investment can ‘enable’ growth and poverty reduction, rather than the ways in which water policy may in fact act as a ‘constraint’. The mantra seems to be ‘don’t tell me what we can’t do, tell me what we can do’ which is of course short-sighted. The result has been a rather

narrow focus on financing ‘hardware’ expenditure targets and a lack of attention to non-spend ‘software’ issues such as regulation, legal reforms and intra- and inter- sectoral coordination. Progressive reforms such as the reallocation of water rights, which are themselves contingent on actions beyond the sector (e.g. land reform), have been largely neglected. Overall therefore PRSPs tend to focus on ‘quick wins’, especially service delivery, rather than longer term institutional reforms required to improve sustainability of services delivered.

A key challenge facing donors tasked with shaping future generations of PRSPs is integrating process and content concerns. This is likely to involve a balance between supporting long term process of institutional change while meeting short term goals around content.

Source: Slaymaker & Welle, 2005

Long term efforts to formalise water rights

Efforts to separate water use rights from land tenure, in order to avoid capture of increasingly limited common use water resources by private land holders, are ongoing but progress in ‘unbundling’ land and water rights has been slow to date. It has been tried in South Africa and Mexico but Australia is the most advanced case. Doubts remain as to the ability of centrally administered water rights regimes to respond flexibly to rapidly changing contexts on the ground (e.g. unprecedented decreases in river flows or rapidly changing patterns of demand) (See Box 5.4).

Box 5.4: Water rights vs asset security: the limits of centrally administered rights regimes in supporting local adaptation in low capacity environments

Recent debates on water rights have tended to focus on water *services*: the right of access of individuals/households to water supply, at the ‘tap end’ (the human right to water), with inadequate given to rights to water *resources*, at the ‘river end’. It is at the water source that competition for water resources in bulk is played out, between water-using sectors (urban, agricultural and industrial) and between water users within each sector. Permissions to abstract water from surface/ground waters are granted for periods of time which may be substantial. These are commonly formulated as property rights, a second legal form of the right to water.

Existing empirical studies show contrasting approaches to river-end property rights in water:

- on the one hand, advocacy of ‘formalised’ water rights, as promoted by many international agencies: centrally-administered systems of regulatory rules and procedures to decide between competing claims; calls for formalised water rights to be registered in the manner of land rights, and separated (‘unbundled’) from them (e.g. Hodgson, 2004) so as to promote investment and trading, attract more capital for funding of water infrastructure, and encourage reallocation of water resources to ‘higher (economic) value’ uses.
- on the other hand, there are commentators (e.g. Bruns et al, 2005 & 2000; Molle, 2004) who favour settlement of competing claims of access to water resources by processes of negotiation which are dynamic and gradual, often advancing through trial-and-error, and who caution against the ‘parachuting’ (abrupt introduction) of formalisation schemes, conceived in developed countries, into the political-economies of developing countries - where capacity to administer and regulate is limited, with greater risk of political capture by powerful interest groups.

Source: Newborne, P. (2004)

6. General Policy implications

We now turn to the implications of the above discussion for the broader international response. A clear message to be drawn is that, in a situation of uncertainty and flux such as is represented by climate change, the focus has to be very firmly on the social distributional implications of agricultural policies, and their mutual interplay with growth strategies.

As a starting point, it may be worth revisiting how donors, including DFID (ex-ODA) handled the previous manifestation of climate stress in Africa – the droughts and famines of the 1970s and 1980s. This experience may provide useful evidence of the relative strengths of technical and politico-institutional approaches in situations of uncertainty.

A new parameter that has emerged in the intervening decades is the strengthening of democracy. Democracy and short-term political objectives may make it difficult to handle long-term climate change issues except through markets, but there remains considerable uncertainty as to whether such markets will operate in an equitable manner or compound the inefficiencies. If the latter, then a case for the onus being on longer term measures that strengthen the negotiating stance of the poor, is substantiated.

A strong case has been made for mainstreaming (integrating) climate change within development policy (Klein et al, 2007). The paper supports this approach. Addressing the impacts of climate change through mainstreaming is likely not only to benefit development interventions aimed at reducing poverty but also to enhance the capacity of communities to cope with the impacts of climate change through more robust adaptation options. It may also help ameliorate the impacts. The justifications are several:

- ⇒ Climate change is likely to exacerbate pre-existing, but largely negative, trends for the poor, relating to other influences, and thus needs to be factored into the responses to the latter;
- ⇒ Mainstreaming should result in greater synergies between existing approaches, and avoid contradictory strategies between sectors (for example, agricultural policies which presuppose supportive land and/or water rights); it should thus lead to greater aid effectiveness;
- ⇒ Mainstreaming should help ensure that the long-term nature of the climate change phenomenon does not lead to its marginalisation in the policy process relative to issues with greater short-term impact and tangibility;
- ⇒ Mainstreaming should influence planning decisions in sectors which might otherwise ‘slip through the net’ (for example, project planning acknowledging heightened climate variability, such as water policy in relation to large dam retention schemes);
- ⇒ Where climate change is not mainstreamed, then policy responses are likely to be captured by non-poor (but not necessarily more productive) actors in the economy; this is a particular risk given the present emphasis on the links between development and growth;
- ⇒ Where climate change is not mainstreamed, there will also be a high risk of maladaptive practices which worsen the predicament of the poor;

- ⇒ Given the short time allowed for most internationally supported processes (the medium term framework for PRSPs, for example, is only three years), mainstreaming climate change will help to put pressure on decision-makers to lengthen planning frameworks; and
- ⇒ Because of the rules for international climate change negotiation (for example, the lack of obligations of non-Annex 1 countries under the existing Kyoto protocol), developing countries may well engage more productively with the development agenda than with the climate change agenda; thus, the former may provide an effective conduit for the latter.

A further justification for mainstreaming is the need to bring climate change decision making into the wider planning processes so as to guard against a loss of objectivity in the climate debate. Ensuring that climate change issues are addressed in established policy arenas and assessed against other priorities would help counter the danger of ‘climate change hysteria’ leading to wasteful expenditure, ignoring more pressing problems and/or issues that would help development and improve capacity to adapt (cf. Lomborg, 2007). There is, however, a need to avoid ‘mainstreaming overload’, with climate change having to vie against other topical issues and priorities, such as gender, governance and environment to the disadvantage of all of them (OECD, 2006).

Box 6.1 illustrates the value of integration of climate change into the wider planning process, drawing together the effects of climate change with other economic forces (in this case, primarily the effects of globalisation on Indian agriculture). This may provide a useful planning model for other vulnerable economies.

Box 6.1: Double Exposure to Climate Change and Globalisation in India

The Project ‘Vulnerability to change of Indian agriculture to climate change and globalisation’ offers an interesting approach to the understanding of the benefits of mainstreaming - in this instance, recognising that the impact of climate will not be experienced in isolation but in conjunction with other social and economic changes (and consequent risks and opportunities), particularly those associated with globalisation. The project involved collaboration between TERI (The Energy and Resources Institute), India; CICERO (Centre for International Climate and Environmental Research, Oslo), Norway; and IISD (International Institute for Sustainable Development), Canada, and was co-funded by the Governments of Canada and Norway (2001-4).

The conceptual framework was that of risk and vulnerability. The methodology involved a macro-level analysis, drawing on district level data, to prepare a vulnerability map for India, and then detailed case studies at locality level within particularly vulnerable areas, to understand how individual and communities developed coping strategies to respond to their changing environment. (These strategies were not always consistent; for example, shifts to soy bean cultivation as a response to globalisation might leave farmers exposed to the effects of climate change). The research led to the identification of a set of policy recommendations. It was found that policies which could reinforce coping strategies also strengthened long-term adaptive capacity. These included crop insurance, seed banks, off-farm employment and improved access to inputs and markets. Strengthening of local institutions (including private sector and civil society organisations) and educational levels also had positive gender and equity impacts, and helped to reduce vulnerability.

The project is now examining the effects of trade liberalisation on India’s capacity to respond to climate vulnerability. The possible reduction or elimination of export subsidies and other forms

of domestic support are likely to influence the cropping profile and have knock-on income and employment effects.

Source: <http://static.teriin.org/coping/index.htm>

The practical means to link both development and climate change policies at the national level are through integration with existing development instruments such as: country-level *poverty-reduction strategies* (PRSPs); (UNFCCC –supported) *national adaptation programmes of action* (NAPAS); and sectoral decision-making tools such as *sector-wide approaches* (Swaps) (Klein et al. 2007, Berry et al, 2006).

All of these have the benefit of promoting multi-sectoral and broad-based consultative processes, built around key generic themes (such as risk and vulnerability). However, as noted above (Box Ten, see also OECD 2006), the level of integration of climate change into such plans and strategies is often low, and the treatment domesticated and unchallenging. Operationalisation is even more rare.

Among the questions that are raised in relation to the use of such standardised aid planning instruments are the following:

- a) *Timeframe*: PRSPs and SWAPs are increasingly using medium-term expenditure frameworks (MTEFs) as a means for coordinating planning – Do MTEFs provide an adequate time-scale for climate change planning, and if not, what recommendations need to be made to lengthen the planning frame?
- b) *Private sector*: these approaches to policy making and aid implementation tend to call for the private sector to play an increasing role – even in scenarios (such as are common in Africa) where the private sector has very low capacity and outreach, and little track record in addressing the needs of marginalised (‘double exposed’) communities.
- c) *Aid modalities*: the principle aid modality at the present time is generalised budget support (GBS), which now amounts to US\$5 billion per year (5% of ODA, de Renzio 2006). This is often cited as having a centralising effect. Will centralised intervention be appropriate for addressing climate-induced vulnerability? Other aspects of the development discourse would call, rather, for further decentralisation, arguing that vulnerability in ecological, social and institutional systems may often require a more locally responsive and thus adaptive approach. A further argument in favour of this position would be that many local communities have already been coping with climate-induced vulnerability for some time; thus, they may already have developed local adaptive strategies.

The inter-sectorality which is inherent in a mainstreamed approach, and one of its strengths, may also prove to be a potential weakness. This is additional to the question of whether inter-sectoral approaches are feasible within existing governmental structures, and relates to the tendency of inter-sectoral action to be apolitical and technically driven (in part as a consequence of the sanctity of sovereign departments of state). The political dimensions need to be captured. These issues can probably be best addressed through broad participatory processes, bringing together the involved departments of government with appropriate civil society actors and NGOs. There would be value in ensuring that the tendency of such processes to be activity-driven and rather

top-down (as with NAPAs, for example¹) does not lead to an over-concentration on technical fixes to the detriment of adaptation and responsiveness.

In such a context, a rights-based approach finds further justification as a complement to these instruments, and emerges as an essential accompanying perspective and orientation. It also has the advantage over conventional aid approaches and modalities of encouraging a longer-term perspective, more compatible with the likely rhythms of climate change.

¹ See for example <http://unfccc.int/resource/docs/napa/bano1.pdf>

7. Concluding Remarks

The argument of this paper has been that the impact of general processes of global change on access to assets will be strongly mediated by socio-economic and political factors operating at national and local levels. Climate change policy needs to be able to address the process of change at the level of political process and institutions, and not just at the level of technical response.

Important unresolved questions surround the level at which to build adaptive capacity and the balance between promoting policy reform and long term structural changes versus simply strengthening the coping capacity of existing institutions. Whilst answers are likely to be highly context specific, there is the need for a systematic response, in each case.

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