Water MOVES

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Water Supply, Stormwater and Wastewater Management in Urban Agglomerations in Dryland Areas: Case Study of Indore City in Madhya Pradesh

Rahul Banerjee, *Dhas Gramin Vikas Kendra, Indore*

Introduction

A major problem confronting large urban agglomerations in dryland areas of the country is that of water supply and storm & wastewater management. The traditional solution for water supply has been to create surface water storages through damming of rivers in the vicinity of the urban centres. This water after treatment is supplied to the consumers. However, as the urban centres have grown and modernisation has taken place, the population and per capita demand have risen leading to a phenomenal increase in water demand. This has been met through the tapping of surface water sources distant from the urban centre as well as by greater drawal of groundwater. Both these alternatives are expensive while capital and maintenance costs are rarely recoverable from the consumers in the form of water taxes. So with time the subsidy amount that has to be provided by the government to the urban local bodies has gone up considerably.

Ninety-five percent of water supplied to consumers after its use becomes watewater which needs to be disposed off in a proper manner so that it does not cause pollution of surface or groundwater sources. There is also the problem of disposal of storm water during the rains as an urban built up environment drastically reduces the area available for its seepage into the soil. The standard wastewater engineering solution for this is to lay underground sewage and stormwater lines to drain the waste and stormwater and install sewage treatment plants to oxidise pollutants in the waste water before releasing them into the streams and rivers. However, like in the instance of centralised water supply, this too involves huge outlays in capital and running costs which are rarely recovered from the citizens. Subsidies for waste and stormwater management are even less forthcoming from the government and so urban local bodies fail miserably in maintaining and upgrading waste and stormwater disposal systems. This leads to heavy pollution of natural surface drainages like streams, rivers and underground aquifers and at times causes flooding during the rains. The situation with regard to water management in the city of Indore in Madhya Pradesh is briefly reviewed here to contextualise the problem and its possible solutions.

The Situation in Indore

Indore, which was initially a small pilgrimage halt between the holy places of Ujjain and Omkareshwar, was developed as a governance centre by the Holkar princes from early nineteenth century onwards and later developed as a commercial and industrial centre as well. The Holkar prince Yeshwantrao engaged British planners and engineers to build the city along modern lines in the early twentieth century. A dam was built on the river Gambhir about twenty kilometers from Indore and a few other tanks were built on streams near the city. While water from the dam was treated before being supplied to the citizens, water from the wells constructed just below tanks on the streams near the city was pumped out and supplied without treatment. An underground sewage network was laid but not for stormwater, which continued to flow along roadside drains.

Water supply became inadequate by the nineteen sixties and new sources were sought. The Malwa plateau where Indore is situated is underlain by basaltic hard rock called Deccan Trap. This is highly impervious and except for some faults and fissures, offers little possibility for storage. Thus, groundwater potential of the region is very low. Consequently the only reliable source was the perennially flowing river Narmada which is at a distance of 50 kilometers from Indore. However, it was 150 meters lower in level given the fact that Indore was situated atop the Malwa plateau. This meant that not only would a huge capital investment have to be made to bring water to the city but it would also entail a heavy recurring expenditure because of the difference in head and consequent hydraulic losses. Nevertheless, this expensive system was implemented. Even after its implementation and later augmentation by the installation of a second pump, the water supply is inadequate and there are thousands of deep tubewells sunk by private persons as well as the municipal corporation to supply water. During the summer months water becomes scarce and has to be supplied by tankers filled from tubewells. Prices shoot upto Rs 0.50 per litre of water while the poor who have to rely on free supply by the municipal corporation have to make do with as low as 20 liters per capita of water per day.

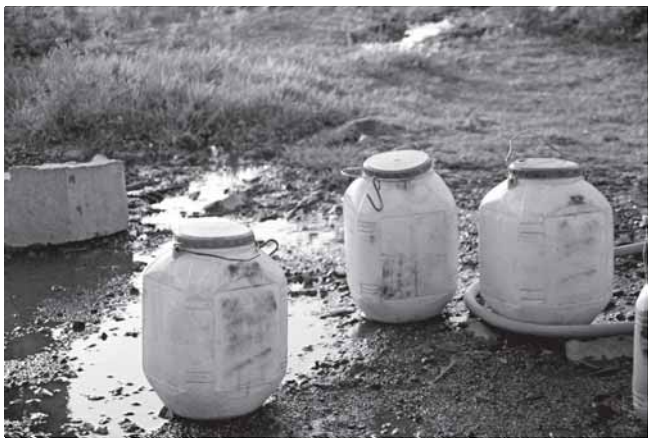
As the city expanded, newer sewage lines were laid to carry wastewater but these were not connected to the old sewage lines which had exhausted their capacity. They were instead emptied directly into the two rivers flowing through the city. The wastewater treatment plant has not been functional for many years now and sewage is being released into the environment without treatment. Most new residential buildings, however, rely on septic tanks for disposal of toilet waste. These septic tanks have been built without any bottom lining so that the sludge seeps directly into the subsoil. There are no provisions of soakpits for the overflow water and instead this is emptied into the open stormwater drains lined along the roads. There are many colonies, which have community septic tanks without any soakpits and the excess water just flows out to fester in pools. Unhygienic disposal of wastewater thus causes a serious problem of pollution of both surface and ground water.

An Alternative Solution

There is an alternative to the standard centralised engineering model of water supply and wastewater management that has been tried out sporadically in some cities and towns all over the world including some residential colonies in Delhi and by individuals in Indore. This involves the recharge or harvesting of rainwater and recycling or recharge of wastewater. The per capita annual replenishable groundwater potential of Indore district, as estimated by the Central Ground Water Board, is at least 200,000 cubic meters per person. Of this, the actual per capita availability for industrial and drinking water purposes at present is just 20 cubic meters per person most of which has to be tapped from the deeper confined aquifers at a higher expenditure of electrical energy. Since there is no systematic plan suited to the topography and underlying geology of the area for recharging of aquifers, this huge replenishable potential is not being fulfilled even minimally. The continuous deforestation and urbanisation is increasing the runoff quotient. This situation can be changed drastically so that all the water needs of Indore city and the adjoining rural areas can be met locally at a very cheap capital and service cost. In the city, all the storm and waste water can easily be recycled or recharged at source with the technology being simple and cheap. Rules for this already exist and no new building construction or colony layout can be sanctioned without a proper plan for recharging, treating and recycling of storm and wastewater. But these rules are not being enforced. Through a process of cross subsidisation involving greater taxes from the bigger properties this process of decentralised recharging of all the rain and waste water from individual buildings can easily be implemented.

The storm water of the streets can be recycled or recharged at suitable intervals along the streets in open spaces and parks through underground storage

tanks or recharge pits. There would be no waterlogging at all during the monsoons. Similarly the old and fairly cheap technology of septic tanks and soak pits can be used to deal with the sewage in a decentralised manner. New bio-organisms have been developed now through biotechnology that can organically oxidise the sludge and completely reduce its pollution potential which is much cheaper than laying sewage lines and then building sewage treatment plants. Once again through a process of cross subsidies this decentralised system too could easily be put in place. Similarly the decomposable solid waste can be treated in a decentralised manner at the household or community level. There are now technologies that can convert the non-biodegradable plastic waste into hydrocarbons to be used as fuel.



In rural areas that form the catchment of rivers and streams flowing through the city, extensive afforestation and watershed development can take care of both irrigation and drinking water needs while at the same time augmenting the water table for the city dwellers. It is possible to recharge the water falling in the catchment where Indore is located as also recycle the wastewater in a cost-effective manner. The Dhas Gramin Vikas Kendra has demonstrated this in its office premises in Indore where for a cost of just Rs 200 per square meter, a system has been installed that effectively treats and recharges all the storm and wastewater within its precincts. Moreover the wastewater is used to irrigate creepers that cover the building and keep it cool through shade and evapotranspiration thus obviating the need for installing airconditioners and air-coolers.

The crux of this alternative solution is involvement of people in decentralised water management. Whether it is slums or posh residential colonies, there will always be a need for community involvement in the decentralised management of water supply and sanitation services thus helping reduce the load on the Municipal Corporation. Additionally there is a need for a clear rural-urban collaboration within the catchment.

The Dominance of Unreason

The present hegemony of the design of unsustainable centralised water supply and sanitation systems is preventing the implementation of this simple, sustainable and cheap solution. The Asian Development Bank (ADB) has sanctioned a loan of Rs 700 crores for the augmentation and renovation of the water supply, sanitation and solid waste management systems of Indore city. The ADB project has a planned expenditure of Rs 500 crores for setting up yet another pumping station and a new water line for more water from the Narmada River. The remaining Rs 200 crores of the ADB loan will be spent on improving the underground sewerage, storm water drainage and solid waste management systems. The ADB plan is thus based on the same water supply and sanitation engineering principles as those that have been followed for more than a century now in urban areas. As we have seen these water supply and sewerage systems are very expensive to maintain and the costs are never recovered from the citizens, which instead have to be made up through subsidies from the government that have become more and more scarce with time.

In the present case to recover capital and running costs the ADB has insisted on the introduction of metering of water supply and economically viable water rates as also drainage levies. A whopping 250% increase in water rates has already been approved by the Indore Municipal Corporation and recovery of outstanding dues has begun. Moreover the estimates of the capital costs budgeted for at the time of the sanction of the loan have proved to be much less than actual costs as revealed after the detailed design and tendering process for construction. Similarly the maintenance and running costs too will overshoot the budget estimates by a good margin. Which means that the projected increases in water supply and property tax rates will also have to be hiked further to meet this heightened cost so as to maintain a positive rate of return for the project and ensure repayment of the ADB loan. Since this is not something the citizens are used to, rumblings of discontent have begun to surface which will only intensify in future.

Thus the whole ADB project will in the end lead to serious social strife because -

1. The new rates will increase even further when the water meters are in place.

2. Even the middle and lower middle classes will find it difficult to pay these enhanced rates.

3. The hardest hit section will be that of slum dwellers who will be deprived of the minimal water supply and sanitation services that they now receive.

4. There is every likelihood that this inability on the part of the lower income groups to pay the water and sanitation taxes will be used as a pretext for removing them from their present locations within the city.

5. Last but not the least the entire project is environmentally unsustainable and will lead to severe and irreversible environmental problems in the future. The whole water supply scheme is based on the assumption that the Narmada will perennially provide water. However, the damming of the river on a large scale and the deforestation of its catchment will continually reduce the flows in the river especially in the summer months when urban water demand is the highest.

The UN Habitat in collaboration with the funding agency WaterAid has tried to intervene in the area of wastewater management in the slums of Indore. While their approach is decentralized, it is nevertheless highly unhygienic. It involves the construction of unlined pit latrines for each household from which contaminated water leaches directly into the subsoil thus seriously polluting the underground aquifers. So while open defecation is controlled to some extent, the much more serious problem of pollution of aquifers is created in the process. What is required instead is the installing of community latrines with proper septic tanks and soak pits and also recharging of waste and storm water after treating. Part of the cost of this as mentioned earlier should be cross-subsidised by the richer sections which occupy more of urban land and yet pay less property tax than they should.

Conclusion

The sorry situation prevailing in Indore with a few minor localised changes can be witnessed in many other cities and large towns in dryland areas of this country. There is an urgent need for the reorientation of urban water management to a more decentralised and environmentally sustainable mode. Especially so in dryland areas where water availability is low. There are only some isolated instances of water recharging and treatment so far but no city level plans in this regard. Alternative participatory planning in the minutest technical and socio-political detail involving the study of the topography, hydrogeology and socio-political characteristics of the whole catchment of the city and design of appropriate water harvesting, recycling and recharging structures in the rural areas adjoining it and in the city itself is what is needed. This would completely change the face of urban water management in the country and ensure that the now inevitable water riots do not take place in future.

Water, Biomass and Livelihoods: Part I

K. J. Joy, *SOPPECOM, Pune*

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

The overall strategy for *'sustainable prosperity of all'* comprises of many components built into a complex relationship. Concepts like sustainable productivity enhancement, regenerative use, equitable distribution, water rights and entitlements, democratisation and informed participation of users, technology choices, pricing, livelihoods of the resource poor sections are some of the normative concerns. CASAD, SOPPECOM, social movements like Mukti Sangharsh Movement, the Bali Raja Dam struggle, anti-dam struggles and struggles for rehabilitation, people's science movements, many grassroots NGOs & civil society groups, individual experiments and innovative parishioners have contributed to the development of these concepts, in grounding them and accumulating social experience around them.

Approaching Water Through Livelihood Needs

Water is the starting point of the strategy for a decentralized, sustainable, equitable, democratic, prosperous agro-industrial society ("regenerative eco-economy"). It is fundamental for both ecological regeneration as also for stabilizing livelihoods of resource poor sections. It is considered to be as important a means of production as land is. As a key input to the regenerative eco-economy, it is approached from the livelihood end unlike the conventional thinking about water, which is preoccupied with increase in irrigated area. The primary purpose of water resource development is to ensure livelihood needs of all. Thus fulfillment of livelihood needs provides a norm for access, water

rights and entitlements.

Defining Livelihood Needs

Earlier discussions of needs were centered on the fulfillment of basic or subsistence needs. The issue is how far have strategies been successful in meeting basic needs of food, fuel, shelter, clothing, education and the like. Livelihood needs apart from subsistence needs include needs that are imposed due to the nature of a livelihood activity itself. For example, a farmer would require means of tillage, and he/she would have to satisfy this need either through maintaining a pair of bullocks himself/herself, sharing a pair with someone else, or else having enough cash to hire bullocks or a tractor. Also this approach differs from subsistence frameworks as for livelihoods one also takes into account certain surpluses over and above consumption needs, which can be exchanged, and/or value added. Livelihood needs also cannot be equated with cash income as in certain situations the latter might increase without making much of a difference to the fulfillment of livelihood needs. Similarly it also cannot be purely limited to agricultural income as in many situations livelihood needs cannot be met fully from the agricultural sector alone and access to non-agricultural incomes becomes essential.

Biomass Based Approach

A biomass-based developmental strategy is central to fulfillment of livelihood needs and crop production is treated as a part of a wider process of biomass production. The concept of biomass brings forth a method of conceptualising many distinctions that are important in planning for sustainable and equitable water use. It gives a measure of ecosystem productivity and also helps set criteria for sustainable resource use. It also helps assess water requirements for livelihood assurance and consequently the requirement of exogenous water for an area.

Biomass here implies the total dry mass of vegetative matter produced within an ecosystem. The needs are met directly in various forms like food, fodder, fuel, timber, oils and resins, fibre, etc. It is also used to satisfy household requirements indirectly when it is sold with or without being processed in order to meet cash requirements for securing other livelihood needs. The biomass productivity of an ecosystem is the natural measure of ecosystem productivity as all biological activity within an ecosystem is regulated by the total photosynthetic production by primary producers. It helps us think and plan in several ways while providing a way of conceptualising common and individual factors. Potential biomass productivity represents the total photosynthetic potential, which is determined by factors such as soil conditions, moisture holding capacity, water regime, biomass and nutrient circulation, etc. On the other hand, the actual degree of its realisation and its different uses depend much more on individual decisions like species selection, crop and water management, nutrient management practices, etc.

Primary Biomass Productivity and Sustainability

The approach also makes a distinction between primary and secondary productivity of an ecosystem. Primary productivity of an ecosystem may be defined as the productivity that an ecosystem will have if external inputs were to be withdrawn from it. Secondary productivity is the increment in productivity that results from the use of external inputs. Aggregate productivity is then the sum of primary and secondary productivity. This distinction between primary and secondary productivity is close to the distinction between 'natural stock of capital' and 'human made capital.'

Sustainability is conceptualized here in a meaningful way. It means maintaining or enhancing primary ecosystem productivity or the natural stock of capital. It need not necessarily deny the use of external inputs and the associated increment in productivity, and will allow all such levels and manner of external input use, which would enhance biological cycles and processes within the ecosystem while conserving or enhancing primary productivity. Low External Input Sustainable Agriculture (LEISA) is a good example of such sustainable practices.

Biomass and Livelihood Needs of a Typical Household

The other important linkage of biomass is with livelihood needs. Since most needs can be expressed as biomass needs, and in rural communities, other needs are also met from sale of biomass that is produced or processed; it gives a good way of assessing livelihood needs, including those of sustainability. For example, as a first estimate, we may assess the livelihood requirements (basic needs and the attendant needs of producing for those needs) of a typical small or medium farmer households at 18 Tonnes as follows (see Table 1 below).

Note that sustainability planning needs to include recycling of part of the biomass produced, as a thumb rule one-third of total throughput. All these requirements given in Table 1 are reasonable, are broad upper bounds according to internationally accepted norms and there is ample scope for optimisation. For example, if the cattle herd is rationalised and two households

Use/need	Biomass (dry wt T)
Food and allied needs (cereals, pulses, oil seeds, vegetables, etc.)	2
Firewood	2
Fodder (for one pair of bullocks)	5
Recycled biomass (leaves, brushwood, roots, and other compostable materials)	6
Biomass for cash income (surplus biomass to be sold)	3
Total:	**18**

Table 1: Estimated Biomass Requirements of a Typical Middle Farmer Household

(five members each) share one pair of bullocks, then, there would be biomass saving of 2.5 T in fodder. Switching over to various fuel-efficient devices and methods can save about half the fuel. Different ways of optimisation of biomass requirements can be used to bring down the total requirement and put them to alternative uses. The total biomass requirement is then estimated to come down to about 12 T for a household.

The 100 Household Model

Datye has recently suggested that the concept of *'industrial watersheds'* be tied with several ideas in the context of small hamlets and a model for 100 households in a village be worked out. This is part of his pathway to regenerative eco-economy or ecosystem transformation and moves on two tracks: (a) restructuring the primary production sector (land, water, biomass production) and (b) moving towards dispersed industrial system including energy.

Biomass and Biomass Pools:Their Role in Drought Proofing

The provision of marketable surplus in the form of non-perishables like small timber, bamboo, fibre, oils, or medicinal plants, makes value addition options possible. Marketable surplus in the form of fruits, vegetables or other high value agriculture produce is, very often, perishable in nature and also a prey to market fluctuations. Here the concept of biomass pool has a special role to play in managing drought, and in making optimal use of water resources in an area.

Assured Water and Variable Water

The distinction Datye makes between assured water and variable water too has significant implications for optimal use of water resources in a given area. Dependability and assured nature of water are important issues in the context of livelihoods and drought proofing. The water required for livelihoods should be planned with at least 80% dependability, meaning that atleast in 80% of the years water should be available. The water over and above this is the variable water, which may not be available during all the years and can vary from year to year. In micro watershed development programmes, the issue of dependability has not been taken into account while planning watershed interventions. Similarly in larger irrigation systems the issue of variable water is not considered at all.

There is a need to have somewhat different approaches to water, which make it available with greater assurance than those models which make water available, but with lesser degree of assurance. The assured component of water should be used to provide an equitable basic service for all, and the variable component may be utilised to provide water as an economic service to the enterprising. Unfortunately, either dependability is usually not considered or if it is, it is to provide assured water as an economic service to a few, rather than for wide and equitable access. This is often done under the assumption that if we provide widespread equitable access from assured water there will be very little water left over for the enterprising farmers. However, variable water is not a small component, and is often comparable to the assured component though its availability varies across the years. In fact, it is because basic service is planned at a higher dependability that substantial water is available for use over the years.

Pooling Risks to Reduce Risks: Pooling Biomass

The best way to use the variable water is to use it for perennial tree species especially those that produce bulk biomass. When a seasonal agricultural crop fails due to 'failure of rains' it fails drastically. Perennials, however, simply adjust their growth: when there is less water they grow less, but when there is ample water they grow faster. Trees, so to speak, pool the biomass across the years, never failing drastically in bad years but also taking full advantage of the extra rainfall in the good years. This is an essential element in a drought proofing strategy - pool risks to reduce risks.

One way of pooling water risk over bad and good years is to turn it into biomass and pool that biomass. All the water that is used by us in the form of water is not directly used. Drinking water for humans and animals, water for cooking, washing and cleaning

ourselves, our surroundings and our cattle - all this water must be available as water, and that too as water of adequate quality. But water that is utilised to grow food or fodder is not used as water directly. The extra food that is produced from the extra water available during good years can be stored thereby reducing the need for a corresponding amount of water in bad years. This is what a so-called grain bank (or more broadly a biomass bank) is all about; it pools the extra water received in good years. In fact biomass pools or banks is an important concept in this strategy for a shift to a decentralised agro-industrial society or the regenerative eco-ecology.

Pooling can be done in a similar manner across social sections. The local PDS or a safety net can be built by pooling grain from those who produce more than they need and by providing it to those who produce less at a fair price, or as food for work. PDS today relies too much on the centralised godown system and ignores this base of the pyramid. A true PDS would be one that builds from the ground up: as much of the grain need as possible is handled within the village by pooling across time and across sections, only the residual need has to be transferred upwards.

Thus biomass pools can play two roles: cover risk in bad years by creating buffer stocks of grain, fodder and fuel, so that in bad years water use can be restricted to uses that involve direct use of water and not through biomass: that is, drinking water, domestic water and water for animals. Secondly, in better years, the biomass pools have a positive role to play by providing non-farm employment opportunities.

Biomass Processing, Energy and Income Generation: Going Beyond Subsistence

Thus biomass and its pooling plays a crucial role as a provider of stable and rising non-farm incomes in the strategy for drought proofing. Lack of non-farm occupations is the other side of the coin to dependence on a single rainfed crop. Moreover, agriculture alone cannot ensure sustainable livelihoods for all the rural population and especially resource poor sections of the drought-prone regions. The approach therefore cannot limit itself to sustainable assurance of subsistence alone. It must provide for a transition to a dispersed industrial society based on biomass and local resources of renewable energy along with judicious use of non-renewable energy and external inputs. Industrial development here does not mean the present centralised, energy intensive, profit driven capitalist mode of industrial development based on non-renewable energy and materials; but a biomass-based, dispersed industrial production system tied to social needs based mostly on resources created within the ecosystem. The key resource here is the biomass surplus of the order of 3 to 5 T per family, which represents both an energy and capital stock. Used strategically, along with local sources of energy, materials and local labour, it opens up an alternative path to a dispersed and self-reliant industrial development.

The main characteristics of these technologies are (i) equal performance or function as compared to conventional technology; (ii) cost reduction; (iii) energy saving in a big way and the non-renewable energy consumed directly or indirectly is smaller typically by a factor of 5 or more; (iv) appreciably higher component of local labour and local materials and to generate substantial employment and incomes for the local population; (v) amenability to modular design and components can be fabricated or manufactured in dispersed rural industries or work places and assembled at site; and (vi) provide opportunities for local skill upgradation and development. The new technologies become part of a process of acquisition of skills by the people in a participative manner. The skill upgradation and development that takes place through the extensive use of these technologies would be of immense value in all future developmental efforts, and is an important step on the road to sustainable prosperity. Such alternative technologies are available in most of the infrastructure areas. In the water sector, some of the innovative technology development areas include diversion structures (overflow and non-overflow), storage structures and pipelines.

Livelihood Needs and Water Requirement

The biomass approach also helps quantify water needs. Productivity of water is an important parameter to work out water requirements. In fact this is one of the neglected areas in irrigated agriculture as most of the focus is on land productivity. As we saw earlier the standard farmer household livelihood requirement is 18 T of biomass, though it could be brought down to around 12 T by optimisation and varies for different sections. Studies of biomass stands and rainfed crops in good years show that man managed stands can be expected to have a biomass productivity of 30 kg/ha-mm or 3 kg/cum. So to produce 18 T of biomass, a household should have access to 6000 cum of water use while an additional provision of 400 cum would be adequate for all other direct water needs (200 cum of water to cover at least 500 litres/day for a household and another 500 litres/day for animals).

Thus the total water requirement of a standard farmer family is about 6400 cum.

Exogenous and Local Water

Then the issue is how to meet this water requirement. The conventional irrigation viewpoint would say that this entire water has to be supplied through the reservoir based irrigation system (especially medium and major irrigation projects). On the other hand the protagonists of watershed development and especially 'environmentalists' would say that the water requirement could be met through local watershed development. In fact this is one area of contention and polarisation in the water sector.

A distinction is made here between exogenous water and local water. Exogenous water is that water which is harvested from a larger catchment through medium and major projects and in a way 'exogenous' to the village and micro-watershed. In other words it is water brought from outside and here scale is an important issue. Local water is that water which is harvested locally in the form of watershed development.

Many water balance studies have shown that the exogenous water requirement could be a small proportion of the total water requirement of 6400 cum/ family. For example in a mildly drought prone region with an 80% dependable rainfall of about 500 mm per year the exogenous water component could be as small as about 1000 cum at source. And in a severely drought prone region with a 50% dependable rainfall of less than 500 mm per year the exogenous water component could be around one-third of the requirement.

Exogenous Water Not to Replace but to Supplement Local Water

The use of exogenous water is not ruled out. In fact an exogenous water component, however small that may be, is important to ensure livelihood needs especially with certain assurance and dependability. Apart from the gap in the quantity of water that is available, one should also note that local water systems are much more sensitive to local rainfall variations as water is harvested from a small catchment. However, in the case of larger sources, the water is harvested from a much larger catchment and this advantage of scale takes care of rainfall variability and fluctuations. Thus a small exogenous water component can stabilize the local water regime. Very often in the conventional irrigation system exogenous water completely replaces local water systems, but here the function is to supplement, strengthen and stabilize the local water system and not replace it.

Going Beyond the Sterile,Polarized Discourse of Large vs. Small

Very often the debate or discussion about water resource development revolves around and treats large vs. small as mutually exclusive options. As a consequence some fundamental issues have been left unaddressed.

Most importantly, it is not realised that there now exist technically sound, alternative methods of designing or restructuring large water resource development projects in a way that ensures sustainability and equity. New possibilities have opened up for making development of large water sources compatible with the development of local sources and decentralised and participative management. There are also ways to greatly reduce the concentration of submergence and thus reduce the human and environmental costs of the projects. The failure to recognise these possibilities has been the central gap in the debate around big dams – and reason for the deadlock around projects like Sardar Sarovar on the Narmada.

No Merit In Large Or Small Per Se

There is no merit in the advocacy of large or small projects per se. One can give innumerable examples in the country of smaller systems that are environmentally unsustainable and socially inequitable. There is no doubt that the way large projects are planned and executed today has resulted in many problems while benefits that were promised are nowhere in view. This is also true of small systems - whether they are wells, minor or medium irrigation projects. Experiences show that smaller systems have also been unsustainable, inequitable and exploitative especially in the absence of conscious interventions from people's movements or NGOs. The system tanks of Tamil Nadu are a good example of such integration.

There is a need to go beyond the present-day conventional ideas of big and small projects in order to evolve and internalise a different, innovative and integrated approach if we have to restructure and reform the water sector to make it more sustainable, equitable, decentralised and participative. The proper way is to start with building up local systems while simultaneously starting with restructuring of the larger systems so that they *can serve and feed into* the smaller systems to increase their dependability and extend their service areas.

(*Part II of this article will appear in the next issue of WaterMOVES*)

Pathway for Eco-economy & Ecosystem Transformation

K. R. Datye

The pathway to regenerative eco-economy or ecosystem transformation moves on two tracks: (a) restructuring the primary production sector (land, water, biomass production) and (b) moving towards dispersed industrial system including energy. The goal is to build a regenerative eco-economy and thereby utilize, on priority basis, the potential of local human and natural resources for providing livelihood security to the poor and opportunities for upward mobility for the socially disadvantaged.

The regenerative economy would use minimum of external inputs of electricity, water and energy. As a consequence, neighbourhood communities will become main providers of water, energy and infrastructure services. Energy losses in transmission and transportation will be drastically curtailed. High levels of efficiency of energy use will thus be realised, as compared to the centralised petroleum fuel and coal based industrial system. Neighbourhood communities of users and providers can attain higher levels of factor productivity and efficiency by use of local resources [land, water and renewable energy]. A high rate of growth of well-being can thus be achieved [refer Herman Daly 'GDP growth v/s growth of well-being'].

By taking up development of agro industrial watersheds growth of the rural areas and small towns will be accelerated. There is also added benefit of reducing carbon dioxide emissions, pollution control and arresting land degradation.

The present policy framework and institutional structure for management of public funds is the major barrier to realization of above benefits for the poor and socially disadvantaged.

Policy change would begin with providing concessional credit in lieu of grants. Accountability would thus be built into the system of fund management, when credit concessions are given for a specified purpose. Further, there should be strict enforcement of cost recovery when concessions are given on ecological considerations. Financial institutions should seek assistance of technical and management specialists for performance evaluation as also for capacity building of beneficiaries.

The motivation for the groups of poor would be forthcoming when benefit sharing agreements are in place between the poor and asset holding sections of the society by use of Employment Assistance (EA) on one hand and cost reduction through productivity enhancement, improving quality of service and efficiency of resource use.

There is a possibility of encroachment on the livelihood of the poor, when recovery of credit is enforced strictly according to terms agreed upon. There is also the hazard of the debt trap for small enterprise and small dry land farmers. By availing of advances in technology and extending use of

eco-friendly and employment generating techniques, the benefits of EA can be shared by the small entrepreneurs and resource poor/socially disadvantaged households. The regenerative economy can then compete with the petroleum coal based centralized production system.

In practice, time lags in building capabilities are unavoidable. The benefit sharing agreements cannot be effective till there is a consensus within the community on priority of land use, water allocation and use of EA. It is also a matter of attitudinal change and building enduring institutions for conflict management, enforcing rules regarding benefit sharing. This calls for targeting EA and credit to bring about cost reduction and enhancing the market share of the local produce in the rural, urban and small town market. Management capabilities need to be acquired which takes time. Through performance-based disbursement of EA, the poor can receive advances to meet livelihood needs and get a bonus after production cycle is completed. A public distribution system for food grain relying on local production can ensure food security for poor.

Policy Update

WGP Team

The Punjab Preservation of Sub-Soil Water Ordinance, April 2008

An ordinance has been passed in Punjab for regulating use of sub-soil water for paddy sowing in the state. Farmers have been prohibited from growing nursery of paddy before May 10 and transplanting it before June 15. The provisions of this clause are not applicable to any research project of the PAU, Ludhiana or any research institute, notified by the State Government. The authorised officer or his subordinate, servant or workman has been empowered to enter into the estate of any farmer for the purpose of surveying the area to assess the violation of the provisions of the Ordinance. In case farmers contravene this the nursery of paddy or transplanted paddy can be destroyed at the expenses of the farmer. Additionally, the farmers will be fined a penalty of Rs 10,000 for violating the provisions made in the ordinance. The authorised officer shall make an enquiry, as he may deem necessary and shall give an opportunity of being heard to the concerned farmer. Any farmer, aggrieved by the order of the authorised officer, may within a period of one month, prefer an appeal to the Collector. The penalty and other expenses shall be recoverable as arrears of land revenue. Moreover, the ordinance clearly mentions that no civil court shall have jurisdiction to entertain any suit or proceeding in respect of any matter arising under or connected with this ordinance.

In absence of any law, farmers for several years had been competing with each other to grow early paddy and in the process were utilising more and more of subsoil water to nurse the crop. There are about 10 lakh tube wells in Punjab, which pump sub-soil water primarily to irrigate paddy crop. The PAU had provided scientific data to tell the farmers how early paddy transplantation would hasten the downfall of sub-soil water.

Earlier the Punjab Farmers Commission had recommended that farmers not be allowed to sow paddy nurseries and crop before the dates recommended by PAU experts. The Chairman of the Commission, Dr G.S. Kalkat, had prepared the draft of the Punjab Preservation of Sub-Soil Water Bill in 2006. This move is expected to save 200-mm of groundwater every year.

Common Guidelines for Watershed Development Projects, Government of India, February 2008

The guidelines came up following the setting up of the National Rainfed Area Authority (NRAA) in November 2006 and apply to all new schemes concerned with watershed development of all departments of GoI with effect from April 1, 2008. For interpretation of any of the provisions of the guidelines, the NRAA is the final authority.

The key features of its unified approach are -

i. Delegating powers to the state

ii Dedicated implementing agencies with multi-disciplinary teams

iii. Financial assistance to dedicated institutions

iv. Project duration has been enhanced in the range of 4 to 7 years depending upon the nature of activities spread over three distinct phases viz., preparatory phase, works phase and consolidation phase.

v Livelihood orientation

vi. Cluster approach: envisages a broader vision of geo-hydrological units normally of average size of 1000 to 5000 hectares comprising of clusters of micro-watersheds.

vii. Scientific planning

viii. Capacity building

ix. Multi-tier approach

The guiding principles include equity and gender sensitivity; decentralization; competent organizations as facilitating agencies, centrality of community participation; capacity building and strong technology inputs like GIS/RS to strengthen programme management; monitoring, evaluation and learning; and organizational restructuring. The guideline recommends the creation of a national portal (National Data Center) to be commissioned and maintained by NRAA to host the data generated for all watershed projects in the entire country.

Institutional Arrangements at National Level

The NRAA would, inter-alia be responsible for:

i. Supporting the process of preparing strategic plans for watershed based development projects at the state and district level keeping in view specific agroclimatic and socio-economic conditions.

ii. Assisting in the preparation of state specific technical manuals for the multidisciplinary and integrated approach required for implementation of these projects together with the standards and specifications etc.

iii. Supporting State Level Nodal Agencies in identifying resource organizations and establishing capacity building arrangements.

iv. Facilitating action research relevant to watershed development programme in different agro-climatic regions.

v. Conducting studies, evaluation and impact assessment from time to time so that the benefits of these are available for improving the quality of watershed management projects.

vi. Facilitating convergence of different schemes and projects of Government of India, which are having similar objectives.

vii. Accessing additional funds from other sources including private sector, foreign funding agencies, etc and facilitating their use to fill up critical gaps in the programme as well as upscaling successful experiences through innovative organizations at field levels.

viii. Acting as an effective coordinating mechanism between all bodies/ organizations/ agencies/ departments/ ministries etc who are involved in watershed programmes.

ix. Organizing regional and international conferences, seminars and workshops, study tours, and information sharing.

x. Providing technical knowledge inputs and expertise.

xi. Such other activities as may be decided by the governing body of NRAA / Government from time to time.

The guidelines give freedom at the Ministry level to set up the institutional arrangement, though a nodal agency has been suggested to facilitate allocation of budgetary outlay among States as also to interact with State and District Level agencies amongst other responsibilities.

Institutional Arrangements at the State Level

A dedicated State Level Nodal Agency (SLNA) will be constituted which will sign an MoU with the Departmental Nodal Agency (central level) to set out mutual expectations with regard to performance, timelines and financial parameters including conditions related to release of funds to SLNA. The SLNA will be required to review the programme and provide enabling mechanism to set up the State Data Cell and ensure regular reporting to the Central Government/ Nodal Agency at the central level in the Department. There would be a multi-disciplinary professional support team (of 7-10 professionals) at the State level to implement the programme. The Development Commissioner / Additional Chief Secretary / Agricultural Production Commissioner/ Principal Secretary of the concerned department or their equivalent nominated by the State Government will be the Chairperson of the SLNA. The State Level Nodal Agency will have a full-time CEO who may be a serving Government officer on deputation or appointed on a contract. The SLNA would consist of one representative from the NRAA, one representative from the Central Nodal Ministry, one representative from NABARD, one representative each from the State Departments of Rural Development, Agriculture, Animal Husbandry and allied sector, one representative from Ground Water Board, one representative from an eminent voluntary organization and two professional experts from research institutes / academia of the state. There will be representation from NREGA, BRGF and other related implementing agencies at

the state level. The SLNA will sanction watershed projects for the State on the basis of approved state perspective and strategic plan as per procedure in vogue and oversee all watershed projects in the state within parameters set out in these Guidelines. The functions of the SLNA have been clearly delineated in the guidelines.

Institutional Arrangements at the District Level

In districts, where the area under watershed development projects is about 25,000 hectare, a separate dedicated unit, called the District Watershed Development Unit (DWDU) will be established at the district level, which will oversee the implementation of watershed programmes in the area and will have separate independent accounts for this purpose. When area of watershed projects within the district is below 25,000 one officer shall be exclusively appointed within the DRDA either on contract or on deputation. DWDU will function in close co-ordination with the District Planning Committee. DWDU will be a separate unit with full time Project Manager and three to four subject matter specialists on Agriculture/ Water Management / Social Mobilisation/ Management & Accounts.

The functions of DWDU will be as follows:

i. Identify potential Project Implementing Agencies (PIAs) in consultation with SLNA as per the empanelment process as decided by the respective state governments.

ii. Take up overall responsibility of facilitating the preparation of strategic and annual action plans for watershed development projects in respective districts.

iii. Providing professional technical support to Project Implementing Agencies (PIAs) in planning and execution of watershed development projects.

iv. Develop action plans for capacity building, with close involvement of resource organizations to execute the capacity building action plans.

v. Carry out regular monitoring, evaluation and learning.

vi. Ensure smooth flow of funds to watershed development projects.

vii. Ensure timely submission of required documents to SLNA / Nodal Agency of the Department at central level.

viii. Facilitate co-ordination with relevant programmes of agriculture, horticulture, rural development, animal husbandry, etc with watershed development projects for enhancement of productivity and livelihoods.

ix. Integrate watershed development projects/ plans into District Plans of the district planning committees. All expenditure of watershed projects would be reflected in district plans.

x. Establish and maintain District Level Data Cell and link it to the State and National Level Data Centres.

Role of PRIs at District and Intermediate Levels

DWDU will facilitate the DPC in providing oversight while ensuring regular monitoring and evaluation of the programme. The District Panchayat/ Zilla Parishad will have an important role of governance in matters relating to the coordination of various sectoral schemes with watershed development projects, review of progress, settling disputes etc. Where the Panchayat system is not in operation, the DWDU/District Autonomous Councils will play this role. Intermediate Panchayats have an important role in planning the watershed development projects at the intermediate level. They can also provide valuable support to PIAs and Gram Panchayats/ Watershed Committee

Institutional Arrangements at Project Level

PIAs will be constituted at this level and may include relevant line departments, autonomous organizations under State/ Central Governments, Government Institutes/ Research bodies, Intermediate Panchayats, Voluntary Organizations (VOs). Selected PIAs will sign a contract/ MOU with the concerned DWDUs/ District Level Committee which will spell out well-defined annual outcomes, against which performance of each PIA will be monitored each year and evaluated on a regular basis by institutional evaluators from a panel approved by the SLNA / Departmental Nodal Agency at the central level. Each PIA must put in position a dedicated watershed development team (WDT) with the approval of DWDU. The WDT will guide the Watershed Committee (WC) in the formulation of the watershed action plan. The gram sabha will constitute the WC (which has to be registered under societies act) to implement the watershed project with the technical support of the WDT in the village. The WC will in turn constitute SHGs and User Groups in the watershed area. The gram sabha will elect or appoint the Chairman and Secretary of the WC; the latter will be a paid functionary of the WC. A member of the WDT shall also be represented in the WC. Where the panchayat covers more than one village they would constitute a separate subcommittee for each village to manage the watershed development project in the concerned village. Where a watershed

project covers more than one Gram Panchayat, separate committees will be constituted for each Gram Panchayat.

The Secretary will be responsible for:

i. Convening meetings of the Gram Sabha, Gram Panchayat and Watershed Committee for facilitating the decision-making processes in the context of Watershed Development Project.

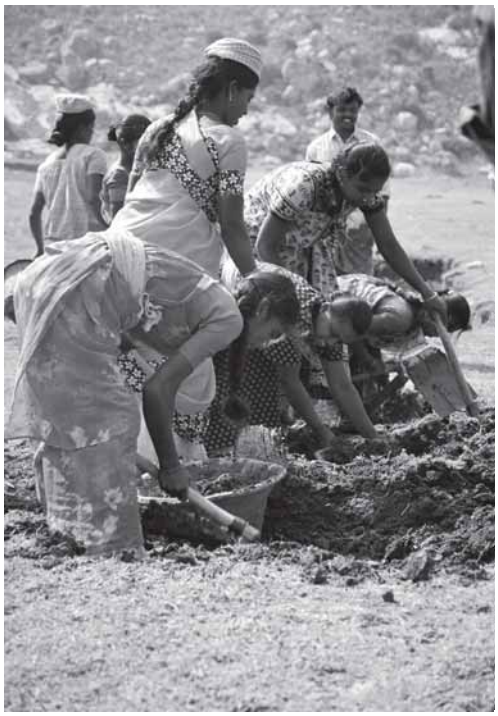
ii. Taking follow up action on all decisions.

iii. Maintaining all the records of project activities and proceedings of the meetings of Gram Panchayat, Watershed Committee (WC) and other institutions for Watershed Development Project.

iv. Ensuring payments and other financial transactions.

v. Signing the cheques jointly with the WDT nominee on behalf of the Watershed Committee.

The guidelines lay the criteria for selection of watersheds. The major activities of the project will be sequenced into (a) preparatory (b) works and (c) consolidation and withdrawal phase. DPR preparation has been given a crucial emphasis in the guidelines.



Federations could be formed at the level of a cluster of villages in order to support economic activities at scale. These would further strengthen and activate the linkages established with external resource agencies for knowledge, credit, input procurement, sale of local produce, carrying on processing activities to the point of exports. In these activities, bankability of activities will be attempted. At the same time, local-level institutions are expected to reach maturity and exit protocols become operative for the PIA. The Watershed Committees (WCs) may use the Watershed Development Fund for repair and maintenance of structures created in Phase II.

NRAA will collaborate with various resource organizations for developing national level as well as state specific capacity building strategies. The key components of the capacity building strategy are the following:

i. Dedicated and decentralised institutional support and delivery mechanism

ii. Annual Action Plan for Capacity Building

iii. Pool of resource persons

iv. Well prepared training modules and reading materials

v. Mechanism for effective monitoring and follow-up.

The expected outcome of each watershed development project has been laid out in the guidelines as :

i. All the works/activities that are planned for the treatment and development of the drainage lines, arable and non-arable lands in the watershed area are completed with the active participation and contribution of the user groups and the community at large.

ii. The user groups/panchayats have willingly taken over the operation and maintenance of the assets created and made suitable administrative and financial arrangements for their maintenance and further development.

iii. All the members of the Watershed Committee and staff such as Watershed Secretary and Volunteers have been given orientation and training to improve their knowledge and upgrade technical/management and community organisational skills to a level that is appropriate for the successful discharge of their responsibilities on withdrawal of the Watershed Development Team from the Project.

iv. The village community would be organised into several, homogeneous self-help groups for savings and other income generation activities, which would have achieved sufficient commitment from their members and built up financial resources to be self-sustaining.

v. The increase in cropping intensity and agricultural productivity reflecting in overall increase in agriculture production.

vi. Increase in income of farmers/ landless labourers in the project area.

vii. Increase in groundwater table due to enhanced recharge by watershed interventions.

Hydropower Policy, Ministry of Power, GoI, January 2008

Comment: *The new hydropower policy approved by the Union Cabinet in January 2008 is inspired by the need to provide a number of incentives to the private sector players in order to induce larger private investments. The dispensation formerly applicable to only the public sector has been extended to private players now. At the same time, special incentives by way of merchant sales linked to speedy commissioning of projects have been provided. The introduction of the problematic cost-plus approach will lead to greater costs being passed on to consumers thus making power unaffordable for the poorer sections. Just how the objective of harnessing profits for expeditious development of hydropotential will be consistent with the requirements of drinking water, irrigation and resettlement and rehabilitation of the project affected families is unclear.*

The main features of the new policy guidelines are:

- The existing dispensation available to the public sector under the National Tariff Policy, 2006, regarding exemption from tariff based bidding up to January 2011, has been extended to private sector hydroelectric projects, which obtain CEA's (Central Electricity Authority) concurrence, sign PPAs with distribution licensees and achieve financial closure before January 2011. This has been done to overcome high risks and uncertainties involved in construction of hydropower projects.
- The State Governments would be required to follow a transparent procedure for awarding potential sites to the private sector. The selection criterion has been outlined in the policy. The concerned private developer would be required to follow the existing procedure such as getting the DPR prepared, obtaining concurrence of CEA/state government, obtaining environment, forest and other statutory clearances, as well as approaching the appropriate regulator. As provided under the existing guidelines, it would be obligatory for the developer to go through an International Competitive Bidding (ICB) process for award of contract for supply of equipment and construction of the project either through a turnkey contract or through a few well-defined packages.
- The tariff of the project would be decided by the appropriate Regulatory Commission. To this extent, the Tariff Policy notified in January 2006 is modified and the developer would be required to enter into long term PPAs with distribution companies. While determining tariffs, the appropriate regulatory commission shall not allow, as a part of the project cost, the expenditure incurred or committed to be incurred by the project developer for getting the site allotted to him. The dispensation accorded under the Hydro Policy of 1998, regarding 12% free power to be provided to the host state government, will, however, be supplemented by an additional 1% for a Local Area Development fund. Any free power beyond 13% would be met by the developers from their own resources and would not be a pass-through in tariff.

- A project developer wishing to avail of this dispensation must reach the specific milestones - concurrence by CEA/ states and all clearances, financial closure and award of work by January 2011, and completion of the project within 4 years thereafter. Any extension to the deadline of January 2011, if made applicable to the CPSUs under the tariff policy, shall be applicable for the aforesaid purposes to such private hydro projects also. Large storage (mega) projects

and run-of-the-river projects of capacity above 500 MW could be given suitable increase with respect to construction time. This time schedule would be determined by the appropriate regulator and must be obtained before commencement of the construction. Independent third party verification would be done regarding adherence to the agreed timelines.

- In order to enable the project developer to recover costs incurred in obtaining the project site, it would be allowed a special incentive by way of merchant sales of up to a maximum of 40 % of the saleable energy. Projects that do not conform to the prescribed time lines would however lose this incentive of merchant sales in a graded manner. With a view to ensure timely completion of these projects, delays of every six months in the commissioning date would result in reduction of merchant sales by 5%. This condition would be operationalised by the appropriate regulator duly apportioning the Annual Fixed Charge accordingly.
- The same policy guidelines would be applicable to projects above 100 MW capacity, which have already been allocated by various states to the private developers provided such allocations have been made in a transparent manner and on a basis of pre-determined set of criteria.
- For a period of 10 years from the date of commissioning of the project, 100 units of electricity per month would be provided by the project developer to each Project Affected Family (PAF) through the relevant distribution company. It is expected that the PAF will consume at least the minimum lifeline consumption of one unit per day and the cost of balance unused electricity, if any, could be made available to PAF in cash or kind or a combination of both, at rates to be determined by the State Electricity Regulatory Commission.

Training cum Consultation: Use of Hydrological Modeling at the Sub-basin Level

Madanapalle; February 2008

A two day training cum interactive session on **'Use of Hydrological Modeling at the Sub-basin Level'** was conducted by SPWD in collaboration with Krushi Samstha in Madanapalle, Andhra Pradesh on the 23rd and 24th of February, 2008.

This meeting comprised of members from civil society and organisations working on water governance issues in the state with the motive of discussing hydrological modeling, as well as seeking feedback and training trainers in the hydrological model being used for the WGP project. Representatives of FES, Madanapally; APFAGMS, Hyderabad; CWS, Hyderabad; AMEF, Madanapally and SAHAYOGA, Bengaluru made presentations on their respective project planning and implementation experiences in watershed management within the state while also putting forth hydrological models that had been considered by them.

Hardeep Singh and Amita Bhaduri of SPWD conducted training sessions on the various hydrological models that had been considered before the selection of the 'Critical Rainfall Model' which is based on a modification of the Haan's model by K.R. Datye.

The presentations made at the training cum consultation on the use of hydrological modeling at the sub-basin level were :

- Groundwater Modeling by Ramamohan, Center for World Solidarity (CWS), Hyderabad
- Papagni River Uplands Project by Diwakar Reddy and Johnson Toppo, Foundation for Ecological Security (FES), Madanapalle
- Knowledge Sharing Discussion on Model of Farming by M.C.V. Prasad, President of Madanapalle Farmers Association, Madanapalle
- Experiences related to PIM in Karnataka by Dr. B.S. Bhawani Shankar, SAHAYOGA, Bengaluru, Karnataka
- Community Groundwater Management under APFAMGS Project, by S.A.Hirudia Raj APFAMGS
- Knowledge sharing discussion on Soil Moisture Conservation by Gangi Reddy, Chaitanya, Anantapur
- Promoting Livelihood Improvements in Dryland Farming on the Deccan Plateau by Ram Prasad, AMEF, Madanapalle

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We look forward to your feedback and in case of wanting to subscribe/unsubscribe, do write in to us at **info@watergovernanceindia.org; wgp_spwd@yahoo.com**

Society for Promotion of Wastelands Development
14-A, Vishnu Digamber Marg
New Delhi - 110002, INDIA

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3087, 2nd Floor Sangtrashan,
Paharganj, New Delhi - 110055, INDIA

Editorial Team: Hardeep Singh
Amita Bhaduri
Surya Prakash Rai
Alisha Vasudev

Editorial Advisor: Rajesh Ramakrishnan

Photographs: Surya Prakash Rai
Alisha Vasudev

Design and Layout: Alisha Vasudev