CHAPTER 1: INTRODUCTION

There is now little doubt that climate change is occurring (IPCC 2007). Observed impacts of climate change on physical and ecological systems over the past century foretell things to come. Along with changes in climatic conditions, the earth potentially faces irreversible and catastrophic systems feedbacks and impacts associated, for example, with collapse of thermohaline circulation, melting of glaciers, or other singular events, which have resulted in increased frequency of climate-related disasters (IPCC 2007).

The 'mitigation' *versus* 'adaptation' debate in climate change

In the climate change debate the overwhelming amount of analysis has traditionally focused on mitigation actions rather than adaptation. [1] One may argue that it has been so because mitigation is a developed country priority (Wijkman 2008), and therefore, deliberations in the United Nations Framework Convention on Climate Change (UNFCCC) tended to focus on mitigation. Only very recently, the Bali Action Plan 2007 of the UNFCC gave somewhat balanced emphasis, if not equal, to adaptation issues as well.

Mitigation is the act of reducing the cumulation of greenhouse gases in the atmosphere (whether by reducing the emission of these gases or increasing the absorption through creation of sinks). Adaptation is the process of changing behaviour in response to actual or expected climate changes. Both activities are likely to be important as responses to potential climate change. But mitigation has been at the heart of the climate change debate for the familiar and undisputed observation that human activity is rapidly increasing the concentration of greenhouse gases in the atmosphere. Each year, worldwide fossil fuel use adds about six

[1] For an exhaustive survey of scientific literature on climate change, see Adger et al. 2007, Intergovernmental Panel on Climate Change (IPCC; 2001, 2007), and the Stern Review (2006).

billion metric tons of carbon to the atmosphere, and the concentration of carbon dioxide is now about 30 percent higher than it was at the dawn of the Industrial Revolution (IPCC 2001). Further, the emissions have global effect – GHGs emitted in Iceland do have effect in the Antarctica region.

But it is equally true that no one fully understands how the climate will respond (Meinshausen 2005). The increase in greenhouse gases could lead to a sharp rise in global temperatures with severe consequences for ecosystems and human societies. On the other hand, it's possible that the temperature rise could be modest, easy to mitigate or adapt to, and far in the future. The most likely outcome is probably somewhere between the two but the intrinsic complexity of the climate makes it impossible to know precisely what will happen with any degree of confidence and what should be our response (to adapt). The uncertainty naturally leads to a focus on climate change mitigation.

Indeed the climate models have vastly improved over the years, and the projected changes in the climate appear to be more certain than before. But even if one had complete confidence in the projection of climate outcomes, determining the costs and benefits of policies that would limit greenhouse gas emissions is even more difficult (Klein & Persson 2008). For example, response to climate change will depend heavily on how fast emissions would grow in the absence of a climate policy: the more quickly emissions rise, the more expensive it will be to reduce them to any given level. The rate of emissions growth, however, depends on factors that are impossible to predict accurately over long spans of time: population growth, educational attainment, productivity growth within different industries, convergence (or lack thereof) in incomes between developing and developed countries, fossil fuel prices, and many others. Plausible alternative assumptions about these factors can lead to vastly different estimates of future emissions and therefore vastly different predictions of the extent of climate change. The uncertainty of emissions and the related effect on climate change could also be related to evolution of a risk culture in this debate (Beck 2000,

Caygill 2000). As a natural corollary to this evolution, mitigations finds greater voice over adaptation which being less uncertain, physical act does not contribute so much to the evolution of risk culture and hence human concern.

With both options available – mitigation and adaptation – it makes sense not to choose only one or the other since they both act to minimize the risk of serious injury. There is now greater understanding that adaptation is crucial to deal with the unavoidable impacts of climate change to which the world is already committed, and that adaptation in most cases provide local benefits, realised without long time lags in contrast to mitigation. The Stern Review's (2006) clear message that developing countries, and the poor within developing countries, would be hit the hardest because of the projected climate change, is now the *raison d' etre* for taking adaptive action in right earnest. Indeed, in a highly globalised world, the future of both developed and developing countries is much more densely intertwined so that adaptation is gradually becoming a priority for developed countries also.

Democratic decentralisation and climate change adaptation

One of the problems in undertaking climate change adaptation in a systematic manner, however, is that although it is known that much adaptation in these countries has to occur locally, the current literature is almost silent about facets of local level adaptation, such as attributes of successful adaptation and role of local government. This problem is much relevant to countries like, India which is vigorously pursuing democratic decentralisation and where the local governments, such as the Panchayati Raj Institutions (PRIs) in the rural areas, have been mandated with responsibilities of overall development (e.g. natural resource management, local level planning, capacity building) and inclusive growth – aspects which are tightly related to climate change adaptation. It is, therefore, vital to understand the role of local government (PRIs) in promoting successful climate change adaptation by individuals, households and communities in rural areas. Further, it has been argued

that democracy and decentralisation are conducive to development in many circumstances [2] and that since the proportion of different interest groups in a system affects the allocation of economic resources, governance models must be embedded in the general equilibrium framework of development if they are to be useful in most empirical situations (Foster & Rosengwiez 2004). Since development is linked (as discussed below) to climate change adaptation, the links between democratic decentralisation and climate change adaptation becomes clearer.

It would, therefore, no longer possible for democratic institutions to ignore climate change adaptation as an essential component of their work as there is a serious danger that climate change in the form of more extreme droughts, floods and storms, sea level rise and more intense rainfalls will undermine development interventions and millennium development goals, increase poverty (Schipper & Pelling 2006, IPCC 2007), and, therefore, undermine the legitimacy of the present government. Adaptation to climate change, by making adjustments of practices, processes and structures, could not only reduce the negative effects mentioned above but take advantage of new opportunities associated with climate change (e.g. see discussions in DSDS 2009), which if utilised properly, would be conducive to further deepening of democracy. In this regard, an interesting article by Besley & Burgess (2002) argue that under the conditions of adverse weather shocks there is more likelihood that an incumbent public representative is returned in the next election. Although this finding is based on a very limited set of data, and may not be applied broadly, it opens a new window in the debate on climate change adaptation and democratic decentralisation.

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[2] See for example, Foster & Rosengwiez 2004 who developed an econometric model to describe the process of democratisation and its effect on distribution of local public goods (one of the important parameters of development) in a poor rural economy. He concludes that democratisation leads to contested (e.g. between landed and landless classes) allocation of public resources (e.g. between road construction favoured by the landless because of high wage potential, and irrigation favoured by the landed class), which maximises the total utility even if it does not increase efficiency.

Climate change adaptation as a developmental issue

Although greenhouse gases emissions need to be reduced to mitigate climate change and avoid future human suffering, immediate action on adaptation to climate change is necessary because the world is already committed to some extent of human-induced climate change over the next decades because of past greenhouse gas emissions. Furthermore, societal changes such as privatisation of natural resources, declining health, and conflicts and insecurity are in some instances making populations increasingly vulnerable even to present climatic variability such as seasonal droughts as well as extreme events. This is because the modern industry-led developmental pathways have placed people's livelihoods at the brink of collapse or undermined their existing adaptation strategies. These same societal processes are likely to make populations equally, if not more, vulnerable to future climate variations and long-term changes.

Thus, it has been argued that the issue of climate change should be treated as an issue of development which is relevant to all sectors of society since these all affect people's vulnerability and their ability to adapt to climate variability and change (Watkins 2007). It has been a general tendency in developing countries, however, to equate development with poverty reduction (see Appendix-I for some definitional issues concerned with climate change adaptation). But, it should be noted that not all poor people are necessarily vulnerable to climate change, and non-poor people can also be vulnerable, in industrialised as well as in developing countries. In this dissertation, therefore, where my primary concern is with the vulnerability of the rural poor because of the specific challenges that they meet, it would be highlighted that adaptation to climate change among rural poor will involve measures that differ from conventional poverty eradication measures. At the same time, it would also be argued that development and poverty eradication efforts need to make specific considerations of the vulnerability of their target groups and enhance the ability of these groups to adapt to climate variability and

change. Poverty can thus be reduced in ways that may be more effective than the current strategies.

Another note of explanation is that in this dissertation, my focus would be on vulnerability to "climatic variability", more than on the overall "climate change" *per se*. This is for two reasons. First that clear cut climate change has not been experienced in many places but the extremes of climate variability are common day occurrence and hence etched in the minds of common people rather well. This makes empirical research rather easy. Second, people who are vulnerable to climatic variability are likely to be vulnerable to future changes as well, and that future changes in average conditions to a large extent will involve an intensification of present variability and extremes. Indeed the focus on climatic variability is commensurate with the fact that many serious problems have arisen because climate conditions and variability have been ignored in development projects, and many societies are not well adapted to their current climate, thereby even less prepared for additional climate variability and long term or abrupt climate change.

Local government to climate change adaptation

In the sphere of democratic decentralisation and climate change adaptation, focus needs to be given on local government. This is so for primarily three reasons. First, local government (e.g. PRI) has been given a significant responsibility for planning and implementation of local development programmes. Second, climate change adaptation is about reducing the vulnerabilities, which by nature are highly contextual and hence local. Identification of vulnerabilities and analysis of their causes and effects could, therefore, be best done by the government at the local level. Third, overwhelming amount of evidence indicates that the poor will be the hardest hit because of climate change. Poverty being a multi-dimensional issue requires fine grained analyses, including identification of those who are *real* poor. Such tasks are possible only at the lowest level of the government which regularly and directly interacts with the poor. Indeed, some of the most effective pro-poor actions to reduce

vulnerabilities also come from partnerships between local government and community organizations.

Talking about link between development and local government, it may be recalled that most aspects of "development" increase adaptive capacity because they also increase local knowledge and local capacity to act. Successful development should also increase the incomes and asset bases of poorer groups and improve their health, which in turn increases their capacity to act to reduce their vulnerability. Development should also increase poorer groups' capacity to influence local governments and so spur them to appropriate action too.

Coming to the issue of vulnerability and local government, it may be recalled that vulnerability is a local issue and that the degree of vulnerability varies between individuals and social groups as well as over time. People differ in their vulnerability because they differ in their livelihood strategies, social and political relations, and the types of stressors to which they are exposed, and they differ in their attempts and capacity to adapt to changing conditions (Coetze 2002). Some people in areas that may experience relatively less dramatic physical changes in the climate can be more vulnerable to climate change than other people who experience more severe changes in the climate but for whom the social and ecological conditions are more favourable. For example, there is little doubt that sea level rise is an extreme effect of climate change and it could cause erosion and inundation of farmlands and settlements of many communities. However, groups for whom incomes from farming and fishing have already been steadily falling due to market conditions and ecological decline may feel much severe effects when faced by relatively slight climate variation, e.g. increases in the incidence of droughts or ocean temperatures. A local government, which is much more exposed to interaction with communities facing both types of vulnerabilities - in the short as well as in the long run, could allocate scarce public resources more efficiently (e.g. by causing least conflict between two different vulnerabilities communities) to address the most pressing issue in hand.

In order to identify the implications of climate change for poor people and poverty eradication strategies, it is important to understand the context of poor people's lives. The social and ecological conditions within which people live influence the way they are affected by climate change. The causes of vulnerability to climate change are therefore to a large extent societal and resulting from political and economical in addition to environmental processes. Social and ecological conditions that influence poor people's lives and can make people vulnerable to climate change include lack of access to basic social services, loss of employment opportunities, lack of empowerment to participate in political processes, violence and insecurity as well as environmental degradation and loss of access to important natural resources. Simply stated, the range of other challenges that poor people face besides climate, influences the ways in which they can manage and adapt to climate related problems. This means that people are in a pre-existing or inherent state of vulnerability which can lead to severe negative effects (such as loss of lives and property, hunger and reduced health) when a particular change in climate conditions strikes. A corollary of this statement is that it is misleading to describe whole regions as particularly vulnerable to climate change. For example, Africa is described as very vulnerable to climate change because of a high dependence on natural resources and because large poor populations live in marginal (drought or flood-prone) climates. In addition, many African countries' capacity to adapt to climate change is said to be limited by a lack of resources, poor institutions and inadequate infrastructure. However, rather than categorising all poor countries and all poor people as vulnerable, it is more useful to focus on which specific populations are vulnerable and why they are vulnerable. For example, people outside the most flood or drought prone areas can be very vulnerable, including urban populations in informal settlements, and in Mozambique, it was found that in some villages, the relatively richer households were the most vulnerable to the 2000 floods (Brouwer & Nhassengo 2006). Indeed the local government could be the best judge in this case to allocate resources, as the distant central government might

disproportionately be biased in favour of rich or poor thereby failing to place the climate change adaptation issue in the right perspective.

The table in Appendix-II exemplifies the above argument further that groups, due to different social and ecological conditions, are vulnerable to climate variability and change in different manner. For example, it is generally understood that the rural areas are more vulnerable to climate change, but the analysis in this table shows that some parts of urban populations also are especially vulnerable in particular contexts? First, all urban inhabitants are more or less vulnerable to extreme heat and following disease and deaths, as well as other types of extreme weather. Second, people living in informal settlements, such as the people living in slums are in situations characterised by lacking or inadequate infrastructure for water, roads and sanitation, high exposure to health problems, only casual employment, high living expenses, and lack of simple techniques for water harvesting or organic toilet techniques (for composting of sewage) (Weru & Bodewes 2001). When flash rains, droughts, storms and extreme temperatures hit, as they increasingly do in this region, they will have more devastating consequences on the livelihoods, health and well-being of most of these people, compared to an imagined situation where they were not loaded by serious problems in the first hand. Many among the urban poor are also in an especially vulnerable situation because of heavily polluted air and water, seriously affecting their health. This process is further illustrated in the box at Appendix-II, showing that the vulnerability of pastoralists in the rural drylands of Kenya is explained, illustrating the diversity of societal factors influencing the outcomes of severe droughts for poor people.

Addressing vulnerability to climate change requires extra efforts

Despite the high vulnerability to climate change among many groups of poor people, it is important to be aware of the distinction between poverty and vulnerability since development measures commonly used in order to reduce poverty do not necessarily reduce vulnerability to climate challenges. There are even well-documented cases of projects aimed at

reducing poverty that have increased vulnerability to difficult climate conditions. Economic growth and technological change does not necessarily reduce vulnerability to climate variability and change, and can increase it. For example, the conversion of mangroves into shrimp farms may generate economic gains but leave coastal communities more vulnerable to coastal hazards such as storm surges (Adger et *al.* 2003).

Important causes of vulnerability to climate change, such as limited labour availability in women-headed households during drought, reduced access to specific drought resources such as shallow wells or forest products, or increased reliance on drought-sensitive crops, may be ignored in an approach that only focuses on poverty. Therefore, making some technological adjustments for extreme weather conditions, with the expectation that general poverty reduction will automatically reduce vulnerability to climate change is not sufficient. On the contrary, climate change adaptation should be addressed more broadly, through three types of measures. First, the efforts should reduce the direct risks of climate change, for example storms or flooding, to people's strategies to secure their material and non-material needs. Second, the ways that poor people cope with climate stresses in the short term and adapt their livelihood systems in the long term should be understood, facilitated and the opportunities broadened. Finally, the specific social and environmental factors and changes leading to inability to cope or adapt should be understood and addressed. In this way "sustainable adaptation measures" can be achieved, by reducing both poverty and vulnerability to climate variability and change at the same time (Eriksen et *al.* 2007).

From a temporal perspective, addressing vulnerabilities to climate risks can be viewed at three levels: including responses to current variability (which reflects learning from past adaptations to historical climates); observed medium- and long-term trends in climate; and anticipatory planning in response to model-based scenarios of long-term climate change. The responses across the three levels are often intertwined, and might form a continuum. The fact that there is little or

no locally relevant information on climate variability and trends in most rural areas is obviously a huge constraint on adaptation, and does limit the capacity of the governments to promote adaptation. Nevertheless, in such circumstances the local governments are best suited as they would have the maximum information about such temporal trends which could facilitate their short and long-term planning.

Purpose of the research and key questions

The foregoing description firmly puts the issue of local governance in the policy framework of climate change adaptation. Not much is known, however, about the ways and extent to which the local governments are able to support households and communities in the rural areas of India to respond autonomously to climate change, or about their capacity to undertake policy-led adaptation. In the Indian context, the PRIs could be principally responsible for climate change adaptation in rural India in terms of framework functions delegated under the 73rd Constitutional Amendment. [3] It would, therefore, useful to identify critical shortcomings in the actual devolution of power and functions to the PRIs by the State Governments which could severely impair their (PRIs') role in promoting successful adaptation. This understanding would be helpful on the one hand in enhancing the role of PRIs in delivering public service and developmental programmes for the welfare of the people, including by effective and inclusive participation (not mere by representation), and on the other hand in the strengthening of PRIs themselves as a sustainable institution of good local governance by minimising intra- and inter-community conflicts in now almost certain climate change scenario. [4] It

[3] Similarly, the Urban Local Governments (e.g. municipalities) could be the principal agents for towns and cities.

[4] One may argue that it is primarily because of the large gap in knowledge about these issues that the (Indian) National Action Plan on Climate Change, which is primarily in the form of an adaptive strategy, has not envisaged any specific role for the PRIs even though it emphasizes: "(C)limate change may alter the distribution and quality of India's natural resources and adversely affect the livelihoods of its people. With an economy closely tied to its natural resource base and climate-sensitive sectors such as agriculture, water and forestry, India may face a major threat because of projected changes in climate." (GOI 2008; p. 1)

may also help understand how closely or effectively PRIs are synergistically linked with government departments at higher levels so as to promote successful adaptation, and whether the overarching principle of 'subsidiarity' in restructuring governance in India, as established by the Second Administrative Reforms Commission, invites a fresh look (GOI 2007). [5]

This research will therefore engage with the following *key questions*:[6]

a. Are PRIs able to provide climate-related information to their constituents (i.e. the villagers),

b. Are PRIs able to provide support to households for income diversification and for other 'proactive' and 'reactive' adaptation measures individually or at group/ community level to make livelihoods more resilient?

Overview

It is now well known and well documented that the rural poor live in one of the riskiest environments – for instance on floodplains or other areas at high risk of flooding (e.g. along the coasts) or unstable slopes, or in drought-prone/ rainfed areas where any change in rain pattern disrupts the whole livelihoods cycle of the poor plunging them into deep vulnerabilities, or on the periphery of the village where the public infrastructure is already negligible and any weather related event further impoverishes the infrastructure. These are also usually the sites most at risk from climate change, as discussed above. In addition, in most

[5] The Commission observes that there is a strong case to revisit the constitutional scheme relating to local government, and that in making subsidiarity as an overarching principle of restructuring it suggests an amendment in Article 243G of the Constitution (and similarly in Article 243W) for vesting Panchayats with powers and authority in respect to *all* functions which can be performed at the local level including the functions mentioned in the Eleventh Schedule (GOI 2007, p. 21-27).

[6] Because of paucity of time and other resource constraint, the data of this research is based on response to an extreme weather event, i.e. floods in the year 2008 in Orissa state. This event has been taken as a proxy to future abrupt or extreme climate changes.

villages, the poor also have problematic relationships with local government – which is meant to be the institution that acts to reduce these risks. In part, this is because most of the poor live in the village periphery (including many on land occupied illegally) and work within the informal economy (and thus not within official rules and regulations). In part, it is because of the "anti-poor" attitudes among government officials and elites, so often based on misconceptions. [7] For instance, is may be assumed that people are unemployed when they work long hours within the informal economy, or that they are local migrants to nearby urban centres and cities when they have long worked and lived within the urban centre, or that migrants would have been better off if they had not moved (when so many migration studies show that migration flows are logical responses to changing patterns of economic opportunity).

It is a logical sequence that as adaptation plans and processes gets more locally rooted and more influenced by low-income groups, so the particular vulnerabilities of different groups within the population relating to income-levels, gender and generation should become more apparent. If this is so, why don't governments act to reduce risk from extreme weather events? The answer may well lie in the inability to perceive the problem in its entirety, as the national agencies responsible for disasters are also the ones which are directly responsible for climatic variability related vulnerabilities, but their perception mostly relate to flood, famine and drought. [8] Thus they are unable to appreciate the effects of transient kind of events like weather variability even though these deeply affect the

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[7] See for example Kumar & Corbridge (2002) for a description how developmental projects routinely fail the poor while they (the poor) are recognized as 'savage'.

[8] A critical constraining factor is found in the international and national funding streams that provide a perverse incentive. Money is readily available for post-disaster relief and reconstruction, but not for risk reduction and development. For example in Guyana, international finance for the maintenance of sea-walls has been hard to come by and funding for incremental improvements is similarly difficult. But following breaches in the sea-wall, funding is made available. Further each international agency has its own programmes, criteria for allocating funding, and project cycles (which helps to explain the poor integration between them). The Paris accord is meant to address this but it does nothing to encourage international funding agencies' engagement with or support for local governments. See also Satterthwaite (2005) on these aspects of international aid.

livelihoods of the poor in the long run. The problem further gets accentuated because of several factors. First, there is usually a lack of awareness of the value of the assets lost by affected poor populations unless the event has been declared as a calamity and also there is no local data to demonstrate the extent of the problem (often related to institutional inadequacies). Second, there is an inability to act on part of the local government. For instance, local government being responsible for providing the infrastructure that should greatly reduce risks has a very small proportion of total government funding and weak authorisation to raise own funds. Third, there is also a lack of political channels to allow vulnerable communities to demand action on reducing unacceptable levels of risk as the local government might have become the victim of the common problem of elite capture. This dissertation is, therefore, organised as follows. In the next chapter (Chapter –II), the importance of adaptation are highlighted, and analyses of its elements and concepts revolving around adaptation science have been attempted to clarify which important elements of adaptation are relevant to local level governments in the context of democratic decentralisation in India. This section builds upon the political framework of vulnerability in the Gramiscian sense. This dissertation is primarily based on secondary literature due to constraints peculiar to the APPPA course design, but based on the conceptual discussion on adaptation the need for at least some minimum primary data is highlighted for which the methodology of data collection is described in brief. This section also describes the reasons for selecting the peri-coastal region of Orissa for data collection. It is clarified here that the data presented does not strictly relate to climate change, as the experience of the people in the sample area does not conform to the exact features of a long-term climate change, but that of climate variability within a season which may also be termed as extreme weather events. But as one could see, this experience is also quite useful in predicting or modelling people's and institutional responses in the event of climate change. Chapter-III provides a brief description of global climate change, and the trends in India to highlight the urgency to act, and also to

understand which features of climate change are closely relevant to adaptation in the context of democratic decentralisation. In Chapter-IV, a profile of the study state (Orissa) is described in relation to major disasters – flood and supercyclone – which are taken as proxies for climate change related impacts/ disasters in the future. Chapter-V describes democratic decentralisation in Orissa, starting with the Orissa Panchayati Raj Act to find out the scale and level of delegation to the PRIs in reducing vulnerabilities of the rural poor in general. Further, the role of the PRIs in disaster management in Orissa is specifically discussed to understand the institutional basis of local government's capacity to promote climate change adaptation. The field level data is reproduced in Chapter-VI. The role of PRIs in securing crop production, flood control and other protection structures, promoting other non-farm income generating activities and supporting joint forest management to regenerate forests as a means of insurance against disasters, is discussed based on interviews and focus group discussions with key informants in the sample villages. Chapter-VII concludes the dissertation with an overview of the findings and recommendations for strengthening PRIs as viable institutions for democratic governance to promote climate change adaptation.

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