

VIII. WATER STRATEGIES FOR CHHATTISGARH

In this chapter, we examine the various policy alternatives before the government of the newly formed state of Chhattisgarh in 2000. Before we discuss the government's water policy for drought proofing, we discuss the suggestions and demands that have emerged from policy makers, farmers, agricultural scientists, economists and NGOs in the past. We find that Chhattisgarh has had a well-enunciation state-led approach, which offers an effective strategy for the water resources sector.

8.1 Interventions Suggested By Experts And Farmers

Agricultural scientists and watershed experts, both at the Indira Gandhi Krishi Vishwavidyalaya, Raipur, and from farmers' organizations and NGOs have made several recommendations. These reports have suggested location-specific interventions after taking into account the differences in topology and terrain across the state, and the accompanying differences in soil texture and moisture retention, etc. Based on all these considerations and after identifying the problem, an appropriate cropping regime, including fertilizers to be used, has been drawn up.

The problems associated with cultivation in banded and unbanded fields, in different soil types, in each of the three ecological zones in the state (namely the central plains, Bastar plateau and the northern hill zone) have been identified. The problems cover those arising from soil chemistry and its texture, and their implications for soil moisture, and hence for crops grown and tendency for weed growth. Based on these the suitability of different soil types for agriculture has been assessed, and an appropriate mix of crops has been suggested (see Table 8.1). The crops may be agricultural crops – like rice, maize, wheat, pulses, oilseeds – in some areas, or those grown for fodder, or vegetation, or horticulture in others. The viability of fish farming in rice fields has also been looked into. Measures such as the manner of sowing of crops in the fields, ways to collect and re-cycle rainwater, varieties of rice that can be sown, appropriate time for sowing of certain crops, schedule of application of weedicides, etc, have been suggested. Areas that warrant either further improvements, or research, or different mechanical inputs (such as implements for sowing) have also been identified.

8.2 Integration Of Conservation And Irrigation Towards Equity, Sustainability And Growth

All sites for water storage and harvesting are "nature's gift and national assets and must be used with utmost care and planning...the life of a reservoir depends on the annual rate of deposit of silt in the basin. Thus it follows that greater the annual deposit of silt, the shorter the life of a reservoir. Reservoir silting is a colossal problem. What is astonishing is that, while planning the development of our water resources at the current pace, we have been ignoring the saddest limitation of our reservoirs in the matter of siltation of their basins. In the short-range impact it may happen that the rate of silting may be so rapid and the service value of the reservoir is rendered so small, as to amortise the cost of development. In the long run we will have a lost a reservoir site for all times and with it all the benefits enjoyed. A reservoir site is not like a site for a dwelling that can be used over and over again. Eventually every reservoir, every tank, every water harvesting structure, no matter how big or small, loses its capacity, but depending upon the competence of its watershed to arrest silt, we must try to get the maximum service life out of it. Unfortunately, however, the rate of silting in most of our reservoirs is much higher than that estimated in the project. The biggest factor responsible for the increased inflow of silt in the

reservoir is the large-scale deforestation in the catchment areas and consequent soil erosion.”⁶⁸ Therefore, soil moisture conservation; arresting soil erosion and protection of forests are part and parcel of the recommendation made by almost every observer. The spread of irrigation requires increasing the water harvesting capabilities of our watersheds through reversing and arresting ecological degradation.

8.3 Focus On Micro And Minor Irrigation

Shankar Guha Niyogi⁶⁹ emphasized the greater relevance of micro-and minor irrigation projects in the undulating tribal areas. While creating large storages with high dams, about one million hectares of forest and almost equal acreage of cultivated lands have been lost, and over two million people ousted from their homes. The canal system has irrigated fields at a slow pace, and with damaging environment consequences. Major dams take nearly ten years for completion and another ten years to fully utilize the created potential. A poor country like India can ill afford to lock up such large sums of money for a long period.

Some measures suggested are as follows:

- i) No new projects involving big dam construction and storage above 0.10 MAF should be sanctioned at least till full installation and utilization of medium and minor irrigation capacity.
- ii) “There should be major rescheduling of development of water resources. All unexploited major storage sites should be reserved for coming generations under a definite plan of phasing. Only those sites be harnessed which cater to the needs of arid and semi-arid areas.”⁷⁰
- iii) Dry farming technology should be adopted on a big scale.
- iv) Preservation of existing forest be done with more strict laws, electronic sensing device should be installed and entry of vehicles, bullock cart, livestock should be controlled through beacon relay system.
- v) Adopting a mix of strategies for proper management and maintenance of existing dams and canals⁷¹.
 - a. Modernizing existing dams and canals.
 - b. Implementing watershed management schemes to check erosion and consequent silting.
 - c. Canal lining and proper drainage.

⁶⁸ RC Deo, **Civilization in a Hurry**

⁶⁹ Shankar Guha Niyogi, Sangharsh Aur Nirmaan, Rajkamal, New Delhi

⁷⁰ RC Deo

⁷¹ RC Deo

- d. Implementing scientific command area development with main emphasis on water management.
- e. Conjunctive use of canal and ground water.
- f. Introducing sprinkler irrigation techniques.
- vi) We should recognize the fact that the real slack lies in the 75 per cent of farm land which is still unirrigated. This rural India, devoid of the impact of state-supported agriculture, contributes shockingly low agricultural yields year after year. Here, there is still unlimited scope for development-innovations of various kinds that are within the reach of crores of peasant-farmers and small holders⁷². For a small landholder, the rain that directly falls on his field as well as in the adjacent areas is of immense value. He looks at the rain and helplessly watches it 'going down the drain'. Here in lies an opportunity to promote localization and decentralization of an important development activity i.e., small-scale water development. This may broadly be defined as rain water harvesting or runoff agriculture with conjunctive use of ground water⁷³.
- vii) In the adoption of any particular small-scale water technology, due consideration should be given to unique local conditions. While NGOs see the small scale techniques as complete solutions in themselves, others argue that "small-scale technologies should be taken only as supplement and not as substitute to conventional irrigation works."
- viii) Small-scale water technology promises to give 90 per cent employment results against the expenditure incurred on such projects⁷⁴. Thus the much-needed employment opportunities in the rural areas can be increased manifold. Their massive implementation can quickly transform the rural economy of large parts of the country. Our system of democratic planning can provide for active participation of the people in these ventures. The future of the country depends on where, how and in what measure we get this co-operation⁷⁵.
- ix) The undulating terrain of Chhattisgarh and the high proportion of area under uplands and fallows in the midlands fundamentally require multipurpose projects with energized extraction of water⁷⁶.
- x) Water for irrigation must receive subsidy till such time that food insecurity and livelihood shortfalls are addressed in part by higher productivity. The state must continue to determine policy tariff.

⁷² Niyogi, *ibid*

⁷³ RC Deo, *op cit*

⁷⁴ Niyogi, *ibid*

⁷⁵ Rc Deo, *ibid*

⁷⁶ This and the following demands are from the Chhattisgarh Kisan Union's Charter of Demands

- xi) The state must continue the financing of water resources projects since, in any case, the private sector uses state/public sector banking to finance its investments.
- xii) *Panchayati Raj* institutions and municipalities must be designated the institutions vested with the ownership of common property resources at the local level, with full accountability to the *gram sabha*. Water users associations must be accountable and led by elected local bodies.
- xiii) Water resources development must be integrated with land use planning and agricultural development for reducing drought vulnerability.

Thus, we see that, from time to time, well-informed suggestions and recommendations on water resources development have emanated from several quarters. These include government agencies, universities and concerned individuals. For instances: more than two decades ago, in 1972, the Irrigation Commission reported the demand for minor irrigation in eastern Madhya Pradesh (now Chhattisgarh).

“Wherever we went in the State, there was a demand for minor irrigation schemes, arising possibly because of the delay in the execution of major and medium projects. There was also a demand for the construction of small diversion works across streams to irrigate up to 40 hectares, and for action to maintain and repair tanks, which exist in very large numbers, but which, through lack of maintenance and repair, are going out of use. We would recommend that the repair and maintenance of tanks should be given very high priority particularly in areas where almost the entire irrigation is through wells and small tanks...In Bastar district also, where there is little scope for big project and where a small population is thinly spread over a large area, minor irrigation worse, particularly, small tanks, have the greatest utility.”⁷⁷

In the following (Table 8.1), we summarize the location-specific solutions offered by the IGKVV.

⁷⁷ *Report of the Irrigation Commission*, 1972, Ministry of Irrigation and Power, New Delhi, pp216

Table 8.1 Location Specific Problems and Solutions in Agro-climatic Zones of Chhattisgarh

	Farming situation	Problem identified	Intervention
A	CHHATTISGARH PLAINS ZONE		
1	<i>Bhata</i> soils	Soils are gravely with low water holding capacity and acidic in nature. Farmers are either keeping fallow or growing crops like sesamum etc. With the increase in population pressure these soils are being converted to rice fields by bunding.	Recommendations were made for agroforestry and fruit trees in upper, fodder in middle and arabie crops like urid in the lower parts. This will reduce soil erosion. Agroforestry, agro pastoral and horti-silvi-pasture systems must be undertaken.
2	Unbunded Black soils	Due to poor drainage and fertility status of the soil, in existing cropping sequence one crop is taken either in <i>kharif</i> (<i>Kodo-Kutki</i>) or in <i>rabi</i> (gram, linseed, coriander etc). The mixed cropping of small millets with arhar blackgram etc is also practiced.	Work on improving drainage and development of pest and disease resistant high yielding varieties of soybean, gram, pigeonpea and linseed needs to be strengthened. Intensive study on judicious use of harvested water in farm ponds is required. The work on reducing the percolation losses in tanks is also needed. The irrigation cum fish tank technology requires to be perfected.
		Under direct sown rainfed rice conditions, wild rice is a problem.	Purple colour leaf variety “Shyamala” has been released which facilitates in identifying wild rice in early stage and can easily be weeded out. In purple colour rice variety, gall midge and BLB resistance with high photosynthetic activity is required. Thus work is to be initiated for incorporating these characters.
		Direct sown rice, followed by <i>biasi</i> operation is responsible for low productivity (1t/ha). Weeds during seedling phase coupled with poor plant population after <i>biasi</i> are the major causes for reduction in yield.	Weedicide application is very technical and some times due to insufficient moisture in the field, the weedicide is not effective. At the time of pre emergence spray of seedicide, in some areas even drinking water is a problem and therefore, effective granular formulations of weedicide are needed to avoid requirement of water. Studies on these aspects need to be carried out.
			Improved <i>biasi</i> technology through which the problem of lower plant population can be overcome. Suitable weeding implements are also required to be designed, fabricated and demonstrated. Seeds drill also need improvement for seeding under excess moisture conditions.

	Farming situation	Problem identified	Intervention
			Possibility of rainfed transplanting should be evaluated on farmers' fields and critical comparison of broadcast v/s transplanting under rainfed conditions should be made.
3	Bunded rice fields (rainfed)	Breeding and identification of rice varieties for different soils and growing situations	The important strategy to stabilize the production is to select varieties of appropriate duration based on moisture availability period and line sowing technology to avoid <i>biasi</i> operation and facilitate manual/mechanical weeding. Since large area is covered under direct seeding, multiple resistant good grained varieties of different durations are to be evolved. There is also a need to evolve resistant purple coloured varieties for karga (Wild rice) eradication since shyamala is susceptible to gall midge and other pests and diseases.
		Water stress during different crop growth stages, particularly during reproductive state (terminal drought) is one of the main reasons of wide fluctuations in production and productivity of rice in different years. In light soils the terminal drought, some times, results in total failure of the crop.	To overcome this, farm pond technology has been developed through which not only protective irrigation to rice can be given but also irrigation to establish the crop during <i>rabi</i> . These tanks can also be used for fish culture. Percolation is a major problem in storing the water in ponds and adoption of technology. Therefore, there is need to develop a suitable technology of minimizing the percolation losses. Also study on optimization of pond size for different size holdings is to be worked out. Suitable package for increasing the productivity of fish under different depths and durations of water availability is to be developed.
4	<i>Utera</i>	<i>Utera</i> system of cultivation is very popular but the productivity of <i>utera</i> is very low. Also, lathyrus cover 6 lakh hectares and is harmful.	Low toxin containing lathyrus varieties have been identified. However, new lines are extremely susceptible to trips. Low ODAP containing high yielding lathyrus varieties resistant to under thrips under <i>utera</i> are required. Intensive breeding efforts are required.

	Farming situation	Problem identified	Intervention
			Gram is identified as substitute for lathyrus in <i>utera</i> for better productivity and economical return. If rice varieties of suitable duration are grown and proper field preparation is made, gram or linseed can be grown as sown crop since normally there is adequate moisture in the profile at the time of rice harvest. Agronomy for getting higher productions and optimum plant population under <i>utera</i> system is required. There is a need to develop suitable cultural practices for taking <i>rabi</i> crops after rice, especially preparing good seed bed after rice.
	Rice bunds	About 8-10% of the cultivated area of rice comes under the huge bunds. The new bunds are used for a year or two for growing various upland crops. However, thereafter the bunds are left fallow/unused.	Pigeon pea is identified as one of the best crops which can be grown on old bunds. These bunds can also be utilized for growing fodder for animals, sudan grass and hybrid sorghum performed better as compared to other grasses. Efforts are needed to increase the productivity through agronomical practices for proper utilization of moisture and nutrients. There is also a need to breed suitable pest resistant varieties of pigeon pea capable of taking advantage of border effect.
B	BASTAR PLATEAU		
1	<i>Marhan</i>	<p>i) The productivity of crops like rice, kodo-kutki and other small millets are very low due to several factors particularly, lack of improved varieties use of poor seed. Poor soil physical conditions and non use of inputs.</p> <p>ii) Recommended for utilization of upland are required.</p>	<p>Though comparatively high yielding varieties have been identified, the seed of these varieties are not available. There is also need to identify more remunerative alternate crops to diversify agriculture.</p> <p>Agroforestry agro-horticulture and Silvipastoral systems are recognized as viable alternatives to poor upland crops like small millets and horse gram (<i>kulthi</i>). The work on rain water management and watershed management.</p>
2	<i>Tikra</i>	i) Soil fertility is low associated with acidic problem	<p>It is necessary to optimize different crop combinations as per the live stock and other resources of the farmers.</p> <p>Crop and crop varieties suitable for acidic soils with drought tolerance need to be identified, since soil amendments are not economically viable option.</p>

	Farming situation	Problem identified	Intervention
3	Mal	1) Low productivity of rice due to pests and diseases, weeds and water stress problems	
		2) Monocropping is the predominant cropping intensity is very low	
			Farm pond technology to collect and recycle run-off water is recommended to mitigate water stress conditions in rice and to enable the establishment of second crop in <i>rabi</i>
			Line sowing in rice with full package is recommended for control of weeds in rice and for improving plant population. Suitable irrigation cum fish pond technology is required. Studies are also required to reduce the water losses and efficient utilization of stored water. For implementation of line sowing package, suitable bullock drawn implements need to be tested and demonstrated. Intensive research/extension efforts are required to increase the area under double cropping. The rainfall is adequate to support two crops in specified areas provided varieties of appropriate durations are selected and appropriate cultivation method is followed.
4	Gabhar	Water logging conditions limit the productivity	1) Rice varieties like Kranti, Mahamaya, Madhuri for shallow water and Mahsuri for medium water submergence have been recommended. Rice cum fish culture technology has been recommended for medium and deep submergence. Possibilities of double cropping need to be examined based on the experimental evaluation of suitable crops and varieties. (a) A fool-proof package for rice cum fish culture is to be developed (b) Crop management practices under medium and deep submergence are to be evolved.

	Farming situation	Problem identified	Intervention
5	Mixed Farming	Integrated approach is required depending on land holding and financial capacity.	Technologies for field crops, horticultural crops and trees and fish farming have been generated, however, integrated approach of mixed farming including crops, fodder, animal, poultry, piggery and fish are to be initiated. 1) Optimum farm holding based mixed farming models need to be developed 2) The poultry and piggery requirement of tribal population is different. There is a need to develop varieties suiting to the requirement and taste of tribal population.
C	NORTHERN HILLS ZONE:		
	Hilly Area	Soil erosion is the major problem in these soils	Different agro-forestry models have been developed to overcome the problem of soil erosion and provide sustainable source of income. Agro-forestry also helps in improving the physical structure of soil. Intensive efforts are required to transfer this technology on farmers' fields and also to identify suitable tree species and crops/varieties.
		Traditionally niger and kulthi are grown with low productivity of niher is about 1.5 q/ha. The farmers do not use any fertilizers.	Improved varieties of <i>niger</i> . Suitably crops with higher economic returns than <i>niger</i> need to be identified
			There is considerable naturally occurring variation in <i>kulthi</i> and <i>niger</i> in the area, since there is no organized seed replacement programme and the farmers are still using their own seed. There is a need to collect and evaluate the variability, before it is lost.
		The productivity of small millets like <i>kodo</i> , <i>sawan</i> and <i>kutki</i> is very poor. The farmers are using their own seed/varieties. The use of inputs like fertilizer is low. The soils are eroded, acidic and poor in fertility.	Improved varieties of small millets have been identified. However, due to lack of organized seed production programme, these varieties are not adapted.
		Niger and <i>kulthi</i> are also important. The growth and yield of these crops are very poor.	Varieties better yielding than locals have been identified. The application of even small doses of NPK have been found to bring about marked improvement in productivity.

	Farming situation	Problem identified	Intervention
		Rice is not economical under this situation because of poor yield, resulting from moisture stress due to high percolation losses and low water retention capacity.	Medium/early maturing pigeon pea varieties are to be identified having tolerance to borer complex. Newly released early maturing rice varieties are required to be tried. The early varieties in advanced generations can also be tried.
		Farmers grow maize in <i>Baris</i> as a pure crop and depending upon the availability of moisture. They go in for mustard after maize. However, yield of both the crops is very poor due to use of local varieties and non use of inputs	Maize followed by improved variety of <i>Toria</i> is remunerative crop rotation. <i>Arhar</i> + ground nut is found to be the profitable intercropping system. There is a need to identify high yielding maize varieties similar in duration to local maize. If required, improvement of local maize may be taken-up by following appropriate population improvement method. Intensive efforts, in evolving suitable maize based sequence/inter cropping technology should be made.
2	Upland unbunded	The farmers do not practice intercropping, so that the cropping intensity and returns could be increased.	
		Infestation of Aphids is the limiting factor in Rapeseed/ <i>Toria</i>	Suitable insecticides and their schedule of application for the control of aphids should be applied.
		Wilt is widely prevalent causing considerable loss in yield of pigeon pea. Pod bug is the most serious pest causing upto 50% damage to this crop.	Crop rotation most effective in controlling the wilt disease. Chemical control measures against pod bug are available. However the poor tribal farmers do not use pesticides. Wilt resistant pigeon pea varieties should be identified. The biology and alternate hosts of pod bug should be studied so as to understand the weak period in the life cycle of the pest. Pigeon pea is not available from March to July. The pests must be surviving on some alternate host, however, it is not known, the identification of alternate host can be helpful in controlling this pest.
		Nematode is prohibiting the cultivation of Tomato/Brinjal/Chilli/Vegetables	It could not be controlled chemically. However, crop rotation helps in minimizing the incidence considerably. Plant Pathological studies in vegetable crops should be intensified

	Farming situation	Problem identified	Intervention
		Incidence of early blight of potato is a serious problem.	Amongst the different fungicides tested, Dithane M-45 @ 2.5kg/ha was found most effective in controlling this disease. Blight is problem of this area. As potato has a great potential in both <i>kharif</i> (on Pats) and <i>rabi</i> seasons, the horticultural research on vegetables in general and potato in particular needs to be strengthened. The Pats can be a good source of potato seeds for plains. The technology of seed production during <i>kharif</i> on pats required to standardized.
		In case of Mango Gall maker, sooty mould and gummosis were observed to be serious problem.	
3	Upland unbunded	Mono cropping of rice is the predominant cropping system. Only in a very limited area, where irrigation facilities exist, wheat is grown by broadcasting method after rice. These soils although better than unbunded upland are poor in moisture holding capacity and fertility.	Rice varieties of suitable duration matching to moisture availability period should be identified and recommended. There is need to evolve/identify early varieties of rice with good grain and resistance/gall midge etc. the weed competition is a serious problems and the varieties with good initial vigour are needed.
		Wherever irrigation facilities exist, wheat is grown after rice. Generally the sowing of wheat is delayed due to prevalence of long duration rice varieties and the method of wheat sowing is defective.	Last week of October was found to be the optimum sowing time for tall wheat. Improved tall varieties like c-306 and sujata are still popular. Drilling method of seeding was found to be superior over broadcasting method of wheat sowing. Suitable high yielding dwarf varieties of wheat are needed.

	Farming situation	Problem identified	Intervention
	Low land banded	Monocropping of rice is most predominant. These soils have enough profile stored moisture at the time of rice harvest and hence a suitable rice based double cropping system needs to be evolved.	Since soils are acidic in nature gram does not perform well after rice. Rice-field pea under rainfed and rice-wheat and rice-pea under irrigated conditions are the most remunerative crop rotation for this situation. Since disease/pest are the serious problem in this situation, multiple resistant varieties of 125-135 days should be evolved/identified to take a good crop of rice followed by <i>rabi</i> crop even under rainfed situation and to ensure timely sowing under irrigated conditions. With the availability of high yielding hybrids of sunflower and better varieties of groundnut. During summer season, there is a need to try these crops after rice under irrigated conditions. Field pea performs better under low pH made to identify high yielding powdery mildew resistant varieties of field pea.
5	Extreme Low land	Suitable varieties of rice and other crops are lacking. In certain cases, farmers are not able to take <i>rabi</i> wheat due to standing water in the field even after the harvest of rice.	The technology for growing long duration multiple resistant rice varieties in combination with fish (rice cum fish culture) need to be developed in this situation. The suitable long duration varieties possessing multiple resistance against gall midge and blast need to be identified.

Thus, we find that all sections of society in Chhattisgarh – policy makers, mass leaders, peasant organizations, scientists – emphasized decentralized and location specific water and land use through state support and public investment. As we discuss ahead, the irrigation commission too made similar observations. Before we embark on the last task, namely, to suggest a water policy for drought proofing along with a viable financial and institutional basis, let us examine the government policy.

8.4 Government Policy For Water Resources Development In Chhattisgarh

In 2001-2002, the state government had two options to choose from with respect to water resources development as it adopted a development vision for the decade ending 2010. One was the Draft State Water Policy of Chhattisgarh drawn up by the Department of Water Resources in 2000 (DSWPC). The other was that drawn up by the international development consultants, Price Waterhouse Coopers, in 2001. The state government chose to go along with Price Waterhouse Coopers, abandoning its own Draft in the process, a step that can only be interpreted as an ideological shift, since the circumstances within the state had not changed so drastically within the intervening nine months. The DSWPC focussed on location specific minor irrigation works and small scale multipurpose projects for augmenting irrigation potential, utilization, drought proofing and balanced intra-regional development. The lynchpin of the PWC document were increased tariff rates and tariff collection; operation and maintenance of the canal system through farmers' organizations, funded by user charges; and private sector participation. Thus, although the PWC report and the DSWPC were separated by no more than a few months, there was an enormous distance in their prescriptions. This ought not to be the case since they should both conform to the 1987 national policy as they precede the 2002 water policy.

8.5 The Draft State Water Policy

Soon after state formation in early 2001, the Water Resources Department of the Government of Chhattisgarh circulated a draft water policy for discussion. It remained a Draft, now relegated to the dustbin of history. It reflected in large measure the perspective of the National Water Policy of 1987, including the maximization of irrigated area by creating further potential through capacity installation. It is a draft prepared by policy makers committed to economic development, though the fourteen years since 1987 have led to greater environmental consciousness. In keeping with this development, the policy took cognizance of the backwardness of the state, proneness to drought and the need for rapid industrialization and rural development. Further, it focussed on micro and minor irrigation for drought proofing; and a very explicit integration of meeting drinking water and hydro-electricity needs. Notwithstanding these positive features, the policy had its limitations. It did reflect a dilemma typical of a mindset that desires development but does not have either the clout to obtain requisite central assistance from the center, nor the political consensus at home for tougher state level resource mobilization. The policy recommended that multi-lateral organizations and the private sector be tapped to raise the resources for their development plan. While, this is not the place for a discussion on state finances or center-state resources, the point is that the case of Chhattisgarh is not unique. The moment a backward state cannot build a case for federal finances and/or cannot raise its own resources, the original agenda of growth becomes an exercise in wishful thinking. Therefore, while lacking in this

respect as a policy document, at least its development vision is far superior and stands out in marked contrast to what followed.

However, the Draft State Water Policy addressed two features of the development experience of Chhattisgarh that are relevant for the water resources sector. The first is the backwardness of vast parts of the state and the high inter-block disparity and unevenness in the percentage of irrigated area. This is especially true for tribal blocks, and remote and high gradient terrain in the rimland. It recognized the critical role of water resources development in balanced regional growth in areas that are predominantly agricultural and have a very high agriculture dependent population. The second is that large parts of the state are affected by drought due to which every year most parts of the state are declared drought affected. This results in out-migration due to water, food, fodder and livelihood distress. In order to promote regionally balanced development, the water resources sector needed to overcome its underdevelopment and unevenness. For this, the policy had to be backed by a financial commitment to location specific irrigation strategies in the hilly areas, where costs of construction are higher. Only 23 per cent of the total potential had been installed, and this held for surface water as moisture as for groundwater. The overall underdevelopment was being caused, in part, by unevenness in the spread and utilization of water resources at the sub-regional level, in turn related due to the neglect of the hilly tribal areas. A thread running right through the document was that dispersal of economic growth required location-specific irrigation development. Hence, on techno-economic grounds, this document had a developmental core that stood on firmer ground than the large project orientation of the 1987 policy.

The Draft Water Policy began with analysis of data to suggest that the potential for development of irrigation capacity is highest in small projects. However, available resources are mostly spent on large projects, a position that worsened after the Seventh Five Year Plan. This technical predilection of the planners has meant that districts where large projects were not possible have become victims of regional imbalance. In the newly formed Chhattisgarh the possibility of large projects is very low due to several reasons, not the least important being financial. Hence, it is very important to give priority to small projects, in which small tanks, diversion weirs, stop dams, wells, tube wells and farm ponds are included. For such work, the policy recommended about half the investment on irrigation in the Ninth and Tenth Five Year Plans. This can provide irrigation to tribal and irrigation deficit areas and tackle the problem of regional inequality.

The policy recognized that Chhattisgarh had failed to utilize its groundwater resources, and this combined with limited irrigation development to result in drought prone low productivity agriculture. However, and particularly so in the tribal areas, the proportion of cultivated area to geographic area is low, usually less than two-thirds. This provides sufficient uncultivated area as catchment, which can be treated through simple boulder and earthen structures and vegetative measures to provide sufficient protective irrigation through micro and minor irrigation schemes. Reduction of drought vulnerability is therefore related to the choice of technology.

Water deficiency in Chhattisgarh is related to multiple factors such as: high run off in unevenly distributed rainfall areas, presence of some rain shadow areas, and practice of agriculture in upland situations. For this, two sets of interventions are required as far as the water policy is concerned.

The first is a massive boost to soil, groundwater and soil moisture conservation measures and rainwater harvesting for micro-irrigation. The second is land use planning to increase fodder and vegetation, and to reduce run off rates. The policy addressed this by stating that drought relief works will be in the future directed towards this kind drought proofing. The policy also envisions transfer of water from surplus to deficit areas, which doesn't fit in with the rest of the document approach.

Besides the issue of inadequate capacity, the Policy addressed four other avenues of slack in the existing system. The first was the large number of incomplete medium and large projects in Chhattisgarh, financed both, from plan funds and special assistance/relief funds. Forest department objections and disputes over compensation were as important causes for this, as inadequacy of funds and cost and time overruns. The second was the underutilization of potential due to poor upkeep and maintenance. The three critical areas of neglect were embankment repair, non-replacement of missing irrigation gates and desiltation. The completion of projects and repair and maintenance work required resources, which, the document said, the state cannot raise. Therefore, it recommended approaching national agencies like NABARD, or multilateral funders like the World Bank, the Asian Development Bank, as well as approaching 'private organizations' to fund new construction, complete pending projects and repair and maintenance.

The third was the skewed and inadequate rural electrification network. Towards this, the Draft suggested greater collaboration with the electricity department for the installation of small hydroelectric projects in areas where hydrology and terrain permitted. This was an intelligent approach to the problem of energy, and would also increase the profitability of irrigation projects as well as encourage expansion of facilities. Obviously, multi-purpose projects are more financially viable in hilly regions with acute drinking water and power shortages. The fourth was poor development of the command area in terms of land leveling, water distribution, etc. This arose from poor management and administration in operations and maintenance. It is odd that a document written in 2000 completely ignored *panchayati raj* institutions and municipalities, as if the 73rd and the 74th amendments never happened. It recommended the same institutional foundation for participatory management as the 1987 policy, namely a network of Water Users Associations at the village, block, district and state level

With the ostensible motive of preventing the 'open access', unprotected exploitation of precious fresh water resources like streams and rivers through impounding, by private industrialists and farmers, the Draft suggested that the ownership of all natural fresh water resources be legally vested with the water resources department. It further suggested that to facilitate better planning as per developmental priorities, the use of this water by private industries and farmers should not be allowed without permission from the Water Resources Department.

However, water has, both, a common property and a public good character, and in order to protect the common property rights of users, perhaps ownership rights are best vested in *gram sabhas* and the legal framework and regulations for this must be developed by the state. The nationalization of forests through the Forest Conservation Act holds many lessons concerning the tying up common property rights in a host of essentially exclusionary devices that accompany such common property nationalization. We may end up in one of two situations, or a

combination of both. The first is the loss of access for those with customary rights but without bargaining power and political clout. Paradoxically, private industry that never had customary rights might find it easier to gain access to common property. The second is the conversion of the common property resource into an open access resource, with the accompanying danger of depletion and pollution. Therefore, while it is true that often unbridled exploitation reduces flow, capacity and quality, and water must be regulated, it is equally true that a distinction must be made between agriculture and industry in a context such as Chhattisgarh's. The state must distinguish between the poverty-afflicted and resource constrained tribal cultivators in and hilly regions, from the more prosperous farmers of the valleys and plains.

The water of four rivers and their tributaries is shared with the neighbouring states — Madhya Pradesh, Uttar Pradesh, Jharkhand, Orissa, Andhra Pradesh and Maharashtra — these are the basins of Mahanadi, Godavari, Narmada and Ganga, in which Son sub-basin is also included. In order to reduce the occurrence of disputes and to ensure their speedy settlement and resolution, it is essential to devise fair and easy guidelines for water sharing, so that states do not have to go to Courts or suffer delays in project development. The suggestion of the state is that the share of each state be determined according to the ratio of its watershed area in the total basin.

The fact is that previously Chhattisgarh was a fairly neglected part of Eastern Madhya Pradesh, and neighbouring states made their irrigation projects without any real consultation or regard for the needs and geology, economy and social system of Chhattisgarh. Now that Chhattisgarh has become a separate state, all existing, ongoing and planned projects involving interstate river sharing need to be fully scrutinized and reviewed.

The level of groundwater development in Chhattisgarh is very low. However, the methodology used by the Central Groundwater Board to estimate this parameter is suspect. It tends to grossly overestimate recharge and underestimate draft or utilization, because of the several assumptions it makes. This notwithstanding, many parts of the state have unutilized available potential, which, the Draft suggested may be tapped for use of small and marginal farmers, who are outside the command areas of irrigation projects. The policy mentioned that, since availability of surface water in tribal and Scheduled Caste majority areas was ridden with problems, they should be allowed to use groundwater. While this sounds good, it misses out on three points: one that tribals live in areas where geo-hydrological conditions make groundwater mining expensive and difficult; two that they do not have the financial resources to make this outlay; and three that the complementary infrastructure is missing.

On the issue of prices, the policy aimed at reformulating the price structure to increase financial viability and conserve water. It also suggested improvement in collections, with better compliance through farmers' involvement; improvement in services with timely and adequate supply; and greater effort by the departmental personnel. It lamented the absence of volumetric pricing, and therefore, suggested a system that would signal the scarcity of water and encourage conservation. Rates need to cover operational and maintenance costs and a percentage of fixed costs each year. It called for such a system to be adopted within five years.

Drinking water and fresh water pricing must take into account the question of access to the poor and may be set at half the price of other water. Prices of both surface and groundwater must also

consider the interests of small and marginal farmers. Concessional water may be provided for forestry projects too. Making a distinction between users on the basis of sectors and capacity to pay, it identified industrial use as a source of revenue and forestry as a deserving case for concession. On rehabilitation and displacement, its precept was correct as it rejected the inhuman and unjust approach thus far. The issue was seen not as one of compensation, but of improved standard of living for the displaced. Their economic condition had to be improved and the re-settlement had to be attractive enough to instill confidence and persuade the displaced to move. The first beneficiaries of the project had to be the displaced persons, needed to be re-settled in the command area. To ensure that planners and funders take resettlement and rehabilitation seriously, the construction of projects must await settlement of displaced persons and the expenditure on compensation must be built into the project cost.

In sum, it is the Draft of a state water policy in consonance with the 1987 National Water Policy, taking into account regional specificities with a strong developmental thrust. It is hopelessly pessimistic about the state's ability to garner resources from the center or mobilize them locally, therefore seeing higher tariff, especially for industrial users, as well as multilateral funding, public sector banking and private sector investment as important sources of finance. It had its inner contradictions and weaknesses, but what follows has completely abandoned the positive features of this document and added far worse.

8.6 Price Waterhouse Coopers' Report

Prior to the National Water Policy 2002, the state government commissioned international development consultants Price Waterhouse Coopers to prepare an ***Infrastructure Development Action Plan*** for the state, which has been endorsed by the government of Chhattisgarh. The following section looks at the water resources development section in this.

Generally, there are four sub-arguments in the prescription for state retreat from investment and/or provisioning, and wanting to leave no stone unturned, this document uses all four. Where profits can be earned through high administered prices with state support, a greater role for the private sector is recommended. Where stakeholder involvement has to be of a very high order, requiring regular interaction, overheads-supported non-government sector is the best option. One argument is that no matter who raises the finances, provisioning should be done by non-government agencies, either the private sector or NGOs. The rationale being that the private-corporate or NGO-sector is more efficient. The second argument, different in precept but identical in prescription, is that the quantum of resources required for efficient provisioning (planning, construction, operation and maintenance and tariff collection) are beyond the resource mobilization capabilities of the state. The third argument is that the non-government sector is more accountable and transparent. The fourth is that the non-government sector is more conservationist and environmentally conscious, either through market-based socio-ecological pricing or ideological commitment.

8.7 Pessimism About Public Investment

On the incapability of the government to raise resources, the Report states that, "As per quick estimates, the State would require a hefty investment of about Rs. 9,651 crores to fully develop

the estimated 43 lakh ha of its irrigation potential...A similar situation exists in the urban water sector also. For example the Municipal Corporation of Raipur has proposed an urban water scheme costing Rs. 397.42 crores to meet the water requirements of the city till the year 2031. All these undoubtedly represent massive expenditure on the part of State government, and therefore, to effectively meet future requirements some alternative measures would need to be explored. These measures could include exploring opportunities for private sector participation in the sector”.

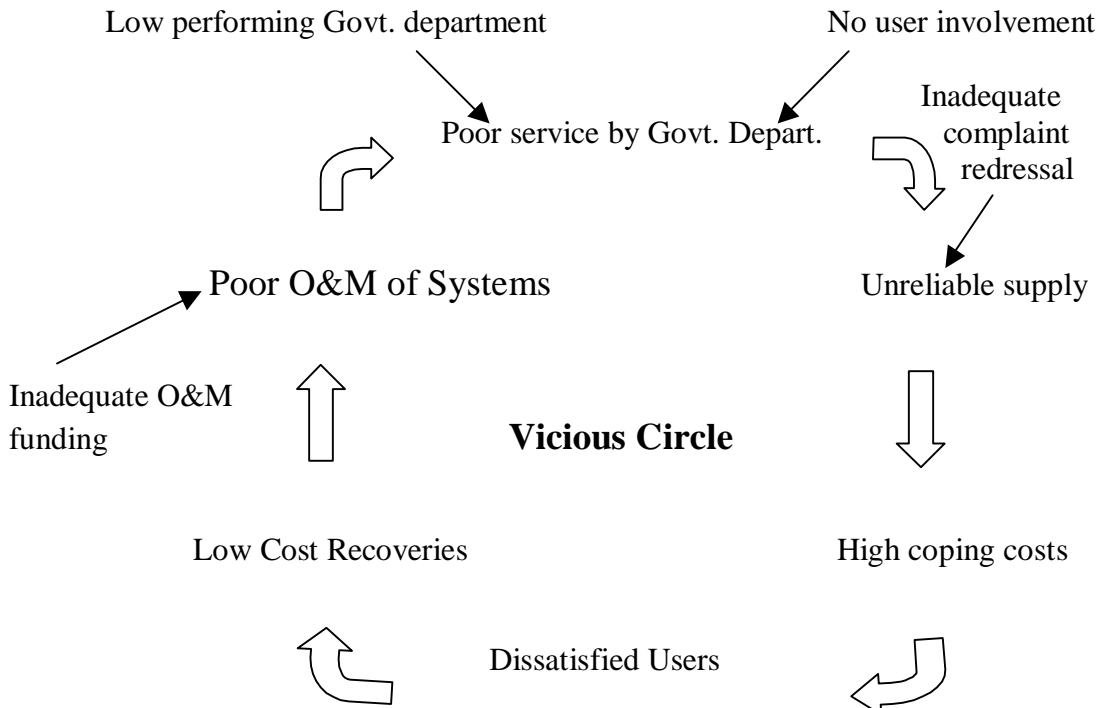
It further states: “The involvement of the private sector in water (and sanitation) is generally sought with one or more of the following objectives.

- injection of large scale capital investment into the sector or gaining access to private capital market
- improving economic efficiency in operating performance as well as use of capital investment
- bringing technical/managerial expertise and new technology in to the sector
- making the sector more responsive to consumers’ needs and preferences
- reducing overall public subsidies to the sector and re-directing them to the poor and those not currently served”

8.8 Inefficient Governance

The irrigation department was in-charge of construction, operation and maintenance of all irrigation works built at public cost, from the head works down to pipe outlets. The government had a bureaucratic approach and limited capacity to intervene at the field level, resulting in several distributional inefficiencies and poor repair and maintenance because of lack of funds and tariff collection (See Figure 8.1 below).

Figure 8.1



Source: Pricewaterhouse Coopers (2001) *Infrastructure Development Action Plan of Chhattisgarh*, Government of Chhattisgarh website

In order to break out of this vicious cycle, the Report recommends a three pronged strategy: tariff rationalisation to cover at least the entire O&M cost; private sector participation and beneficiary participation through water users associations (WUAS). It speaks most approvingly of the attempt to increase the collection of user charges through beneficiary management by the government of undivided MP. The latter decided to hand over the management of the government irrigation canal network to its beneficiaries through the “*Sinchai Prabandhan Me Krishakon ki Bhagidari Adhiniyam 1999*” (Farmers Participation in Irrigation Management Act 1999). However, the Report bemoans the fact that little action has been taken so far to actively involve these WUAs in management of irrigation systems and to hand over the responsibilities assigned to them as per the Act.

8.9 Underutilization Of Potential

According to these international consultants, low tariffs combine with poor governance resulting in very low provisions and expenditure on operation and maintenance (O&M). The actual O and M expenditure has been a third of what was required. Low O&M budget leads to deterioration of the system and this results in low utilization vis-à-vis designed irrigation potential. Unmet maintenance requirements over a period of time also result in high rehabilitation costs to bring the system back to design potential(p.9)

8.10 Demand Management

The Report endorses a water balance study conducted in Gujarat. The methodology is as follows: “The demand for water was divided into Deterministic Demand (D1) and Supply Driven Demand (D2). D1 comprises demand for drinking water and industrial water. This demand is deterministic in the sense that it is determined by the requirements of population to be serviced and industries coming up in the area. D2 comprises demand for irrigation water and is ‘supply driven’ as it tends to get aligned with the supply through adjustments in cropping pattern, irrigation methods, etc.

Supply side comprises the following:

1. Water reserves already being exploited in the State (S1)
2. Additional potential supply through regulation, artificial recharge and waste-water re-use (S2)
3. Projected additional on-going and proposed water supply schemes in the State (S3)

The concept of water balance would suggest:

$$S1+S2+S3=D1+D2”$$

In this model, it is not possible to reduce deterministic demand. Besides supply side augmentation, efficiency and conservation and curtailment of supply driven demand are the only options. Therefore, agricultural practices (crop and water distribution technology) are the immediate instruments for demand management.

8.11 Summary of PWC Report

The summary of the water sector report is as follows:

- Water is an extremely important resource for Chhattisgarh as almost 80 per cent of its population relies on agriculture for a livelihood. Hence irrigation systems are vital.
- The State has sufficient water resources and a large untapped potential. It is estimated that 43 lakh ha area can be irrigated as against the existing irrigation potential of 13.37 lakh ha.
- Aware of the critical importance of water resources, the Government of Chhattisgarh (GoC) has accorded high priority to the development of the sector by assigning Rs. 246.47 crores, namely more than 20 per cent of the State’s plan budget to the sector.
- The key issues facing this sector include absence of a State-wide water resources plan; low utilisation of developed water resources; inequitable development of resources; low coverage of urban water supply; low operation and maintenance budget; thin spread of resources, low recovery rate and tariff; poor demand management.

- In order to address these issues the State needs to undertake wide ranging measures, which can be segregated into 4 distinct stages which are preparatory, run-up, execution and monitoring.
- The various activities that need to be undertaken during these phases include development of a long term water resource plan, formation of a high level committee, formation of a water regulatory body, regulation of ground water, creation of the conditions for attracting private sector participation, etc.

8.12 Differences With Draft State Water Policy Of Chhattisgarh (DSWPC)

We see that decentralized natural resource management is the thrust of the Draft State Water Policy, although from where the resources for government provisioning will come is unknown even to the policy makers. On the other hand, the thrust of the PWC document is increased tariff rates and tariff collection; operation and maintenance of the canal system through farmers' organizations, funded by user charges; and private sector participation. The point is not so much that the 1987 policy was devoid of problems, or that there is no continuity between the 1987 policy and the 2002 policy. In fact, the seeds of liberalization-privatization-globalization had already been sown in the 1987 document and fructified in the 2002 policy. The NWP 1987 was written at a time when the World Bank and others in favour of liberalization had already begun to enjoy tremendous clout in the highest echelons of economic policy decision making. The winds of change had begun, albeit diffidently, and the DSWPC echoes some of these aspects. Nonetheless, the highly selective interpretation of the NWP 1987 in the PWC Report is very revealing, as is the different treatment in the DSWPC. Despite the pessimism regarding resources, the Draft State Water Policy of Chhattisgarh succeeded in keeping alive the developmental role of the government in investment and provisioning in the water resources sector, like the 1987 NWP. In contrast, the Price Waterhouse Coopers Report is far closer to the NWP 2002. It is important to note as we have above that though both preceded the National Water Policy of 2002, unlike the state Draft the PWC Report only pays lip service to state provisioning and investment in additional capacity as the 1987 policy suggests.

National Water Policy 1987, in the PWC Report

Formed by Ministry of Water Resources in 1987, the National Water Policy sets out the reform agenda in the water resources sector. This policy covers the following aspects of the water resources sector:

- Need for the policy
- Priorities for water allocation
- Requirement for information systems
- Maintenance and modernization of existing schemes
- Groundwater development and regulation to prevent the excessive use
- Need for cost recovery through appropriate charges
- Participation of farmers, NGOs and other agencies in management of water resources
- Need for appropriate technology in management of water resources
- Training and capacity building of staff

Source: Pricewaterhouse Coopers (2001) Infrastructure Development Action Plan of Chhattisgarh, Government of Chhattisgarh website

8.13 Chhattisgarh's Vision 2010

"Unlocking natural wealth" is the key to Chhattisgarh's development strategy. Decentralized development and protection of tribal landowners against land alienation is unashamedly secondary to objectives like participation of the private sector in development of industrial infrastructure, in which local bodies are seen to play a key role. "The State recognizes that the existing land acquisition process is one of the key constraints in aggregating contiguous tracts of land, necessary for developing industrial parks in the State. In order to address this aspect, the State government would act as a facilitator ensuring that the negotiations are free and fair, and explaining to the landowners the use the land would be put to and the benefits that would accrue by undertaking such a project. Such a facilitating role of the State would be undertaken in association with the local government." (Infrastructure Development Report) The Price Waterhouse Coopers report too suggests that: "It should also be possible for a private investor-negotiator to look up to the Government for its supportive intervention to resolve the problems of breaks in land contiguity."

The Vision 2010 document borrows heavily from the PWC Report, including presentations and data clips! Chhattisgarh's Vision 2010 has the following objectives:

1. Achieving 200 percent increase in the irrigation potential from the present 1.34 million hectares to 4.02 million hectares by 2010, by increasing the number of water pumps across the State.
2. Ensuring 100 per cent safe drinking water for all. The State currently has 54,816 hamlets, of which approximately 85 per cent have access to drinking water. This existing coverage would be extended to all hamlets resulting in access to safe drinking water for all before 2010.
3. All villages in the State to have at least one perennial source of water supply
4. Tariff rationalisation to cover at least the entire operation and maintenance cost
5. Coverage of urban water service to meet prescribed norms (like 140 litres per capita daily for cities with sewerage facilities)

The Vision document states that private sector participation would be initiated in lift irrigation, since "water tariff for water supplied by lift schemes is more than (normally double) the water tariff for water supplied by gravity schemes, and there exists a higher willingness to pay appropriate water charges on part of farmers." Great importance is attached to tariff reform to "provide a clear signal of the State's intention to reform the sector by taking steps to make it self-sustaining, to help in building credibility for inviting professional private agencies to take up specific responsibilities in managing the sector and to raise funds from capital markets in order to fund development requirements."

The State Government will create an independent tariff regulatory body, and all other objectives, howsoever laudable, are secondary to user charge and tariff collection. Even decentralized development reduces to farmers' participation in the operation and maintenance of existing irrigation systems through a three-tier structure (water users' associations, distributory committee and project committees) and is obviously linked to realisation of higher tariffs and the upkeep of

stakeholder interests. "Apart from increasing the availability of water, local water harvesting systems developed by local communities and households can reduce the pressure on the state to provide all the financial resources needed for efficient water supply. Additionally, involving people will give them a sense of ownership and promote water conservation".

There is nothing unique in these moves of the Chhattisgarh government. State governments who are going in for privatization in the water sector have adopted the same set of three legal and policy instruments. The first is a participatory irrigation management Act in one name or the other, which not only mandates the formation of water users associations but also denies users who have not formed WUAs access to water after a specified period of time. It is three years in Andhra Pradesh and in Maharashtra. It should be no surprise therefore that private contractors are most enthusiastically promoting WUAs in Andhra Pradesh and Maharashtra. The second modality is a water policy that basically builds an enabling framework for raising tariffs; facilitating private sector participation and reducing public investment. The third is the setting up of an independent regulatory body for tariff collection and management, signalling an end to government discretion (affirmative action, etc.) and regulation. In this way, the withdrawal of the government from investment, regulation and provisioning is being pushed. Institutionally, 'participatory irrigation management' and water users associations are considered superior primarily because this structure facilitates a shift to volumetric pricing; reduces default and improves tariff collections; provides more efficient management; ensures better operation and maintenance services.

The Maharashtra model of Paani Panchayats began as cooperatives of water users with a very radical message of breaking the connection between water and land rights. They were instruments of empowerment and protecting the water rights of the landless. Under the recent water privatization drive launched by different state governments, they have become vehicles of privatization. Therefore, the present participatory irrigation management laws have little to do with decentralized natural resource management.

8.14 Conclusion

The superiority of location-specific minor irrigation and multi-purpose projects on grounds of economic viability, environmental sustainability and equity (intraregional and for the socio-economically deprived) are the cornerstones of the DSWPC. It also highlighted the importance of surface water and rainwater for irrigation, where feasible through gravity flows, and where required, through irrigation schemes supported by small hydroelectric units. In a sensitive handling of the issue, the Draft stated that groundwater must be utilized sustainably, and pointed to the irreversible depletion in parts of Madhya Pradesh due to mindless expansion as a cause for caution. Therefore, groundwater should first be preserved for drinking and for use of farmers who have lesser access to canal irrigation on account of geographical or socio-economic factors. In any case, groundwater development is an adjunct or correlate of surface water development and rainwater harvesting, since often rainfall by itself may not replenish groundwater reserves. This is more so in dry, hard rock areas low in rainfall and aquifer recharge.

The biggest casualty of the PWC influence on state policy in Vision 2010 has been the abandoning of all three principles: location specificity, decentralization; and multipurpose water

resources development. Instead it is replaced instead by state-sponsored groundwater exploitation, which though undeniably underutilized is also most fragile in Chhattisgarh's geo-hydrological setting. The rationale for private sector participation in lift irrigation schemes seems completely bizarre: if these offer an avenue for profitable investment, co-operatives might be a better institutional mode, through public sector bank lending. Even if we go along with the argument that the government retreat from provisioning in profitable avenues for investment, co-operatives are surely superior to making way for the private sector. If finance is a constraint, institutional credit can support at least these profitable ventures. Instead, in the Vision document markets are seen to be inherently and transcendently superior. They are assumed to provide the instruments for development and conservation, through price and private investment.