Climate Change and an Approach to Water

The need to generate knowledge at the grassroots

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Introduction

Climate change is now a vast and sprawling discipline. Water likewise is a subject that tends to become all-encompassing. This note deals with neither in its own right. It *addresses the connection between them* and tries to put forward what that connection should be. It does this in the belief that a simplistic `mainstreaming' approach to climate change is insufficient and that our prior approach (theoretically, and not chronologically, prior) to water is extremely important and that different approaches will mainstream climate change differently and will have different consequences. It therefore tries to delineate elements of an approach to managing water resources, mainly in a rural context, which also become important in relation to climate change and which are in turn affected by climate change. Each of the elements discussed here has also an equity component which is as, if not more, important but which we will not take up here.

This note is also written in the belief that *an approach based on simple polarities is not always sufficient* in the long run; for example, the insistence on the small to the exclusion of the big or vice versa, the insistence on local communities to the exclusion of state and supra-community (and sometimes infra-community) institutions , and the insistence on local self-sufficiency to the complete exclusion of external inputs are not sufficient in the long run, and even

[1] This note was written for a discussion on "Climate Change and Water Resource Management" organised by Institute for Community Organisation Research (ICOR) in Mumbai on 15 February 2013. A lot of the argument in this note draws on the body of work related to the water sector that I have been associated with for over 20 years in my association with the late Dr.K. R. Datye, renowned geotechnical engineer and neo-Gandhian, neo-Marxist development theorist, and the Society for Promoting Participative Ecosystem Management (SOPPECOM). Many of these arguments are discussed, though not in the context of climate change, in two books published by the Centre for Environment Education, Ahmedabad: (i) *Banking on Biomass : A New Strategy for Sustainable Prosperity Based on Renewable Energy and Dispersed Industrialisation* by K. R. Datye (assisted by Suhas Paranjape and K. J. Joy); and (ii) *Sustainable Technology: Making the Sardar Sarovar Project Viable* by Suhas Paranjape and K. J. Joy.

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less so in the context of climate change. Nor will a simple mix of the small and the big, the local and the global, or the community and the state work. The point is to base the mix and its structure on an understanding of what the relationship between these opposites needs to be. Without an understanding of this relationship, which we could even call a dialectical relationship, the mix will fall apart.

Lastly, we hold that concepts and approaches are more important than detailed blueprints. The note therefore basically *tries to change mindsets* – by looking at things in a different light and pointing out alternative methods, concepts and approaches -- rather than develop details. Once we begin to look at things in a different light, once the gestalt switch sets in, it is not difficult to develop details.[3] We will discuss details only so far as necessary to illustrate differences; in any case, no detailed blueprint will fit all sizes and situations. Instead, once insights have been absorbed and new approaches adopted, it is better to start on a new creative journey of developing one's own solutions.

With this background, let us get on with the main theme.

Situating climate change

Because climate change has global causes and global effects, measures for climate change mitigation and adaptation also become comprehensive and all- embracing. Almost everything begins to count. Anything from planting trees to providing emergency escape boats qualifies. Climate change is an unintended effect of the way the world has developed. In a similar vein, one can say that climate change mitigation and adaptation are, to some extent, `unintended' effects of all alternative development efforts, because they attempt to change the way the world has developed for the better. In this larger sense, climate change mitigation and adaptation become synonymous with sustainable development efforts.

Climate change is therefore also often used to justify and support whatever sustainable development effort one is carrying out. There is no real consideration given to how climate change would modify what one is doing. In such cases, climate change is used merely as a `lens' or merely as a `translation' into climate change language. What is important is to treat it as a real factor and see how it would change what one is doing, take account of it as an additional, new factor. If we do not do this, it breeds complacence and can result in becoming a lens with a focus that distorts rather than clarifies.

[3] As one of our mentors, S. A. Dabholkar used to emphasise using a Marathi saying, *tujhe ahe tujpashi, pari tu jaga chuklasi* – meaning, you already possess that which you need, all you need to do is to look in the right place. And, as he also used to say, you do not need a green revolution or a red revolution, you first need a grey revolution, a revolution in your grey cells, and the rest will follow

Climate change is a serious phenomenon, though there are a number of forces which try to trivialise it and dismiss it. That is why it needs to be *situated properly.* Perhaps the first distinction we have to make is between climate change mitigation[4] and climate change adaptation. Climate change mitigation is a long-term process and the extent of mitigation depends on global aggregation of local effects and works itself through over a longer period. As said earlier, all sustainable and equitable development efforts contribute to climate change mitigation. So in what follows, climate change mitigation is taken to be a given, as a sustainable and equitable development pathway and not considered a separate element. For our purposes here, therefore, let us put aside climate change mitigation and focus on adaptation.[5]

Importance of context

Climate change adaptation (a term I shall continue to use though I am not quite happy with it) is a much more immediate concern because climate change impact can have an immediate effect. It can modify a given situation -- a particular bio-physical, social-economic and cultural context -- in complicated ways and also create new problems. The context could be local, global, national, a river basin, a city or women in the city, or any other bio-physical, social-economic and cultural slice.

The point here is to recognise the prior existence of the context and that the context already had, and will continue to have, its own problems independent of climate change, and then consider climate change as an added-on interaction that modifies these problems: how will climate change work itself out by modifying pre-existing problems and their interrelationship or by adding new problems? Thus climate change per se is not the problem: what is important is how it changes the contextual field, how it changes pre-existing problems and strategies and creates new problems. I often see this step being bypassed and the situation treated as if we can directly deal with climate change adaptation.

Prior approach

Precisely because of the context, our prior approach to the situation also matters in what kinds of climate change adaptation strategies are evolved. The context includes different approaches,

[4] I use mitigation here in the specific sense of modifying climate change trends and not, as is often done, as synonymous with adaptation.

[5] This is not to deny the importance of working out the mitigation impact of what we do. Different sustainable development efforts will have different mitigation impacts and the quantification of those impacts will certainly be important in options assessment and policy choices. Here, we also need to be aware of the perversity of intended measures, especially in respect of carbon trading. For example, there are very good arguments for how a well- meaning measure like `polluter pays' can be turned into `pay and pollute' or how `minimum pollution standards' could turn into `assured maximum pollution levels'.

and they will incorporate climate change adaptation strategies in different ways. Simple `mainstreaming' of climate change adaptation will bring about a myriad of strategies. There can be, and there are, highly energy and capital-intensive strategies of climate change adaptation. Our prior approach to things will also determine how we deal with climate change. Do we think that big dams are the only solution or that these are demons and must be avoided at all costs? Do we think of water flowing downstream past us as waste or not, or do we see land and water as capital from which we extract the maximum benefit and then, if they are exhausted, move on to something else? All these things matter. This may appear self- evident, but I do not think that we have given it sufficient attention as I will attempt to show in what follows.

Level of precision

We should also be clear about the level of precision that we seek. Climate change studies are a rapidly-growing field. But it is also highly uncertain. It is one of those fields in which estimates at higher levels of aggregation are more reliable or more agreed upon than estimates as we go down to smaller scales. Also, there are different models which give different results. So we have to be clear about the degree of precision that we should aim for as the reference point for our discussion on water resources.

While actual details of the effects of climate change may differ in different areas or at different scales and in actual values, there seem to be some areas of broad consensus: (i) rise in the mean sea level, (ii) global warming, (iii) a redistribution of aridity and humidity, and (iv) greater variability and greater incidence of extreme events. For evolving a strategy for water, I think that it is the last -- greater variability and greater incidence of extreme events -- that is the key factor around which broad strategies need to be planned.

This is because (i) is relevant for coastal areas but not for reasons of water, and (iv) nullifies factors (ii) and (iii) under specific local and temporal conditions. For example, even in areas showing a rise in average temperature, there will be periods of extreme cold as well as extreme heat. Similarly, even if a region shifts to a more arid pattern on the average, there will still be years with much greater rainfall than before. This partly nullifies the general trend, which cannot therefore be the basis for evolving a strategy. In what follows, I shall base myself mainly on this aspect of climate change.

Water for life functions and virtual water

We need water for almost every kind of activity. But if we look at human needs, we do not require water in the same way for all activities and products. The broadest distinction is between water that we need as water and water that we require for the production/provision of goods and services that we need. The water we need for basic life functions such as

drinking, washing, cooking and hygienic purposes as well as water used by domestic animals must be available as water in adequate amounts and quality. However, we also need food, clothing, electricity, etc all of which require water to produce, and we may call this virtual water or embedded water. So we have *water for life functions* and *virtual water*. This conceptual distinction has many implications.

Water for life is much more difficult to store and transport than virtual water. Transporting goods and services is an indirect transfer of water, whether through market or non-market mechanisms (for example, transporting grain as part of PDS). When we eat Punjab wheat or Tamil Nadu rice, we are using the rain that fell in Punjab or Tamil Nadu. In this sense, redistributing these products is like indirectly redistributing rainfall! This leads us to different approaches to fulfilling the needs for water for life and virtual water. As far possible, the need for water for life must be met at the local level, but the need for virtual water need not.

Moving away from localism

The variability that climate change brings makes this distinction even more important. It also shows up the inadequacy of an exclusively market-oriented, centralised approach to water as well as a local, self-sufficiency-oriented approach. Variability means that even in most humid areas there will be periods of water stress whereas in arid areas there will be periods of greater aridity and also intense rains and floods. In such a situation, maximizing local self-sufficiency in both kinds of basic needs of water – water for life as well as virtual water -- may not work, and the number of years in which self- sufficiency might break down will increase. This means that while we should aim for local self- sufficiency in water for life, for basic needs of virtual water, we may have to think in terms of local production supplemented by distributive mechanisms, such as the PDS in the case of food, at supra-local, state, regional or national levels. We shall return to this issue later.

Ensuring priority

Before we return to the issue of variability, I want to emphasise the issue of priority. If we are to aim for local self-sufficiency in water for life, we need to ensure that it gets priority over all other needs of water, and also that it gets first priority in all water policies, from the national to the state. However, these policies turn out to be no more than pious wish lists at best. At the local level, what we see is actually the reverse. With a few notable exceptions, there is no social mechanism or medium that can exercise control and ensure this priority at a community level. Water for irrigation has taken priority over water for life.

Consequently, more and more areas are now relying on groundwater resources for drinking water; and as groundwater tables fall, deeper and deeper aquifers are exploited leading also to problems of water quality, often severe in areas with iodine or arsenic contamination. Even in

cases where watershed development has taken place, very few have ensured priority for drinking water. If we do not have institutional mechanisms that can ensure this priority, all policy statements about giving it the highest priority are no more than mere wish lists.

Assured water and variable water

Another important distinction to be made is between what we shall call assured water and variable water. Local-level planning for water now generally uses average rainfall values to estimate availability and match it with needs. Very little thought is given to dependability, even though nowhere is this as important as in climate change adaptation. Generally average rainfall has a dependability of around 50 per cent. What does this mean when you plan on the basis of average rainfall values? It means that the dependability of your planning is around 50 per cent; in other words, your planning will fail every alternate year! The degree to which it will fail will depend on the degree of variability. Given the large increase in variability that climate change is expected to cause, your planning may fail drastically. Yet these aspect are rarely taken into account in local-level planning for water.

Dependability

It is therefore important that water resources planning should separate the water available in different years into two components -- assured water, that is water available (corresponding to the rainfall) with a high level of dependability, and variable water (water that will be available over and above the assured water). In irrigation planning, it is customary to plan for 75 per cent dependability, but we generally recommend a little higher level of around 80 per cent. (While large-source planning is now based on water availability at 75 per cent dependability, local-level planning, where dependability is even more important, largely ignores this.)

With planning for water availability at 80 per cent dependability, the water available for at least eight years out of 10 becomes assured water; water availability in the rest of the two years will be less. For eight years, though, the total water available will be higher than the assured water. This additional water is the variable water, and it will vary from year to year. It is important to plan how to utilise both these components.

Dependability analysis thus becomes important. It forms the basis on which we work out risk-proofing strategies, taking variability into account – risk-proofing in relation to spatial variability, temporal variability and social pooling. If these elements are not part of our approach to water, then it is unlikely that our strategies will tackle climate change impacts.

Three-pronged approach

Overall, we should generally have a three- pronged approach, especially for water-scarce regions.

The first step is to satisfy as many of the basic needs of water as possible from assured water. These include water for life, then water required for producing basic necessities like food and also water required for producing the minimum quantity of crops/goods with sufficient value so that they can be exchanged for other basic needs like clothing, shelter, health and education to ensure the fulfillment of basic needs. It is not necessary to plan for complete self-sufficiency here but aim mainly at ensuring fulfillment of *all* water for life requirements from local sources and *as many as possible but not necessarily all* of the fuel, fodder and food needs .

The second step is to use variable water optimally for supplementary/additional production. This is not as easy as it may sound. We need to plan what is to be produced and how, so as to take maximum advantage of this quantum of water. It needs an `opportunistic' attitude, a flexible approach and some degree of forecasting to anticipate how much of it will be available at what time. Even here, a part of the variable water must go to build up stocks of virtual water (in the form of essentials like food or tradables to be exchanged for other basic needs) that will cover shortfalls in 20 per cent of the years. The rest will then go to surplus production and accumulation.

Finally, in these 20 per cent shortfall years, water for life has the top priority and stocks of virtual water built up with the help of variable water in other years may need to be used to supplement it.

Connecting climate change research to dependability

While a lot of climate change research is going on, it is not geared to this kind of approach. Based on this approach, we need to classify different areas into the following broad groups: (i) areas in which assured water is sufficient to provide water for life as well as for all other basic needs, including fuel, fodder and food; (ii) areas in which assured water can fully meet requirements of water for life but only partially meet requirements for producing fuel, fodder and food; (iii) areas in which assured water is just sufficient to provide for water for life; and (iv) areas where assured water may not even provide adequate water for life.

Variable water is a significant resource

Variable water available over a number of years could be quite significant. Our early studies showed that it could range from 50 per cent to almost 100 per cent of assured water (at 80 per cent dependability). In a climate-change scenario, this is even more significant. But there have to be good strategies to use this water. It is not wise to use it for annual crops. It is best used for biomass, especially perennial species. Unlike annuals, perennials do not show catastrophic failure but husband and accumulate whatever growth is possible; they have a rectifier-like effect in smoothening out variability and adapting to it. It is best to have biomass species that have a vegetative growth pattern and can be used in ways that replace fossil fuels or materials

derived from fossil fuels (iron, cement, chemicals, etc). Such energy-replacing use helps multiply their value qualitatively and quantitatively. The efficient and synergistic management of assured and variable water, which requires different approaches, is indeed one of the important components of adapting to climate change.

Storages

Going beyond big and small

The conventional answer to climate change problems is storages, the bigger the better. So the argument for big dams (and also nuclear energy) is being put forward with renewed vigour. However, this is a half-truth, and so it is important to face squarely the issue of large versus small dams. There is a tendency in the country to demonise large dams and trivialise small dams by their respective opponents. But a badly designed and managed big dam is no more harmful than a thousand ill-designed small structures. The rapid and continuing decline in groundwater in vast areas of the country is an aggregated effect of what has happened at a micro and even a community scale. And, even granting that big dams may not be entirely beneficial, the question of what is to be done with those that have been built is important.

Synergising big and small

The issue therefore is not of large versus small. Both have their positive and negative points. With the variability of extreme climate-related events, aggregated large sources of water also help smoothen out effects of spatial variability, and hence could have a vital role if they are properly incorporated into a well-planned overall approach. According to Dr. K. R. Datye, our mentor, big dams are an example of what they could have done but did not. In fact, large sources can be used as supplements to small sources in order to stabilise them. Unfortunately big dams today are planned as stand-alone mammoths which make them unwieldy and inefficient. On the other hand, if they could feed local systems instead of independent commands they would strengthen local systems.

Such a system is described in detail in our book on the alternative restructuring of Sardar Sarovar that we have proposed. The command areas of big dams will then look like what the Chinese call melons on the vine, where the melons are the small systems and the vines are the canals of the large system. In short, big dams make sense when they feed into and strengthen small and local systems. By the aggregation/rectifier effect they have, they provide what the local systems lack. It is this synergy which should form the basis of a risk-proofing approach to climate change.

Groundwater as storage

Another neglected area is groundwater. Groundwater is mostly seen in the context of natural recharge, though it has many more aspects to it. First, it is becoming a vital component of the water system all over the country. Even in areas served by canals, farmers are shifting to receiving that water by putting it into wells and collecting the seepage or even directly drawing canal water into wells. This is using surface water by its short-term conversion to groundwater; even more, it is an important storage mechanism. Thus the conjoint use of surface and groundwater is becoming important and there is a need to consider both these together. And this makes groundwater replenishment and participative aquifer management increasingly important.

If we restructure our large and small water systems on the melons-on- a- vine model and then add groundwater and participative water management (participative and joint management of aquifers and canals, or groundwater and surface water) to the mix, we shall have a very good system to meet the demands of adapting to climate change.

Resource mapping and assessment of sustainable use

Though there are many other finer points that we can discuss, I shall end this note with a discussion of what we call participative resource mapping and assessment of sustainable use. Earlier agro-systems were adaptive and sustainable because they were essentially based on technologies that could not have interfered too much with natural systems. They were based on traditional practices and forms of knowledge that were based on a given stable pattern of natural phenomena. Considering the enormous capacity for interference with natural phenomena that humans have now acquired and the likely impacts of climate change, it is doubtful whether traditional practices will still fulfill the requirements of sustainable and equitable adaptation to climate change. We can learn from them, apply those lessons to the present but cannot return to those systems. Paraphrasing what historian D. D. Kosambi had once said, there is no golden age in the past that we can return to -- if at all, it is there in the future for us to build.

Combining participative and scientific knowledge

Even so, there is an urgent *need to generate knowledge at a local level* that will also build awareness of the problematic nature of the resource. But exactly what kind of knowledge and through what process, is the issue. Participative rural appraisals (of rural natural resources) with unscaled maps may be useful to draw broad outlines, to establish relationships with the community and help visualise the resource. But they are not of much help when it comes to quantifying the resource. On the other hand, rigorous scientific assessments are prohibitively expensive and even then they are so data-hungry that their data needs are rarely met. Participative resource mapping is a programme that combines participative techniques and

knowledge with scientific techniques and knowledge through the use of GIS (Geographical Information Systems) and scaled cadastral maps and simple imagery like Google Earth.

Armed with these techniques, it is possible to develop and demonstrate a broad water balance, an assessment of water input (how much water is available from all sources - rainfall, surface water and groundwater inflows) and water use (how much water is used or lost – evaporation, domestic and other human uses, for crops and plants, additions to storages, etc) that functions at two levels. At one level, it helps resource and options assessment and dependability analysis by developing scenarios -- what if the rainfall is X instead of Y, and what if we grow crop A instead of B? At another level, it helps an analysis of sustainability.

Question of sustainabilty -- *aapkamai, baapkamai* and *diwala*

The emphasis here was on outlining an approach to water resources that can deal with climate change, and initiate a discussion around it. Let me conclude with an example of how this approach has helped us discuss sustainability of resource use at the village level.

To explain this approach and sustainability, we use a simple analytical framework developed on the basis of how people understood sustainability of resource use in terms of property or financial resources that they were familiar with. In discussions on sustainability, they came up with the concepts of *bapkamai* and *aapkamai* *w*hich translate roughly to mean ancestral property and self-earned property. This provided a framework for them to talk about water and sustainability.

The idea was to differentiate between water stocks and flows. Annual flows are like *aapkamai* and accumulated stocks are *baapkamai.* One should learn to live within *aapkamai,* they said. And how should we use *baapkamai*? People were clear on that. As far as possible, it should be preserved, dipping into it only in times of difficulty and then restoring and adding to it in times of prosperity.

With this frame, it was also simple to understand the consequences of unsustainable use of resources. What happens if we go far beyond our *aapkamai* and live on *baapkamai* ? The response was prompt -- we go bankrupt, *diwala nikalata hai*! This is simple common wisdom, and it applies to all natural resources. But it is not so easy to separate *aapkamai* from *baapkamai*, especially in the case of water. This led us to a system of participative assessment of water resources.

Most of the concepts outlined above are essentially simple, though they may need various degrees of scientific sophistication and people's participation for their application at different levels. As the *baapkamai/aapkamai* analogy shows, it is important to develop a new common sense around these concepts, a common sense that can bridge the popular and the scientific

domains. And it is these concepts and the development of a new common sense which form the connection between climate change strategies and the approach to water which we must adopt if we are not to go `bankrupt'.

INSTITUTE FOR COMMUNITY ORGANISATION RESEARCH

The Institute for Community Organisation Research (ICOR) is a non-profit organisation established in 1989 and registered under the Society Registration Act 1860, and the Bombay Public Trust Act 1950.

The primary goal of ICOR is to come up with a body of knowledge indigenous to India and its culture that will enable the empowerment of grassroots workers/non-government organisations (NGOs) / community-based organisations (CBOs) in the field of human development. Towards this end, ICOR is mandated to focus on:

- Undertaking empirical research, including secondary analysis of available data on fundamental concepts relevant to human development including studies of organisations, personnel, and people involved either as benefactors or beneficiaries or initiators of the human development process
- Developing models of monitoring and evaluative studies in the field of human development
- Documenting and disseminating information to individuals and organisations involved in the pursuit of human development
- Training in research and social analytical skills
- Collaborating and networking with other organisations in training, research and community-building activities that will further the understanding and practice of human development

ICOR'S thrust

The institute has adopted the following nine-point thrust which may be classified under three heads.

Target groups

- Work with and for people's organisations, NGOs and CBOs
- Networking with like-minded organisations to further the ICOR thrust
- Collaborate with those committed to people's empowerment

Inputs

- Concepts relevant to community organisation
- Global trends relevant to community organisation
- Processes at work in various organisations, and especially people's organisations, NGOs and CBOs, and devising alternative target-group-specific models
- Seminars and training programmes flowing from these works and addressed to specific groups and bodies

Output

- Documentation that is specific and service-oriented
- Periodic publication of research papers in addition to other publications