CHAPTER-II: ADAPTATION CONCEPTS

In this chapter, the concepts and elements of adaptation have been analysed to show how it is linked to development and to identify the features of successful adaptation against which field data collection and analyses is taken-up in subsequent chapters of this dissertation. Exploring the links of adaptation to development, here, also helps its framing within the broad debate of democratic decentralisation, as developmental intervention is a key responsibility of Panchayati Raj Institutions in India. This chapter, then, further analyses some of the available literature to understand as to what are the constraints for local governments and communities in adapting to climate change.

Defining adaptation

Adaptation to climate change is a complex topic that presents a number of challenges. Indeed, one important challenge lies in defining adaptation and understanding the full scope of its implications. Adaptation is currently the topic of numerous studies that offer a range of definitions. The Intergovernmental Panel on Climate Change (IPCC) offers a starting point by defining adaptation as adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects which moderates harm or exploits beneficial opportunities (IPCC 2001). However, adaptation is increasingly difficult define in practical and operational terms (See Appendix-I for some of the definitional issues concerning adaptation). To aid in this effort, some key points can be identified to provide a helpful framework for understanding the complex nature of adaptation. It may include adjustments to moderate harm from, or to benefit from, current climate variability as well as anticipated climate change. Adaptation can be a specific action, such as a farmer switching from one crop variety to another that is better suited to anticipated conditions. It can be a systemic change such as diversifying rural livelihoods as a hedge against risks from variability and extremes. It

can be an institutional reform such as revising ownership and user rights for land and water to create incentives for better resource management. Adaptation is also a process. The process of adaptation includes learning about risks, evaluating response options, creating the conditions that enable adaptation, mobilizing resources, implementing adaptations, and revising choices with new learning. We mean all these things by adaptation. But the conception of adaptation as a process is often the most important for formulating public interventions that will have lasting benefits.

Adaptation involves a process of sustainable and permanent adjustment in response to new and changing environmental circumstances. Although humanity has constantly adapted to their surroundings, planned anticipatory adaptation has only recently emerged as a response to the impacts of anthropogenic climate change around the world. Policy makers have accepted that the world is facing a real and immediate threat and adapting to the change is necessary. Adaptation has been identified as an appropriate response because it is associated with supporting development processes and can facilitate the continuation and improvement of existing livelihoods.

Climate change will affect every aspect of society, environment and economy. This means adjusting behaviour, livelihoods, infrastructure, laws and policies and institutions in response to experienced or expected climatic events. These adjustments can include increasing flexibility of institutions and management systems to deal with uncertain future changes, or they can be based on experienced impacts and threats and/or predicted changes. Planned adaptation requires careful thinking about how systems will function in the short, medium and long term.

Adaptation - an old concept

Adaptation to climate is not new. People, property, economic activities and environmental resources have always been at risk from climate and people have continually sought ways of adapting, sometimes successfully and sometimes not. The long history of adapting to variations and

extremes of climate includes crop diversification, irrigation, construction of water reservoirs and distribution systems, disaster management and insurance, and even includes, on a limited basis, recent measures to adapt to climate change (Adger et *al.* 2007).

The UNFCCC adaptation case studies databank documents a variety of adaptive practices in use that have reduced vulnerability to climate hazards. In most cases, these have been adopted in response to multiple sources of risk and only rarely to climate risk alone. One strategy commonly in use is to increase the capacity to bear losses by accumulating food surpluses, livestock, financial assets and other assets. Risks are hedged by diversifying crops, income sources, food sources and locations of production activities. Exposures to climate hazards have been reduced by relocating, either temporarily or permanently. Variability of production and incomes derived from natural resources have been reduced by restoring degraded lands, using drought resistant seed varieties, harvesting rainfall, adopting irrigation and using seasonal forecasts to optimize farm management. Prevention of climate impacts with flood control, building standards and early warning systems is practiced. Risk spreading is accomplished through kinship networks, pooled community funds, insurance and disaster relief. In many cases the capacity to adapt is increased through public sector assistance such as extension services, education, community development projects, and access to subsidized credit. Appendix-III provides an analysis of common adaptation clusters (e.g. irrigation, insurance, infrastructure, etc.).

Adaptation in rural areas *versus* adaptation in urban areas

As the Fourth Assessment of the Intergovernmental Panel on Climate Change (IPCC) notes, the rural areas are often capable of considerable adaptation to reduce risks from the direct and indirect impacts of climate change (IPCC 2007). Indeed, to function as regions of agro-economic activity, which is the backbone of development in many developing counties, the rural areas have to make very large "adaptations" to

environmental conditions, site characteristics, natural-resource availabilities and environmental hazards – for instance creating water conservation and distribution structures, land development, building safety nets (e.g. seed banks to overcome shortage of seeds because of failed crops in the last season), flood and storm protection structures, connectivity with urban centres, conservation and maintenance of common pool resource sites, grain / forest produce collection and storage godowns, etc. Healthy villages are proof of the adaptation capacities of their governments, citizens and enterprises. In any well-governed country, there is already a great range of measures in place to ensure that rural economy – especially the agricultural economy - can withstand extreme weather events. Governments are also making efforts for providing good environmental and public health services to be able to cope with any increase in other climate-change-related health risks – whether this is through heatwaves or reduced freshwater availability during period of flooding, or greater risks from communicable diseases.

Adaptation and development

The lesson emerging out of the above discussion is that adaptation is closely linked with development and this linkage is critical to reducing vulnerability to climate change. Economic growth is essential for developing countries to improve the health, economic livelihood and quality of life of their citizens. It has also been understood that all of the development objectives that fall under the MDGs influence how vulnerable any individual, group or society is to climate change. The IPCC agrees that "sustainable development can reduce vulnerability to climate change" (IPCC, 2007). At the same time, climate change is a direct threat to sustainable development. One of the pivotal issues underlying the growing popularity of adaptation is the belief that adaptation is fundamentally linked to sustainable development and must be part of the development and planning process.

It is also argued that most development processes that are sustainable and equitable will also be able to bridge the "adaptation

deficit" – i.e., the gap between the adaptation that is possible without additional policy or projects and the level that is needed to avoid adverse effects of climate change (Burton et *al.* 2002). The adaptation deficit describes the additional effort needed to manage the impacts of climate change in order to make up for the failures in managing existing climate variability, emphasising the massive scale of the gap. Indeed, this "deficit" is a central element drawing together adaptation and sustainable development.

Thus, when problems of rural areas' adaptation to climate change are considered, independent of current conditions and government structures, it is easy to map out a long-term process of support and funding for adaptation. At least in the next fifty years or so, assuming none of the high-impact but uncertain catastrophic climate changes take place, this seems able to produce the needed adaptations without high costs in most locations. Indeed certain rural locations face far more serious risks than others, but it is possible to envisage an national and international funding system that gives special attention to helping them adapt. It is also possible to envisage national adaptation strategies that encourage and support development away from the areas most at risk from climate-change-related impacts. Most governments and many international agencies have officially endorsed recommendations to move in this direction – as in, for instance, the Hyogo Framework for Action 2005–2015. This, however, underpins the fact that development in line with 'business-as-usual' is often not sufficient to adapt to climate change. Indeed, some dimensions of development can impede the adaptation process, focusing on growth at the cost of higher exposure and sensitivity to climate change. There is also a risk that development efforts will be misaligned with future changes in climate, leading to maladaptation, i.e., a process that initially looks like a response to a hazard but ultimately exacerbates vulnerability to the hazard.

Mitigation in adaptation

There is some evidence that the above process of integrating adaptation in developmental planning may incorporate measures that reduce greenhouse-gas emissions. This link is much evident in case of forest sector development, which as an illustration is described below.

Forest sector has the potential to diversify and enhance the livelihoods of forest dependent as well as other communities vulnerable to climate change such as dryland farmers, fisherfolk and horticultural producers. However, there is a need to reduce the vulnerability of biodiversity rich natural forests itself through adaptation measures. In country like India where sizable rural population is dependent on forests for goods like timber, fuel wood, fodder, food supplement, and services like soil fertility, water recharge, and land stability, maximizing availability of goods and services from forests to aid adaptation is not an option, but an imperative. Present projections indicate a shortfall in food production due to climate change. Fruit bearing trees, shrubs and herbaceous food yielding plants in the forests indeed alleviate such productivity related shortages. Same approach would be followed to increase the production of non-food non-timber forest products which are used as raw material for a large number of small and medium industries across the globe. Forests also overcome the shortage of fodder in case of extreme climate events, while people traditionally use fuel wood as source of energy to remain independent of external grid supplied energy sources which are highly dependent on stable climate for steady transmission and distribution. Forests also safeguard availability of water, and ensure land stability especially in hilly areas. Forests, mangroves and plantations acting as wind breaks, and shelterbelts contain the fury of high winds and storms, predicted as elements of global warming. The forests simultaneously create a valuable carbon sink. For example, it has been estimated that creation of additional 23 million ha forest and tree cover to achieve the national forest policy goal of 1/3rd forest and tree cover in the country,

would enhance the carbon stock by 1390 MtC (or, 5087 $MtCO_2$) between 2008 and 2030. [9]

Integration of adaptation in rural development planning

Thus, it is easy to envisage a process by which rural planning and management ensures planned adaptation – with developments and investments in and around reducing risks for inhabitants, enterprises and infrastructure to climate-change-related impacts.[10] Nevertheless, the adaptation initiatives in the rural areas have lagged far behind the efforts in the urban areas. Over time, elements of adaptation in urban areas have been developed for example, in the building-stock, the industrial base, and the infrastructure. The tools and methods required to do this are well known and their effectiveness has been demonstrated in many locations in urban areas – for instance, adjustments to building codes, and infrastructure standards combined with land-use planning that restricts buildings in high-risk areas and makes special provision for extreme events including the use of insurance to spread risk. Accordingly, there is already a well-established literature (including codes and other forms of legislation) on the importance of integrating adaptation into disaster-preparedness in and around urban areas. But, such comprehensive literature is largely lacking for rural areas. [11] There is a silver lining though. Rural areas are quite vast in countries like India bringing economies of scale, [12] and the current focus of rural area development in

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[9] Based on model estimates in Ravindranath, et *al.* (2008).

[10] Efforts to "mainstream" adaptation can be found in national development plans (as in Bangladesh and the Caribbean), development projects (by non-governmental organizations (NGOs) and institutes carrying out action research, e.g. OXFAM, ActionAid) and in bilateral developmental agencies such as NORAD (Norway), DFID (UK), SIDA (Sweden), GTZ (Germany), etc. This work is in early stages, with few results on which to assess levels of success.

[11] Guide books published by the National Disaster Management Authority of India, on disasters such as flood, drought, earthquake, etc. are an exception but these also do not make special distinction of the different capabilities of urban and rural areas.

[12] This would remain true even in light of the fact that rate of urbanisation in the recent decades have been exemplary, but it is quite apparent that the same was fuelled by a particular kind of (export and service sector oriented) economic development. The recent global financial crisis, coupled with advances in ICT, might

most countries is upon vulnerability reduction of the poor. Since most of the risks from climate change heighten other risks already present, it may be argued that climate change risks in the rural areas can generally be addressed by long-term policies which make these affordable by spreading the cost over long periods and by making use of potential synergies between poverty reduction and climate-change induced risk reduction strategies.

It is also easy to envisage the above process addressing hazards unrelated to climate change – for instance improved drainage and provisions for coping with occasional heavy, concentrated rainfall that has long been a risk (and often produces serious flooding). So adaptation to climate change may be said to be integrated into programmes to reduce risks from disasters and other environmental hazards.

Constraints in integration of adaptation in developmental planning

It would be a mistake to assume that the above – a logical, justifiable, fundable process driven by good science – provides a viable roadmap for action. The examples of evolving good practice cited in literature represent exceptions, [13] and it is important to understand why this is so. It is easy for national governments to sign declarations at international conferences that recommend all the needed measures – and then ignore them.

The best indication of the constraints on implementing adaptation comes from the last 50–60 years of "development". In the 1950s, it was easy to envisage a process by which international funding for "productive activities" and the required infrastructure allied to "technical assistance" would rapidly reduce poverty and "under-development" in Africa, Asia and Latin America and the Caribbean. Yet, more than five decades later, the

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usher a new era of economic development, which could slow the process of urbanisation and resurrect rural area's position as an epicentre of development.

[13] For a comprehensive account of one such climate change variability, see for example, Thomas, et al. (2007) which describes farmers' response to intra-seasonal precipitation variability in South Africa. See also the UNFCCC database of successful adaptation cases.

number of people suffering extreme poverty is much larger than it was in the 1950s. [14] Indeed, there was a need to launch the Millennium Development Goals in 2000 precisely to focus attention on the vast scale of unmet needs, despite four "development decades". In the 1970s, many international agencies committed themselves to a new focus on "meeting basic needs", with detailed costings of what additional funding this would require; four decades later, the number of people lacking access to most "basic needs" is higher than it was in the 1970s.

People may not adapt, or adapt incompletely, for a variety of reasons. Why is there an adaptation deficit? To understand this, one might like to explore the concepts of "risk" and "uncertainty", in addition to the concept of "vulnerability" discussed above.

Construction of "the risk" of climate change

Risk is central to the policy response in the field of natural resource management, and it is important in many other policy fields related to climate change. A common definition of risk is given by Harding: "a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence: how often is a particular potentially harmful event going to occur, [and] what are the consequences of this occurrence? (Harding 1998, p. 167 quoted in Botterill & Mazur 2004). There is now a fair degree of consensus that societies select particular risks for attention and that risks are therefore exaggerated or minimised according to the social, cultural and moral acceptability of the underlying activities (Harding 1998). Personal experience, memory and other related factors influence the way people perceive risks and these may ignore the probability of the event's occurrence – *thus risk perception is socially constructed*. In addition, it appears that people have a level of risk with which they feel comfortable and will adjust their riskiness of their behaviour in the presence of safety measures. Thus, risk perception and response to risk, including due to

[14] For example, the number of poor in India has remained around 300 million in the last four decades.

uncertainties in relation to climate change and variability, could be different in different communities and under different local settings. Climate may be perceived, rightly or wrongly depending on the context, to pose little risk relative to other hazards and therefore given low priority. Knowledge of options to reduce climate risks or the means to implement them may be lacking. Or their expected costs may exceed the expected benefits. [15] In all such cases there may be a tendency to downplay the risk. This description of risk closely ties the climate change debate with local government, and hence offers strong argument in favour of progressive democratic decentralisation. This is so because the conception (or, construction) of a risk perceived by a particular community or an individual in a community is far likely to be closer to the conception(or, construction) of that risk by the government of that locality (e.g. Gram Panchayat) rather than the government at the higher levels (e.g. State or national government).

Uncertainty of climate change

Uncertainty is another important feature of climate change which is relevant to adaptation at the local level. Despite decades of ever more exacting science projecting Earth's warmer climate, there remains large uncertainty about just how much warming will actually occur. Such uncertainties amplify when encountered by the local people (Dessai & van der Slujis 2007). Uncertainty about the future makes it difficult to know what to do or when to do it. Irreversible consequences of some actions may delay choices until some of the uncertainty is resolved. Incentives may be distorted in ways that discourage choices that reduce risks, or even encourage riskier choices. Sometimes the uncertainty of action of others, or inaction of others, can be an obstacle. Some may believe that reducing their own risk is the responsibility of others, but they are

[15] Indicative of the constraint imposed by poverty is the high proportion of households in East Africa that do not use insecticide treated bed nets as a prevention against malaria, despite their effectiveness and seemingly low cost (Yanda et al, 2008).

uncertain about those others' response. All these are found to impede adaptation.

Dessai & van der Slujis (2007) describe two schools of thought that have emerged on how to deal with climate change uncertainty in adaptation under which various decision analysis frameworks can fit into. One school of thought is prediction oriented, which argues that if there is uncertainty about climate change then uncertainty needs to be characterised, reduced, managed and communicated. This is consistent with the 'Top Down' model of climate change response (adaptation and mitigation) which has been prevalent so far. But there is equally well established school of thought which is resilience oriented. It accepts that some uncertainties associated with climate change are irreducible, therefore, it emphasises learning from the past. In the words of Berkes "Learning to live with uncertainty requires building memory of past events, abandoning the notion of stability, expecting the unexpected, and increasing the capability to learn from crisis" (Berkes 2007 quoted in Dessai & van der Slujis 2007). The resilience approach is highly relevant to India as it comes from the field of adaptive management of natural resources [16] while it expects the future to bring unanticipated surprises and to address these from the learnings from the past. *The bottom-up resilience approach can nevertheless be combined with the top down prediction approach, yet it underscores the importance of good local governance in its own right in the discourse of climate change adaptation.*

Combining "risk" and "uncertainty" in climate adaptation decision making

The science of climate modelling is still far from being perfect - the imperfection rising steeply with the scale becoming smaller. These divergent models and results render a risk-based analysis extremely difficult because stakeholders are left wondering whether they should be

[16] The occurrence of vast varieties of Sacred Groves in India in highly varied contexts and local settings, for example, is a testimony to the richness of the principle of adaptive management of natural resources.

prepared for example, for more drought-like conditions or for wetter conditions. This leads to suboptimal adaptation strategies closer to 'adaptation screening' than 'robust solutions'. Stakhiv (1998) has rightly concluded that 'the Global Climate Modelling scenarios produce such widely varying results that it is simply impossible to develop a tailored, cost-effective adaptation strategy'. Paté-Cornell (1996) has also noted, 'the reason for quantifying risk is to make coherent risk management decisions under uncertainties and within resource constraints'. From this, one could infer that systems should be as flexible as possible to allow for any sort of adaptation. But flexibility comes at cost, and limited national or local resources –as is the case with almost all developing countries - would render this strategy unrealistic, even if robust. This calls for a robust risk assessment framework, which would in turn depend upon the various probabilities of climate change in a particular geographical area. If these probabilities are conditional and subjective – as the case of climate modelling presently is - we will not be actually managing risk, but at least uncertainty would be managed to a certain extent leading to better informed adaptation decision making.

Furthermore, this type of information would allow decision-makers to hedge the risk of climate change by balancing the risks of waiting against premature action. Hedging-oriented methods have the additional advantage of keeping uncertainties within the bounds of credibility for decision-makers (Rotmans & van Asselt 2001). [17]

It may be recalled, however, that several experts – for example civil engineers – already use probabilities, though of a different kind, to minimize the impacts of climate variability on their activities. They are therefore very receptive to probabilities and in fact tend to demand them from the climate modelling community. But it is important, however, to

[17] A long-range climate derivatives market, following the weather derivative or insurance market – 'a contract between two parties that stipulates how payment will be exchanged between the parties depending on certain meteorological conditions during the contract period' (Dessai & Hulme 2007) – is also likely to emerge in the future and would require probabilistic information.

note the different nature of the probabilities being discussed here. Water managers and engineers frequently use probabilities based on historical records, for example, to determine the return period of the 100-year flood and take a decision on the full(flood) reservoir level of a dam. These types of probabilities are called *frequentist* (or classical) because they are determined by long-run observations of the occurrence of an event (Dessai & Hulme 2004). In contrast, climate change probabilities are *subjective* (or Bayesian) because they are based on the degree of belief that a person has that an event will occur, given all the relevant information currently known to that person (Dessai & Hulme 2004). Thus while these particular user communities would like frequentist probabilities to facilitate adaptation, only subjective (and highly conditional) probabilities can be delivered within the constraints imposed by climate science today.

Integrating 'resilience' in climate adaptation policy

In contrast to the above views, there is a growing literature that argues that scenarios of climate change, least of all probabilities of climate change, are not needed for climate adaptation policy. Instead, a strategy of resilience and adaptive environmental management that enhances coping capacity is preferred (Adger 1999; Burton et *al.* 2002). These authors argue that in the face of the considerable uncertainty over climate change projections and its impacts, one is better off adapting to the present day (or recent historic) climate variability, as this is assumed to be a good proxy for near-term climate change. This is the approach taken by me also for collection of field data for this dissertation. These so-called 'bottom-up' approaches (see Fig. 1) have been tremendously useful for understanding society's vulnerability to present-day climate and also the underlying causes of vulnerability. In particular, social vulnerability scholars are concerned with the capacity of individuals or social groups to respond to (i.e. to cope with, recover from or adapt to) any external stress placed on their livelihoods and well-being; this method of analysis emerged from the work of Sen (1981), Blaikie et *al.* (1994) and others.

Building on this bottom-up approach is the so-called 'analogues' approach in adaptation science to learn from past climate adaptation experiences because their basis in actual experience is viewed as an advantage over modelled quantitative scenarios (e.g. Pulwarty & Melis 2001). There are two fundamental limitations to the use of analogues in climate adaptation research - analogues between cases are never perfect, and analogues can say little about long-term climate change. Future climate change is a result of unique global forcing and is likely to produce non-analogue impacts. Therefore, while analogues can be extremely useful to calibrate our understanding of how the system works, they are limited by the unique and transient nature of future climate change. Nevertheless, the advantage of this approach over others is that probabilistic results are not very useful because they do not reveal anything about the underlying adaptive capacity of the system(s) in study. On the downside, the "bottomup-analogue" approach is more concerned with the underlying causes of social vulnerability (e.g. poverty, institutional structures, and inequality) and therefore any type of adaptation to future changes in climate will necessarily have to tackle these underlying processes in the present. Such a perspective would indeed render scenarios, and consequently probabilities, of climate change less relevant for present climate adaptation policy, which might not be the best approach. Nevertheless, given the current understanding of (i.e. the accuracy of the science related to) the projected climate change, and the urgency to act, the 'bottomup analogue' approach appears to be most suitable, and that is why this approach has been selected for the present dissertation.

Methodology of data collection

As mentioned in Chapter-I, this dissertation is mainly based on secondary literature and limited set of primary data. [18] The current literature on successful adaptation practices (published articles and case studies)

[18] But also see Krishna (2002) who argues that "(p)ublished and official sources do not usually provide high-quality data for village level in India, and emergent trends need to be investigated first-hand." (Preface, p. xi)

available in the websites of various institutions and organisations, the IPCC database of coping strategies, available livelihoods case studies in other domains (e.g. watershed management by PRIs, maintenance of social safety nets, e.g. grain banks, at the village level), the 6th Report of the Second Administrative Reforms Commission dealing with local governance, the published literature of Ministry of Panchayati Raj, especially the 3 volume report, State of Panchayats (2007-08), the National Action Plan for Climate Change (NAPCC 2008), [19] and the Panchayati Raj Act and rules of the sample state, have primarily informed this research besides other published literature on the efficacy and functioning of Panchayats, especially in the sample state.

The primary research (data collection) was only one stage, and it was undertaken in coastal region of Orissa state. Ideally, one should have taken a universe of coastal, arid, semi-arid and hill regions of the country for this type of research - regions which are also highly prone to the projected climate change due to severity of change and widespread poverty, and sample areas should have been selected randomly (or in stratified random sampling manner) from within . Yet, the purposive one-stage selection of Orissa was done because preliminary discussions with officials of Ministry of Environment & Forests and other Ministries revealed that climatic variability in form of recurring floods and storms (Fig. 2) is quite discernible in this area and that people have started conditioning their responses accordingly (e.g. flood control structures, construction of village gain banks, etc.). The choice of coastal Orissa for field study has been also relevant in terms of risk perception and uncertainty outlined above in this chapter, as people have already faced the Super Cyclone of 1999 and the 2008 floods. The choice of Orissa is also helped by the fact that the Orissa State Government have already completed activity mapping of 21 out of 29 matters listed in the Eleventh Schedule of the Constitution for devolution to Panchayats in October 2005 (IRMA, 2008), including Agriculture, Water resources, Food, Supplies and Consumer

[19] It was hoped that the full documents of the eight missions announced under the

Welfare, Fisheries and Rural Development which are most relevant to the present study.

In view of time and resource constraint only geographical area (falling in two revenue districts, Khurda and Puri) and four villages were selected for data collection, guided by key informants' (Ministry of Environment and Forests officials belonging to Orissa cadre, state level officers, e.g. of Orissa State Disaster Mitigation Authority and officials of Department of Agriculture) who could tell about perception of climatic variability occurrence in the sample geographical area. Indeed the choice of district and geographic locality within the district was also confirmed with literature available on the website (mostly newspapers and newsletters of various developmental organisations), but also by the priority that the sample villages should have undergone severe climatic event in the recent past so that people's memories are still fresh, while there are steps taken for addressing the event should it occur this year also. The selected areas fitted well in this canvas, as they have experienced furies of both the 1999 Supercyclone and 2008 floods.

Sl No.	District	Block	Gram Panchayat	Village
1	Puri	Pipli	Laxminarainpur	Billipada
2	Puri	Gop	Sutana	Sutana
3	Puri	Puri	Baliguali	Baliguali [20]
4	Khordha	Khordha	Puranpradhan	Anjira

The field data collection involved both open ended interviews with individuals (mostly officials in the government, and panchayat presidents) and focus group discussions with groups of villagers who have responded to climatic variability or whose livelihoods have been affected because of climatic variability preferably in the recent past. In view of resource limitations of this study, interviews with the villagers mainly focused on

[20] Part of Samogara Revenue Village.

their experience of the most recent flood which occurred in September 2008 rather than talking more generally about various climate change parameters over long duration of time (e.g. gradual shift in rainy days pattern, temperature, etc.). The purpose of this method was to let the respondents directly relate to a 'risk' and then extract as much as possible their experiences and learnings as elements of adaptation strategies. In this regard, this methodology deviates from the usual method of collating people's perception about climate change (e.g. whether rainy days are increasing or decreasing, whether the climate is becoming hotter, etc.) and their response to such changes. The reason for this deviation and using the experience of 2008 flood disaster as a proxy for future climate change adaptation is the fact that people's perceptions are often hard to substantiate with scientific data, and in this case absence of past longitudinal metereological data at the village level has made things difficult to follow a perception-based approach. Also, perception-centred methodologies rely on recall method which has its own problems of fidelity.

Though it was planned, the observation technique could not be used to capture the dynamics of decision making in one of the PRI meetings being organised at the time of field study, as none of the villages visited reported any such meeting programme during the tenure of my field visit. Care was also taken to address two major weaknesses during data collection, namely (a) sensitivity to inter-organisational conflicts (e.g. PRIs *versus* traditional village council, JFM committees etc. and party politics), and (b) bias due to the researcher himself being a senior government officer. The former was quite common, as one could witness during the field visit of the sample Anjira village in Khordha district where JFM committee and Panchayat are almost pitched against one another in terms of exercising authority, while in sample village Billipada the conflict between the Panchayat President and the MLA (from an opposition political party) was quite evident before the villagers. In terms of methodology, the latter issue, i.e. researcher himself being a senior government servant was also quite important because of the difficulties in

distinguishing people's responses in terms of experience or opinion. Most of the times respondents, especially villagers tended to narrate opiniated experience in the expectation that the interviewer-respondent interaction may bring positive benefits to their village. Further, my own experiences also very much counted in the framing of interview questions and deconstructing the responses. In this sense, the field data collection took a conscious balance between 'social constructionist' and 'positivist (objective truth)' approaches. [21] The data so collected was analysed qualitatively, as there was not enough time and other resources to collect data from a household-based questionnaire.

Conclusions

In this chapter, it is attempted to present the various concepts associated with climate change adaptation in order to highlight that 'local' factors are most important in this debate – the elements of localness arising out of the risks and uncertainties associated with climate change, as well as the vulnerability of individuals, households and communities which again is highly contextual. In view of this 'localness' in the impact of climate change as well as adaptive capacity of those who are impacted upon, the role of local government becomes very important. It was further highlighted that a bottom-up approach to climate change adaptation seems most practical for countries like India, where the institutional mechanism for local governance has already been put in place through the PRI structure. This bottom-up approach would benefit adaptation planning by local government in the sense that the construction of risk by the local government and the local (impacted) community are going to be similar, and there is much likelihood of a consensual approach towards adaptation programmes. Based on this understanding, an attempt to bring out the features of climate change and its impacts in India in general and in Orissa in particular will be made.

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[21] See Laws (2003) for details.