

Water

MOVES

A Quarterly Newsletter on Water Governance

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Launch of WGP Website

WGP Team

We are pleased to announce that the Water Governance Project website is up and running and can be accessed at www.watergovernanceindia.org. Information with regard to the project as well as developments in the water sector will be available on the site.

Background papers, proceedings and reports produced by the WGP team and partner organisations will be available under the *Reports* section while the section on *Acts Policies Documents* contains summaries and full text links for public documents on water i.e.- in the sectors of irrigation, watershed management, groundwater amongst others. The *Acts Policies Documents* section has been divided into State and National Levels. Both sections will be updated regularly.

WaterMOVES is available for download on the website as well and as always we look forward to your feedback.

Water, Biomass and Livelihoods: Part II

K J Joy, SOPPECOM, Pune

Part I of this article appeared in the previous issue of WaterMOVES. The article captures the approach followed by SOPPECOM in relation to the broad theme of "water, biomass and livelihoods". It does so by deploying some of the larger concepts and ideas that are critical to restructuring the water sector along more equitable, sustainable, regenerative and democratic lines.

Dispersal of Storage: Integration of Large and Small

Most large source planning identifies storage behind the dam as the main storage and systems are usually planned to make behind-the-dam storage equal to, or at least comparable to the total planned water use from the large source.

The alternative approach breaks from this practice and suggests a dispersal of storage, with behind the dam storage mainly having the function of a regulatory storage. This means that dispersed local storages and their refilling serves as the main storage. This greatly reduces the storage behind the dam and brings

down submergence while allowing utilisation of much larger quantities of water from the large source.

Dual Role of Small Systems

This kind of integration allows small systems to act in a dual capacity- as a means to harness local water resources and as receptacles and dispersed storage elements of water from the large source. Considering that local systems need to be built in their own right, we can use these systems as storage systems for the water from the large source, thus avoiding the duplication of cost which is involved in creating behind the dam storage for this component and keeping it separated from the large system by rigid conceptual as well as administrative boundaries. Thus, water source development starts with an integrated view of the large and the small and makes the large system a supporting and strengthening system for the small system.

Studies show that in most of the cases there is very little need to create new local storages. Our own study of the Gujarat situation in the context of the SSP alternative also shows this. In fact, it is not often realised that local storages built in drought prone regions are mainly limited by yield. Actual storage potentials are much higher as these storages are designed, especially in drought-prone regions, at 50% dependability. If exogenous water is available, storages with lower dependability can be accommodated, since filling and refilling from exogenous water is possible for greater dependability. In a truly integrated system village tanks, ponds, percolation tanks, minor irrigation tanks and even medium projects can be used as recipient storages (local storages) with extension of their service areas. If we do so, recipient surface storage potential itself will be very large. In addition, in many places, local groundwater storage potential may represent a potential of the same order, and in many places, it may represent a multiple of the surface potential. Thus, existing potential of small systems may mean that in most places, the need to create new surface storages may be small and consequent additional submergence may not be very high.

Concept of Storage: Further Refinements

Too much has been made out for the requirement of large storages and the way storage is conceptualized today is a myth propagated by the advocates of large storages. First of all we should get out of the perception that storage is limited to only surface storage. Storage can be in the form of groundwater, soil moisture, etc. Instead of storing water, convert it into biomass

and store biomass (biomass storage). This may be a more efficient way of storing water! And this would also bring down the requirement of surface storage further.

Smaller ponds can also be a good way of storing this water. There are two types of ponds: lined and unlined ponds. Making a complete and perfect lined pond and preventing all percolation of water can become very expensive; instead of this, one can go for low cost lining which will allow a certain amount of percolation. The percolated water can be channelised and intercepted by using an under-drainage and put back into the pond again. This is a more cost-effective mechanism. If this has to work then it should be planned as such as a system of inter-connected ponds.

Learning from Bhaskar Save's work, SOPPECOM thinks that evapo-transpiration after January can be brought down to 1 mm per day through crop diversification, multi-tiered and multi rooted system, mulching layers, re-use of dew by the plants, etc. After 15 April the plants should be left on their own and they would hydrolise stored carbo-hydrates (in breaking down of carbohydrates, one component is water) and survive the dry spell.

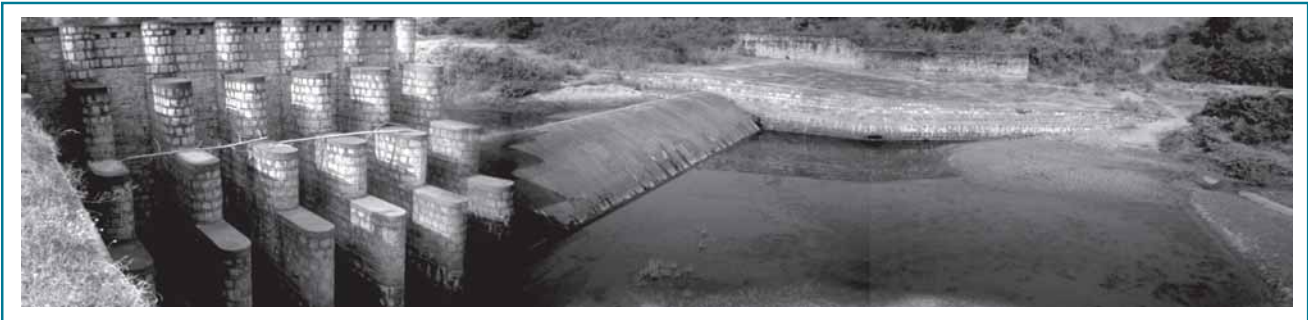
In short the point is that water requirement can be brought down significantly and this reduced water requirement can be managed through interception ponds and without depending too much on large surface storages.

Doing Away with Gravity Commands: Pumping Energy - a Necessary Price to be Paid for Equity

Gravity canal based irrigation systems need to be restructured and can be provided with small, local lifts so that one can go beyond the present-day gravity commands. Unless one does this, irrigation benefits would be limited only to the people who have lands located within the gravity command. Also the minimum water assurance for rural families would turn out to be an empty promise if we were not prepared to lift water in order to supply it to those who cannot be easily reached by gravity flows. The alternative approach therefore explicitly provides for pumping energy and costs and this is a major departure from the conventional approach. This violates the usual unwritten dogma in project planning, by which all canal deliveries, barring small and exceptional areas take place by gravity. This unwritten dogma has a very large part to play in the iniquitous nature of canal commands. First, it automatically excludes all areas upstream of

canal alignments. In addition, it favours people with holdings in lower areas over people with holdings in the higher reaches, which most often means favouring the holdings of the relatively better off. More seriously, it obstructs any attempt to construct equitable access based on watershed or village as unit because it inevitably cuts across them. Equitable water access therefore presupposes either that everyone shares in the command like the old *phad* systems in Maharashtra or that water is conveyed to everyone's field, even if it involves pumping. In that sense, redistribution of access involves costs, both energy and economic costs and an unwillingness to pay those costs means a denial of equity.

The alternative approach provides for this cost and at the same time attempts to see to it that this cost is sustainable. A prime question in this respect is the question of where the energy is to come from. The required energy can come from two sources. The first is the hydropower generated by the project. Any project, which has hydropower component to it, should earmark priority use of the power generation to meet the pumping costs of the conveyance and delivery systems. The second is the biomass generated within the project. The alternative approach is based on the biomass perspective- a perspective that takes into account that all the water use is resulting in the



production of biomass, potentially, biomass energy. Studies show that for every unit of water pumped in this manner to provide equitable access, only a small proportion of the incremental biomass production is needed for even large lifts. In that sense every unit of water pumped produces an energy surplus that more than pays for itself. Provided, of course, that sufficient cognisance is taken of biomass as energy and policies are planned around it. In fact, once one-third of the service area is brought under permanent cover, the wastes from that area, the shrub wood and brushwood can also pay for the pumping energy.

The Issue of Submergence, Displacement and Rehabilitation

Storage creation by integrating local and exogenous water does not completely do away with submergence and displacement altogether. However, the approach discussed here has the potential to bring down submergence and displacement considerably, to tractable levels. This has been made possible mainly because of the changed role of dams and structures needed to harvest larger, exogenous sources and the central conveyance system as discussed earlier. In the alternative approach, the need for storage behind the dam is drastically reduced. The function of the dam and the central conveyance system is only to divert water during

the monsoon and post-monsoon period, take it into the service area, and store it in the decentralised local storages.

The important point to note here is that there is an exchange-taking place in the submergence area. In the alternative approach, a substantial portion of the behind-the-dam submergence gets exchanged with local submergence in the service area of the project. How do the two relate? It is generally true that smaller storages with shallower storage depths mean a relatively larger submergence as compared to large storages with greater depths. However, there are other compensating factors at work in a well planned integration of local and exogenous water systems: the local surface storages and their refilling play a dual storage role without additional submergence; and similarly, local groundwater storages also allow additional storage without additional submergence.

There is an independent significance of every hectare of behind-the-dam submergence being exchanged for a hectare of local submergence which needs to be discussed and which goes to the heart of the conflict around most of the major projects being floated today. With every such exchange, the proportion of people who are uprooted en-masse reduces drastically. In fact, large, concentrated and contiguous submergence

is disruptive not only of people's lives but also of the eco-system in the area.

It is essential to realise that the issue is not submergence per se; it is our experience that people are much more rational in working out arrangements in a local context in which the project affected are a part of their daily lives and the gains are palpable. The issue is that of the coincidence of boundaries between project affected and the project beneficiaries and those between socially advantaged and disadvantaged groups, of the disadvantaged having to bear the losses for the benefit of the advantaged and of that being presented as inevitable losses in the interests of 'progress' and 'development'.

Rehabilitation of the project-affected persons should be seen as part of an integrated upstream area development programme. In the conventional irrigation system, the upstream areas of the dams have always remained outside the purview of the benefits of these projects. The consequence of such an approach is that the rehabilitation of the displaced people has necessarily to be in the downstream areas of the dams, and rehabilitation, and especially in large projects, necessarily becomes a process of first uprooting these people from their economic, social and cultural conditions and then settling them in a totally new set of conditions. If provision is made for providing water to the areas upstream of the dams, then rehabilitation becomes possible without having to uproot the people entirely from the upstream areas with which they have their economic, social and cultural ties. Therefore, for such rehabilitation, a primary necessity is to make water available for areas above or upstream of the dam. This has to be made an integral part of project planning- in terms of both water allocation and cost estimates.

Provision of Exogenous Water Must Carry Conditions

Any project, whether it is large or small, should adhere to certain conditions if it is to ensure sustainable and equitable water use. However, adherence to these conditions is not the responsibility only of the water users; instead, it should be a mutual obligation of both the water users and the state. This obligation increases manifold with the increase in the size of the project because such projects radically alter the water systems and water use (also cropping pattern and land use) over very large areas. For example a mega-project like Sardar Sarovar Project (SSP), according to official estimates, is supposed to serve 1.8 M ha, which amounts to 18,000 sq km of agriculture area alone! How far these extensive systems are disposed

to build in the conditions required to ensure sustainability and equity is a question that needs serious consideration.

The minimum set of conditions include: the conjoint use of local water and exogenous water in a definite proportion, provision of a basic service to every family in the service area on a priority basis and at a high degree of dependability (assumed to be 80%) and allocation of any extra water as 'economic service' which would be made available only after priority needs, one-third of the service area to be brought under permanent vegetative cover as a condition for the provision of basic service and participatory management leading to democratic governance.

Equity, Access and Rights

One of the important components of the strategy is equity or equitable distribution of water (or for that matter all ecosystem resources). The concept of equity also goes much beyond what is being talked about now days: meaning of equity within the gravity commands is essentially limited to providing access to water to every piece of land within an irrigation command.

De-linking Water Rights from Land Rights

The idea of equitable access to water means that the water required for livelihood needs should be provided to all those who depend on land and water for livelihoods (farmers, landless labourers, artisans, women, dalits, etc.). Thus everyone in the village should have access to minimum water irrespective of his/her holding. Thus the core idea of equity is to de-link water right from land right and instead link it to the livelihood needs of the people. Minimum water assurance is seen as a right that vests in people by virtue of their right to an adequate livelihood, and not by virtue of the land or other assets that they own. In the conventional approach, water rights are tied to and enjoyed through land rights. Very often access to water is determined by the size of the holding in a command area. The departure point here is that land rights and water rights need to be separated and instead should be tied to the livelihood needs of the family. A word of caution would be in place here as the World Bank and the pro-privatisation lobby are also talking of de-linking land rights and water rights. For the World Bank the rationale for de-linking the water rights from land rights is to make it a commodity (Briscoe and Malik, 2006). For the social movements and grassroots initiatives, committed to the equity agenda, the rationale for de-linking of water and land rights is to create wider access to the resource for poor sections including

the landless. Thus the very same demand of de-linking land and water rights is being pushed forward to serve two opposing interests.

Basic Service and Economic Service

It should be noted here that one is not talking of distributing all the water equally amongst all the people. A distinction needs to be made between basic service and economic service. Basic service is the water required by a family to meet requirements like drinking and domestic water, water for livestock, water for production (agriculture, processing, etc.) to meet consumption needs as well as generate cash incomes to meet needs which have to be mediated by cash or market (like education, health, recreation, etc.). For example, as we saw earlier, in the case of a typical farmer family it would be around 6400 m³ of water per year. Economic service is a service, which is provided over and above the basic service to generate surplus (for example water for production for the market).

Basic service is to be provided to all equally as a matter of right and only after meeting the basic service must water be provided as an economic service. In fact basic service is very close to the concept of water as a social good and economic service is very close to the concept of water as an economic good. This distinction has implications not only for access to water but also for water pricing, which is discussed under water pricing below.

Equity also has implications for water use prioritisation (or what could be called inter sectoral equity) and implies making distinctions about water use and treating different uses differently. Broadly, the priority in most areas would be: drinking water; water for domestic use and for cattle; water required for ecosystem regeneration (for example, minimum environmental flows) and water required for livelihood activity; and surplus/extra water that could be used for cash or commercial crops. The principle here is that water should become available to the next category of use only after the first use is assured.

Equity is important because there are historically embedded inequalities. Class, caste (or community) and patriarchy are the three major dimensions in which inequality manifests itself in India. Of course there are other forms of inequality also, for example, the division between tribals and non-tribals, urban versus rural, etc. The implication here is that in assessing the impact of watershed development, one needs to disaggregate the 'local community' in terms of different social sections (class, caste, ethnicity, etc.) and

see the differential impact on them. The gender dimension adds one more layer to the issue of historical disadvantages.

Privileged access to certain minimum quantities of water to resource poor sections like artisans, dalits, labourers and women can open up new livelihood options for these sections. These sections can use their water in many different ways like small plot intensive cultivation by women's groups, taking land, especially degraded and wastelands on produce sharing arrangements, etc. Or getting privileged access to biomass pools is another way of getting access to water.

Water Pricing: Graded Tariff System

Water pricing has to be done in such a manner that the basic service should be provided at an affordable cost, basically charged to recover operation and maintenance cost. Economic service can be charged at full cost recovery principle, recovering the capital costs also over a period of time. This gives fresh ways of tackling the issue of water pricing and subsidies, which have become contentious issues in the water sector.

Since the 1990s there has been an increasing demand to remove subsidies in the water sector and let the water tariff reflect the real cost of providing water. This is also reflected in the World Bank's prescription for water sector reforms in India as it advocates 'meeting costs from user charges as there is no free lunch and remove the disconnect between prices and costs as it induces very large economic costs'.

Related to the issue of water pricing is whether water is a social or economic good, and also the role of the state in the provision of water. The advocates of privatisation who believe water should be allowed to become a full commodity and that restrictions placed on this are the cause of all the ills related to water have unanimously welcomed the demand for full cost recovery. The Left and other anti-privatisation voices have insisted that water is a social good, should not become a commodity and should be dispensed by the state as is presently being done. The issue of subsidised water gets further compounded as the track record of water tariff collection has been pretty dismal and in some of the states the money spent on salaries of the staff engaged in water tariff collection far exceeds the collected water tariff!

Both these positions are problematic. There is a third strand of thinking, which treats water as both a social, and an economic good and argues not for withdrawal of the state but for a change in its role. For example, access to clean water is fundamental to survival and

critical in reducing the prevalence of many water-related diseases. Other dimensions of water supply also have a social-good character that therefore requires government action in overseeing or regulation. At the same time, the supporters of this approach advocate the use of sound economics in water management.

Water is also a means of production, whether in agriculture or in industry, whether in artisanal production or large-scale production. Take irrigation, where water is important in order to stabilise minimum production on small and medium farmers' lands. It is also important to farmers who produce for profit rather than for subsistence needs. When water is provided it is provided as a service and it serves both functions, as a basic service aimed at basic livelihood needs and also an economic service for conspicuous consumption or surplus generation.

Both these functions place contradictory demands on how the service should be provided and at what charge. A basic service aimed at basic needs to be provided to all equitably at an affordable price, including the poorest sections, has to be subsidised, whether through cross subsidy within the sector or across sectors. On the other hand, an economic service provided for surplus generation needs to be charged full economic cost, and be charged at premium rates to provide for cross subsidy for basic service.



It is difficult to see how free markets can even begin to meet these complex and contradictory demands. There is a need to take a rational but socially just stand on the issue of water pricing, and basic service required for livelihood needs should be provided at an affordable cost, to meet operation and maintenance costs. The economic service, which is meant for surplus generation, should be provided at an economic cost and over and above the operation and maintenance (O&M) costs should also meet capital costs. The differential or graded tariff system advocated by the Irrigation Pricing Committee headed by Prof. A. Vaidyanathan can go a long way in resolving this tension between the social and economic good character of water.

In Conclusion

Most of the ideas and concepts outlined in the article would require further elaborations and substantiations. Many of these concepts have been used in our book on the alternative restructuring of the Sardar Sarovar Project. In fact it provided us an opportunity to apply these concepts in a real world situation and see what these have to offer.

I think the biggest strength of these ideas lie in the fact they can re-orient the way we think and conceptualise about water. And opens up different possibilities of creatively engaging with the substantive issues and the different types of crises that the sector is going through. Secondly it also has the strength to go beyond the polarisation that is taking place in the water sector, for example the large vs. small controversy. It can also provide a framework for meaningful stakeholder dialogues in the water sector and also find answers to many of the water conflicts that are taking place. The type of regenerative biomass production using minimum external inputs, including water, can also open up new avenues for climate change mitigation strategies.

Though most of these ideas have tremendous strength, potential and relevance and, have also provided inspiration for grassroots action, unfortunately these ideas have not been able to make a big dent into the mainstream thinking. The obvious reason for this is that the mainstream water establishment does not want to engage with these ideas.

Still as people who find these ideas relevant and significant and also as people who have been part of this large collective in developing some of these ideas, we further need to ask why is it that we have not been able to make a dent so far. Why is it that these ideas always move in parallel to what is happening as part of the mainstream. Why is that a whole lot of people, otherwise sympathetic to these ideas, find them very complex and futuristic? Also there has been very little effort to engage with the issues thrown up by the mainstream on the basis of these alternative ideas and concepts. For example there are many policy instruments which are coming up in the water sector (like water policies, PIM acts, regulatory authorities, etc). We need to engage with these on the basis of the alternative ideas and concepts and see what difference they can make. We need to engage with them and not ignore them.

Water & Agriculture – Myths & Realities

K. R. Datye

There is a need to look at agriculture in the context of ecological sustainability and biodiversity. Some of the myths and realities in relation to water and agriculture are:

- Crop residue and other biomass are considered as low grade having low value potential.

The fact is that these are currently not valued properly. Apart from being used as fodder, these need to be valued in terms of:

§ High potential that these have for value addition through processing into chemicals and other materials

§ Promoting biodiversity

§ Being vital inputs into farming system

The myth is also reflected in promotion of high yielding varieties, which have high harvest index leading to increased grain in comparison with residual biomass.

- Drip and sprinkler are considered efficient means for water delivery and are supported by Government subsidies. However these are purely mechanical devices, energy intensive and when promoted in isolation ignore many vital aspects of the farming system. Water savings by soil moisture storage, mixed cropping, system of multi level root systems and canopy management etc impact the consumptive use of water during the growth period. While the drip system consumes 3 to 4 mm/day an optimized system survives on as low as 1 mm/day. With soil improvement and with same level of water consumption productivity can significantly increase. Tendency is to place sole reliance on the drip sprinkler system, which has high investment but low labour and low skills and make no investment in soil improvement, which promotes productive use of labour.

- Exclusive reliance on external chemical inputs for crop productivity enhancement and qualitative enhancement of the crop. Pest hazards and soil degradation are totally ignored.

- Farmer does not have the capacity to invest on inputs - mechanical or chemical and hence the way out is seen in terms of contract farming, companies rely on routines, package of practices for its implementation and seek to manage a biological system like a chemical / mechanical system. Further these corporate agencies have no obligation or incentive to assure sustenance, as their stakes are low. Biological systems for optimal functioning need in-depth understanding of ecological principles & flexible response and can be effectively managed through reliance on factors of production, which are local. When these principles are disregarded overall effects on livelihood and ecology are disastrous.

- In respect of water optimal is not maximum. To support with an example. If 400mm is the water requirement for maximum yield. The drop in yield if 200 mm of water is supplied is 10% as per yield response to water table. Unlike chemical agriculture, which reduces soil moisture, organic methods increase capacity of soil to hold moisture and along with mulching the stored moisture could be in the range of 60 - 70 mm. Thus applied water requirement further drops to 140mm for same yield loss of 10%. In other words using 1/3 water (140 instead of 400) will still result in only 10% loss in yields. The savings in water due to this are significant and this water can be diverted to a diversified cropping system. It is in this context that in regard to water optimal is not maximum.

- The myth is that productivity of land suffers if one shifts from chemicals-based agriculture to organic methods. This belief developed from the experiences of early organic practitioners who did not have market as a driving force, had low cash needs, were content with quality of produce and had large lands which enabled their needs fulfillment even with less than maximum yields. Their tendency was to minimize risks and optimize use of labour. This scenario is changing with a few practitioners going towards attaining higher productivity using high labour and developing skills. Initial results indicate that the yields from organic match the yields from chemical based system as per the FAO 1978 standards. Rigorous evaluation of organic systems is needed to establish what is the maximum sustainable productivity of land when labour and credit is not a constraint and there are risk coverage funds. Such an evaluation is essential and if the superiority of the organic system is established then the benefits are tremendous in terms of ecological benefits, tapping full potential of the local ecosystem and generating local employment.

- Canal irrigation from reservoirs is seen as the exclusive avenue for storage overcoming deficits in water need and availability of various crops. Investment is deployed for newer areas using technologically

sub optimal devices. No consideration is given to system improvement, upgradation and appropriate crop choices considering climate. Canal irrigation as an exclusive choice displaces local water and results in mechanized and energy consuming investments and expenditure. Role of perennials with their multiple level root systems and canopies are very economical with respect to consumptive use of nutrients and water. By virtue of their stored moisture in their root system they drastically reduce requirement of applied irrigation water; consequently pressure on demand of surface reservoirs is curtailed. Role of perennials with their multiple level root systems and canopy are very economical with respect to consumptive use of nutrients and water. By virtue of their stored moisture in their root system they drastically reduce requirement of applied irrigation water; consequently pressure on demand of surface reservoirs is curtailed.

Report: Hydrogeological Investigation in Bahuda Sub-basin

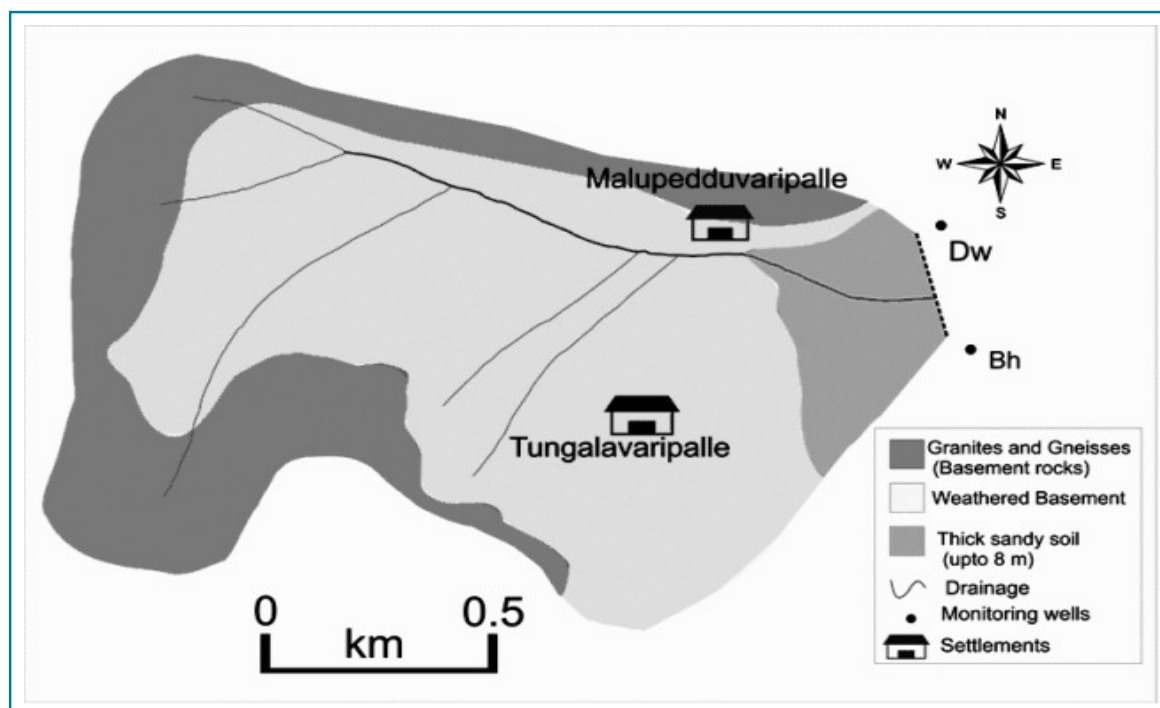
Harshavardhan Dhawan and Devdutt Upasani, ACWADAM, Pune

SPWD in collaboration with Krushi Samstha has taken up an action research project on the Bahuda sub-basin of river Cheyyeru, a tributary of Pennar, as a part of its Water Governance Project supported by the Sir Dorabjee Tata Trust. Advanced Center for Water Resources Development and Management (ACWADAM), active in the field of earth sciences applications, particularly in the area of groundwater resources, was approached by SPWD to help on groundwater governance aspects. It provided a fifteen-day training on groundwater management to the WGP team under the training component of its Ford Foundation supported programme 'Training and Long-Term Facilitation in the Field of Hydrogeology to Enhance Civil Society Capabilities in Watershed Management'. ACWADAM

supported the project under the programme's field facilitation component for conducting a hydrogeological survey of the Bahuda sub-basin.

A joint field visit by ACWADAM, SPWD and Krushi Samstha teams was undertaken in end May that involved a hydrogeological traverse of Angallu Cheruvu and the Bahuda dam catchment areas for a geological mapping exercise of the region

The hydrogeological survey was carried out in Angallu area where left bank canal work under Hundri Neeva Sujala Shraavanthi Project is in progress. The World Bank supported Tank Improvement and Management Project is also being implemented for renovating a minor irrigation tank with a primary objective of increasing



Source: ACWADAM

the storage capacity of the tank that would in turn improve the groundwater conditions in the surrounding areas. Most of the wells are located downstream of this tank. Dependence on groundwater is evident from the prosperous agriculture, as the tank sluice gates are effectively less functional and overflows have been considerably reduced over the years. Lush green agriculture below the tank gives insights to the overall groundwater endowment in this area. The base flows are perennial even during the peak summer, i.e. in May 2008. Clearly, there is evidence of subtle surface water – groundwater relationship in the region, which needs to be better understood, especially in terms of maintaining a certain water balance for such a system to remain sustainable.

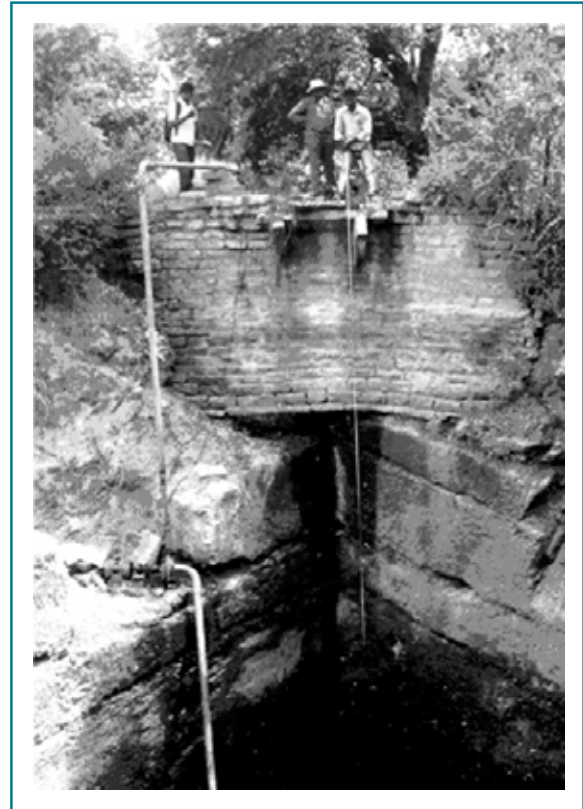
There is a need for hydrogeological intervention through a detailed study by setting up a monitoring system to look into such a relationship. The database generated would help not only in better resource understanding but could even go a long way in establishing decision support tools for a comprehensive water management system for the area. The left bank canal in this area when functional would be a significant factor in the overall hydrological process. It would be a potential line of recharge. If left unlined, it is fraught with some risk pertaining to potential water logging problems in the immediate vicinity of the tank, making the agricultural lands in such areas unproductive.

Observations were recorded in two dug wells and a couple of bore holes. Prima-facie evidence points to the fact that the dug wells are located in a typical groundwater discharge zone, with minor annual water level fluctuations.

A detailed traverse was also undertaken in the catchments and in some portions downstream of the Bahuda dam. One could clearly perceive the effects of increasing groundwater abstraction on the hydrology of the Bahuda and the traditional tank system. This exploitation is evident in the nature of agriculture flourishing in the area. Clearly, a study involving the specific components of the water balance including estimates of inflows and outflows, recharge and groundwater abstraction would go a long way, along with an understanding of aquifers in the area.

Some Salient Observations and Suggestions

a. In Angallu area, the tank appears to be mainly a surface irrigation structure. The downstream of the dam would be a good location for constructing a ‘V’ notch for monitoring the baseflows.



Source: ACWADAM

b. Installation of Rain Gauge in this area would be useful in determining the water balance studies for this area. Also, in addition, monitoring over a period of few years would generate a good database to analyze the variation and change in pattern of rainfall in the area.

c. A detailed traverse in the adjoining area was planned as an upcoming activity to delve deeper into the hydrogeology of the area. This would help ACWADAM and SPWD analyze the situation and provide inputs to activities like watershed planning or net planning.

d. Revival of traditional irrigation systems in the Bahuda dam area at present seems impossible, but through regulation of groundwater and appropriate hydrogeological interventions a positive impact on the baseflows in this area can be expected.

e. Consideration of geology of a site is a must for planning of watershed measures or other projects having implications on groundwater.

f. Water quality testing needs to be carried out for the different water structures and drinking water sources. ACWADAM suggested 14 parameters for monitoring viz. pH, hardness, TDS, alkalinity, calcium, magnesium, sodium, potassium, bicarbonates / carbonates, chlorides, sulphates, nitrates, fluoride, arsenic.

Policy Update: Opening Up of India's Coast and the Dilution of Environmental Norms: Comments on the Draft Notification on Coastal Management Zone (CMZ), May 2008

Amita Bhaduri, SPWD, New Delhi

The draft notification shared by MoEF in May 2008 for public comments on Coastal Management Zone (CMZ) is set to supersede the Coastal Regulation Zone (CRZ) notification of 1991. Though the stated objective of the draft CMZ notification is "protection and sustainable development of the coastal stretches and marine environment" the contents of the draft CMZ notification is a watered down version of the CRZ notification's safeguards as regards the ecology and fishing communities.

The CRZ notification was earlier issued under the provisions of the Environment Protection Act, 1986 to regulate developmental activities in the coastal stretches of seas, bays, estuaries and creeks, rivers and backwaters, along with the areas which are influenced on the landward side by tidal action. The idea was to protect the coast from parties with vested interests, keen on taking over the coast for commercial purposes as also to safeguard the interests of local fishing communities. For this, CRZ notification imposed restrictions on the setting up and expansion of industries and also on some of their operations and processes. The area to be included under CRZ was defined on the basis of Low Tide Line (LTL) and High Tide Line (HTL) in the case of coast and, HTL and their width in the case of creek, river and backwater. Thus, in case of coast, the CRZ included area beginning from Low Tide Line (LTL) on seaward side till a distance of 500 meters beyond High Tide Line (HTL) on landward

side. Whereas in case of rivers, creeks and backwaters, it was their width or a distance of 100 meters from the HTL (whichever is less) that became basis for defining CRZ.

The State Governments were to identify and classify all CRZ areas and record these in the State Coastal Zone Management (SCZM) plans after seeking approval from the Central Government. The States delayed the identification of zones and implementation of the notification with the SCZM plans being prepared only after the Supreme Court directed them to do so in 1996. Whilst the CRZ notification had hardly been implemented and several SCZM plans had incorrectly classified CRZ areas, a series of nineteen amendments representing the commercial interests diluted the protective measures considerably. By 1998 the MoEF had constituted thirteen State Coastal Zone Management (SCZM) Authorities as well as a National Coastal Zone Management Authority (NCZMA) to monitor and implement the provisions of the CRZ notification.

The CRZ was classified into four categories for regulating permissible development activities depending upon the ecological sensitivity and level of existing development. Various committees were set up from 1992 onward to review CRZ provisions on issues of coastal tourism, extraction of groundwater and sand, inclusion of panchayats and towns, prohibition/regulation of resource exploitation in ocean etc.

Table.1. Committees Set Up to Review Some Aspects Related to the CRZ Notification, 1991

Committee	Purpose/Outcome
BB Vohra Committee, 1992	To examine CRZ vis-a-vis coastal tourism; Report submitted in December 1992. Recommendations - - Reduce distance of No Development Zone (NDZ) in selected coastal stretches for promoting tourism. CRZ notification amended in 1994, reducing NDZ along tidal water bodies from 100 to 50 m; construction was also permitted in NDZ. Amendment challenged in Supreme Court and quashed. - HTL demarcation not clearly defined. Ministry defined HTL and demarcation agencies in 199 Amendment. - No drawal of Groundwater in the NDZ including CRZ area, except by manual extraction. Flattening of sand dunes in the CRZ area prohibited.

Balakrishnan Nair Committee, 1996	<p>To examine issues relating to Kerala on CRZ; Recommendations -</p> <ul style="list-style-type: none"> - Inclusion of census towns and panchayats, which are substantially built up to be declared as urban areas (CRZ-II). - The extent of CRZ area in case of inland tidal water bodies to be relaxed, to permit all ports and harbour constructions and port related industries. - Storage of petroleum products in CRZ [considered vide amendment in 1997] Reclamation to be made permissible for the approved projects. - Locating non-polluting industries, relaxation for tourism potential areas and construction of fishermen houses in 200-500 mts. - Drawl of ground water between 0-200 metres by manual method, [considered in the 1997 amendment). - Setting up fish processing units. [Considered in 1997 amendment which permitted modernization of fish processing units and setting up of effluent treatment plants for such existing plants. <p>Reduction of CRZ to 50 mts along tidal water bodies keeping in view the unique conditions of Kerala.</p>
Fr. Saldanha Committee - I	<p>To advise on withdrawal of groundwater and extraction of sand in A&N Islands</p> <ul style="list-style-type: none"> - Permitting manual drawl of groundwater in 50-200 metres amendment in 1997] - Permitting mining of sand in CRZ area on yearly basis.
Fr. Saldanha Committee - II	<p>To examine specific issues relating to CRZ</p> <ul style="list-style-type: none"> - To reduce CRZ along tidal water bodies - To construct of dwelling within 200 mts in CRZ-III
Sukthankar Committee (I)	<p>To examine the issues relating to Mumbai and Navi Mumbai</p> <ul style="list-style-type: none"> - Recommended increase in FSI for undertaking slum redevelopment schemes and rehabilitation of dilapidated structures.
Sukthankar Committee (II)	<p>To prepare a National Coastal Zone Policy of India (NCZP)</p> <ul style="list-style-type: none"> - Based on a CESS study suggested a legislative framework for framing Coastal Zone Management Policy. Recommended that the coastal zone should be demarcated based on risk from erosion and flooding.
Arcot Ramachandran Committee	<p>On Ocean Zone regulation</p> <ul style="list-style-type: none"> - Suggested inclusion of several activities for prohibition/regulation in the ocean part of the coastal zone. These activities include construction of Ports and Harbours, waste disposal, sea bed mining, OTEC plant, oil and natural gas exploration, ship breaking, etc., which are not covered under CRZ.

The draft CMZ notification redefines and re-categorises coastal zone, setback line and the permissible activities based on 'scientific' study. The seaward boundary under CMZ has been extended to 12 nautical miles into the sea from LTL and administrative boundary of the local body of authority (municipality, panchayat etc.) has become the landward boundary. CMZ has been categorized into four zones removing certain restrictions that were imposed under CRZ notification. The delineation of setback line is to be based on scientific study based on the four parameters - elevation, geomorphology, sea level trends and horizontal shoreline displacement. Three additional parameters viz. wave height, tidal range and geology suggested by Swaminathan Committee (1995), which forms the basis of the draft CMZ notification, have been ignored. The setback line will be delineated for the entire coast excluding CMZ-I and CMZ - IV areas, and will be notified in one or more stretche at a time in a map on cadastral scale by the Central Government, which will issue

detailed technical guidelines for the same. Provisions of the CRZ, 1991 will prevail till the delineation is completed by competent and established scientific institutions specializing in earth surveys and mapping, among a set of such institutions to be notified by the Central Government.

A National Board for Sustainable Coastal Zone Management has been created for policy oversight and has the mandate to advice the Central Government on matters relating to coastal zone management, but has not been given any regulatory functions. The Board would consist of not more than thirty-two members; the term of the non-official members of the Board shall be three years. The regulatory functions are to be undertaken by the National and State or UT Coastal Zone Management Authorities to be set up under the Environment (Protection) Act, 1986. The arrangement ostensibly is to bring the coastal regulatory framework consistent with well-established scientific principles of Coastal Zone Management.

The comparison zone categorization under draft CMZ and CRZ notifications is tabulated below:

Table. 2. Committees Set Up to Review Some Aspects Related to the CRZ Notification, 1991

CRZ Notification	CMZ Notification
<p>CRZ-I Areas which are ecologically sensitive and important. Also areas between Low Tide Line and the High Tide Line.</p>	<p>CMZ-I Shall consist of areas designated as Ecologically Sensitive Areas (ESA). <i>Same as CRZ I areas</i></p>
<p>CRZ-II The areas that have already been developed upto or close to the shoreline. For this purpose, 'developed area' is referred to as that area within the municipal limits or in other legally designated urban areas which is already substantially built up and which has been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains.</p>	<p>CMZ-II Areas, other than CMZ - I and coastal waters, identified as 'Areas of Particular Concern (APC)' such as economically important areas, high population density areas, and culturally and, or strategically important areas. The administrative boundaries of these 'Areas of Particular Concern' would be boundaries of CMZ - II. <i>CRZ II areas plus coastal panchayats with population density above 400 sq. km.</i></p>
<p>CRZ-III Areas that are relatively undisturbed and those which do not belong to either Category-I or II. These will include coastal zone in the rural areas (developed and undeveloped) and also areas within Municipal limits or in other legally designated urban areas, which are not substantially built up.</p>	<p>CMZ-III Shall consist of all other open areas including coastal waters and tidal influenced inland water bodies, that is, all areas excluding those classified as CMZ - I, II and IV.</p>
<p>CRZ-IV Coastal stretches in the Andaman & Nicobar, Lakshadweep and small islands, except those designated as CRZ-I, CRZ-II or CRZ-III.</p>	<p>CMZ - IV Shall consist of island territories of Andaman and Nicobar, Lakshadweep, and other offshore islands. 1. In respect of the islands in coastal backwaters areas, which are not included in CMZ - I or CMZ - II, such areas may be included in CMZ - IV at the option of the Local Authority; otherwise they would be included in CMZ - III. Once exercised, the option of the Local Authority would not be subject to change.</p>

CMZ notification comes in the backdrop of the large-scale entry of private capital in ports & port-based SEZs as well as other projects and SEZs that prefer the logistical advantage of strategic location near ports. There has also been an expansion of infrastructural projects to support this development. More than ninety-five per cent of India's export-import trade volume and seventy percent of trade value is routed through seaports.

Presently, the Centre handles twelve major ports apart from which there are about 45 non-major and private ports, which have been contributing to the maritime trade. The National Maritime Development Programme (NMDP), GoI had identified 219 projects involving

an estimated investment of US \$ 13.5 billion in ports and related infrastructure by 2006. The various investment opportunities under the NMDP were in construction of jetties and berths, procurement, replacement and upgradation of equipment at ports, deepening of channels & improvement of port connectivity, leasing out assets of existing ports, construction and operation of terminals, berths and storage facilities along with captive facilities for port-based industries, construction and operation of greenfield ports, construction and operation of container terminals, multipurpose and specialized cargo berths, warehousing, container freight stations, storage facilities, and handling equipment, setting up of captive power plants, dry-docking and ship repair facilities,

leasing of equipment and floating craft from the private sector and port-based SEZs. All this was to lead to significant investment opportunities for heavy engineering industries, steel units and fertilizer & cement companies.

The last year has witnessed private sector investment in port-based SEZs like Kandla Port, Navi Mumbai SEZ, Adani Group's SEZ at Mundra port. A peek into the minutes of the 62nd Meeting of Expert Committee on Infrastructure Development and Miscellaneous Projects held in February 2008 at New Delhi suggests that about half the projects that were reviewed were in coastal areas and were under the purview of the CRZ notification.

While proximity of the project to the ports is a prerequisite for most investors it usually transgressed the CRZ norms and thus there was a pressure to soften the extent of safeguards required for conservation and protection in coastal zones. According to a news item in Economic Times, Indian investors are increasingly turning to ports and port-based SEZs instead of developing a number of SEZs across the country. Consultants associated with a study of infrastructural investment opportunities in ports feel that developing SEZs around greenfield ports in different maritime states seems to be the 'craze of the times' [ET, July 2008].

The present CMZ notification has to be seen in the context of where several investors including infrastructure companies like construction majors and investment banks are doing the rounds



Source: <http://img146.imageshack.us/img146/5521/vizag13rc3.jpg>

looking at potential projects. Investors interested in the development of port, logistic and marine infrastructures have blamed the government for the absence of a cohesive policy framework that makes it difficult for them to set up dedicated berths for activities like ports, bulk oil and LPG handling in the Indian coast. CRZ norms were increasingly acting as a fetter in both land acquisitions as well as in the kinds of activities permitted. With the rapid infrastructural development underway in the coastal areas of the country the statement in the Swaminathan Committee report that 'coastal management should be done, without unnecessarily impeding livelihood or legitimate coastal economic activity or settlements or infrastructure development' was most likely to be used to address the concerns of the investors who had for long been seeking the dilution of CRZ notification. Violations in collusion with the State authorities had often been resorted to but a supportive state policy was much more desirable. Earlier potential port projects like Tadri, Vardhaman had lost steam owing to environmental objections. The former had faced opposition from the fishermen of Kumta taluk in Uttara Kannada district, as it was to destroy the estuary and fishing harbour on which the community depended. The latest move that is being opposed is the proposal for a coastal corridor and petrochemical and petroleum industries between Kakinada and Vishakapatnam. The proposed thermal power plants in Polatitippa (Krishna district) and near Naupada (Srikakulam

district) are being opposed on the grounds that the district officials have cleared these despite their having violated the provisions of the CRZ act. Investors have been therefore voicing the need for norms, which allow them to purely focus on developing their projects instead of having to obtain environmental clearance on a case-to-case basis. The draft CMZ notification, 2008 came in the context where it was no longer possible to regularize the violations taking place on the ground through amendments to the notification. The Swaminathan Committee report came in the backdrop of the 'fear generated among people after tsunami' [Sudarshan Rodrigues, 2008] and the 'pressure to relax the existing restrictions on infrastructure facilities to permit oil and natural gas exploration, receipt, storage and re-gasification of LNG and salt harvesting by solar evaporation of sea water in the CRZ' (<http://www.indlaw.com/>). It is to be noted that the 'Swaminathan Committee was constituted in the backdrop of the environmental reforms process. The Secretary of the MoEF stated in the first meeting of the Swaminathan Committee that the National Environmental Policy recommended decentralization to the extent possible and exempting activities, which do not cause significant environmental impacts from the purview of the regulation.' [Arati Sridhar, 2007]

The fresh categorization of the lands to be included in the CMZ zones (I-IV) is likely to bring a large

entailing less severe environmental norms. Categorizing the lands new 'The redesignation of the CMZ areas indicates that ecologically sensitive areas are no longer a 'no development zone' using a technical feasibility clause so that as long as any activity is recorded in the integrated coastal management plans (ICZMP), it would be allowed.' [Sudarshan Rodrigues, 2008]. A whole range of activities has been allowed on the landward side of the setback line.

The new notification allows activities prohibited under the CRZ notification by offering the option of allowing activities behind the sea wall, which could serve as a set back line. While SEZs have been permitted in the CMZ -II, lack of clarity on the rights of the fishing communities continues in the light of the sea walls

Training & Consultations

Consultation on Developing a Forum on Water Governance in Andhra Pradesh, Hyderabad, July 2008

A meeting was held at the Centre for World Solidarity (CWS), Hyderabad on 31st July 2008 to discuss the modalities related to the functioning of the State Level Forum as well as the individual proposals to be taken up under the project. The State Level Forum is being initiated as a part of SPWD's Water Governance Project, of which CWS is the Andhra Pradesh State Level Anchor. A preliminary meeting was held earlier at Hyderabad during June 2008 and was attended by representatives from SPWD, CWS, WASSAN and APMAS. The current meeting was organised by CWS, Hyderabad and attended by SPWD, New Delhi; SasiWaters, Hyderabad; SAKTI, Hyderabad; APMAS, Hyderabad; APFAMGS, Hyderabad; Krushi Samstha, Madanapally; Chitra Krishnan and Doraiswamy.

The details of the initiative were shared by Hardeep Singh, SPWD and Rama Mohan, CWS. The project was initiated in April 2007 and covers three states, viz., Madhya Pradesh, Maharashtra and Andhra Pradesh. Sub-basin projects such as Seethapalli vagu in Godavari river basin and Bahuda in Pennar basin are being studied by SPWD along with its partner NGOs to articulate water resource management issues at basin level. The state level component would attempt to address some of the water governance issues by connecting with various actors and their on-going experiences. The project also plans to take up a few short studies and capacity building workshops over the next one and a half year period. The sub-basin related issues were shared by SAKTI, Hyderabad and Krushi Samstha, Madanapally.

suggested in the Swaminathan report. The livelihood activities of the traditional fishworkers do not get mention in the draft notification while beach tourism and water sport facilities have been discussed. The habitations of the traditional fishworkers and the space required for their livelihood activities like landing of their boats, space for drying fish etc also do not get a mention in the draft CMZ notification. The draft CMZ notification like the previous CRZ notification does not ensure much role of the Centre in either implementation or monitoring. Just how will the implementational problems be resolved by having a new notification is unclear. It is also not clear whether/how the violations committed under the 1991 notification will be dealt with.

It was observed during the discussions that governance is a dynamic process and needs to be understood and addressed at various levels right from grassroots to basin level. In addition to technical mapping at sub-basin level, it is also important to take up socio-cultural mapping as to who controls resources. Chitra Krishnan in her presentation on 'Irrigation infrastructure with reference to Tungabhadra basin' shared her study findings on the Tungabhadra river basin, an inter-state river spread over Karnataka, Maharashtra and Andhra Pradesh. She tried to capture the status of irrigation infrastructure in the basin, such as, Vijayanagar anicuts, Sunkesula, Rajoli Banda Scheme (RDS) and Tungabhadra Dam, and zoom in over the period 2003-2005 to understand the functioning of these schemes in detail. She identified some governance issues, which need to be studied in greater detail. (Some short examples could be given?)

Mr. Doraiswamy who has been working with farmers and on PIM issues for a long time, in his presentation on 'Study on modernization of KC canal and command area', shared his experiences in RDS and KC canal command areas. His work also includes mobilizing local farmers' organizations at few pilot locations towards empowering them and demonstrating effective command area management. He shared the steps that are being taken by Government of Andhra Pradesh to empower farmers' organizations to collect and retain the water charges themselves on a pilot basis. He felt that there was a need to understand governance with greater clarity.

Udayashankar facilitated the discussion. He listed the political, economic, environmental, technical, gender, institutional, and legal dimensions of governance and said that there was a need to look into all these aspects while talking about governance in the water sector.

During the discussion on these key aspects, the participants highlighted the following:

- Depending on the focus area, location, nature of problem, some of these dimensions take prominence while articulating governance issues.
- Civil society has been actively engaged in institutional and governance issues at grass-roots through PIM, WUAs, WATSAN/ Watershed committees etc., but not so at higher levels of governance.
- The decision-making processes at basin level are not properly studied and understood. There is a lack

of interface between the higher level governance structures (such as River boards) and lower level farmers' institutions.

- For the purpose of this initiative, we may consider the broad themes - Sub-basin level; Groundwater; Canal Irrigation and Tank Irrigation – and address elements of governance within these four broad themes.
- More discussion is required on governance and an e-mail exchange group can help in deepening our understanding and identifying issues of common concern.

Topics were identified for short studies and research within the four broad themes viz., sub-basin, groundwater, canal irrigation and tank irrigation.

Training on 'Planning and Management of Groundwater with Special Reference to Watershed Management Practices, Madanapalle, August 2008

A 5 day residential training course on 'Planning, Development and Management of Groundwater with Special Reference to Watershed Management Practices' was organized from 11th to 15th August at Madanapalle, Andhra Pradesh.

This was jointly organized by ACWADAM, Pune and SPWD, New Delhi and was attended by over 30 participants from over 16 organisations which included ARTS, Vizag; Chaitanya REDS, Anantapur; Dharamitra, Wardha; FES, Madanapalle; GJSS, Madanapalle; GORD, Madanapalle; GVS, Punganur; REDS, Kadiri; RIDS, Anantapur, Samavesh Society, Bhopal; Spandana, Palamaner; and Vikasa, Vizag.

Training sessions were conducted by trainers from organisations who have earlier been trained by ACWADAM at Pune and they included SPWD New Dehi, FES; Madanapalle, SOPPECOM; Pune, Samavesh Society, Bhopal and Krushi Samstha Madanapalle with ACWADAM providing support when needed. Designed on the lines of ACWADAM's two and a half week hydrogeology training, this was targeted mainly at development practitioners in the water sector with a large number of participants being from Andhra Pradesh. Members of SPWD's partner NGOs from other states were also present for the training.

Sessions conducted were developed by ACWADAM as a mix of theory and field visits in order to optimise learning and for better applicability at the respective field sites.



The course was built around principles of geology and hydrology that would help a lay man identify basic properties in relation to water storage and availability at the sub-surface level in a given location. The subject of hydrogeology was taught with special reference to Watershed Management and its schemes.

Field visits were taken to nearby villages and sites in order to understand the local geology of the area and its implications on water availability and management. Field visits included identification of rock types and geological features that play an important role in water systems, conducting pumping tests for monitoring discharge and recharge rates of a well, water quality testing, to name a few.

Workshop on Water Governance and Improved Implementation of Water Based Interventions under NREGA Schemes in Madhya Pradesh, Betul, August 2008

SPWD along with its sub-basin partner in Madhya Pradesh, Samavesh Society organized a one day interactive session on experiences on water related works under NREGS in Madhya Pradesh. Twelve NGOs, most of whose work was spread in southern parts of Madhya Pradesh, participated in this workshop cum interaction. These organisations were ASSS, PGVS, Yashodeep, Pradeepan, SRUB, BYPASS, NAMAN Seva Samiti, JP, RECHA, and GVS. Amongst the organizers, Amit Gaumat and Jeetendra Saxena represented Samavesh

Society and Alisha Vasudev and Surya Prakash represented SPWD. The workshop was initiated with a brief introductory theme by SPWD and Samavesh team followed by brief presentations by all the NGOs and a discussion session.

The major issues that emerged from the presentations and short discussion were: integration of groundwater component in the activities to improve surface water conditions, training and awareness at CSO/CBO and panchayat, proper work allocation and priorities under



NREGS, advocacy, experience sharing and collective work by NGOs, training and emphasis on cost-benefit analysis of works done under the scheme and ensuring the tracks and works of Panchayat in lines with the decentralized governance system. After the presentations,

many issues were discussed based on water and soil conservation under the ongoing NREGS scheme in particular and the normal water requirements and availability in general in various areas of the states and the experience of these CSOs in the state.

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