

GOMUKH ENVIRONMENTAL TRUST FOR SUSTAINABLE DEVELOPMENT

**West Zone Partner of
INDIA WATER PARTNERSHIP (IWP)**



Report on IWP- sponsored Project:

**“Preparing an Integrated Development and Management Plan
of Water Resources in the Wainganga Sub- Basin (Godavari) in
Maharashtra”**

For the Water Resources Department, Government of Maharashtra

2010



**Convened by
Gomukh Environmental Trust for Sustainable Development**



ACKNOWLEDGMENT

As part of the West Zone Water Partnership we have undertaken the work of 'Preparing the Integrated Water Resources Management for Plan Wainganga Sub-basin (Godavari River)' for the Government of Maharashtra.

Our work involves communicating with members of the civil society organizations, local communities, experts, administrators, etc. and involving them in the process of planning of the water resources using the Negotiated Approach.

This work has been possible due to the seed funding received from the **India Water Partnership, New Delhi** of the **Global Water Partnership, Stockholm** and Both ENDS, Netherlands during the year 2010.

We are grateful to Prof. S. R. Hashim (President, IWP) and Dr. Veena Khanduri (Executive Secretary, IWP) for their support and encouragement.

With Regards,

Vijay Paranjpye

Convenor, West Zone Water Partnership

Gomukh Environmental Trust for Sustainable Development

Pune

INDIA



Executive Summary

Planning of the development and management of water resources for river basins in India is still in its primary stages, with the Godavari River being the first of the major rivers for which such an activity has been initiated.

The West Zone Water Partnership had proposed to take the lead in developing such a plan for the Wainganga River Basin in December 2009 as it occupies the largest area in the Godavari River Basin which is the most important river in the West Zone.

Apart from being the largest of the sub-basins in Godavari River, the Wainganga basin is unique due to its physical and social features. It is a region with the highest forest cover in the State of Maharashtra, is affected by Naxalism and suffers from a developmental backlog despite the availability of natural resources. Given these conditions, the WZWP took the opportunity to develop a truly integrated river basin management plan which responds to the real issues and incorporates stakeholders' right from the inception of the planning process.

The WZWP therefore completely focused on developing a local team of experts and NGOs which would help in mobilizing and taking the research work to the grassroots during the year 2010. The WZWP is collaborating with over 6 NGOs in the Wainganga river basin and four others in Pune and several government departments for this purpose. Gomukh Trust, Convener of the WZWP has received a seed grant from the India Water Partnership which provided the initial impetus in early 2010 and later on an additional financial assistance from Both ENDS, Amsterdam, for advocating the Negotiated Approach to Integrated Water Resource Management. The two grants together enabled the completion of the activities during 2010. The financial assistance from the Government of Maharashtra is awaited.



**Preparing a Master Plan for
Integrated Development and Management of Wainganga sub-basin**

(Report of the work done during January to December 2010)

The West Zone Water Partnership has been working in creating a platform for planning and management of water resources based on the Negotiated Approach, which involves integrating government, non-government and individual citizens and stakeholders in the decision making processes for resource use and management. In an effort to further the objective, the Gomukh Environmental Trust for Sustainable Development had filed an application and submitted a tender document for the preparation of a Master Plan for the Integrated Development and Management of Water Resources of Wainganga Sub-basin (Godavari River basin) in Maharashtra, in December 2009. This project was submitted to the Godavari Khore Mahamandal, one of the Water Resources Regulatory Authorities functioning under the Water Resources Department of the Government of Maharashtra.



Picture 1: Wainganga River Basin



Since the process of bidding and sanctioning of the project can take several months, a decision to start off the capacity building and stakeholder negotiation activities within the Wainganga basin (located about 550 kms north-west of Pune in Central India) was taken. Three contact meetings/ workshops were organized for the purpose in Nagpur, Bhandara and Gondia in the months of February, June and September.

Of the three meetings, the first meeting focused on identifying local leaders and research organizations which could participate in the activities of the West Zone Water Partnership in the region and assist in preparing the Wainganga Integrated River Basin Management Plan. The one-day brainstorming session in Nagpur was held in order to identify all the stakeholder groups, government officials and research and academic institutions which would be relevant to the preparation of the Wainganga Master Plan. It was decided that Mrs. and Mr. Manish Rajankar will take the leadership for coordinating the activities in the Gondia district, while Mrs. Yogini Dolke and Mr. Ajay Dolke will be coordinating the activities in the Nagpur region. Activities like data collection, primary field visits, contacts with local experts, etc. were commenced immediately after this meeting. Organizations like **Srujan, Bhandara Nisarga Va Sanskriti Abhyas Mandal, Virkshamitra, Vedha, Srishti, Lokamangal, Nutan Kanya Vidyalaya (Girls School), Bhandara Fisheries Co-operative**, etc. were invited to participate in the Wainganga IWRM project.



Picture 2 Dhiwar Community -Wainganga River Basin

In the month of June (27th June 2010) , all the stakeholders and the representatives (32 participants) were invited to a two-day workshop for making detailed presentations on the aspects which sub-groups would like to take up independently. A summary report of the workshop conducted at Bhandara town within the Wainganga project area is attached as **Annex-I**.

Commissioning of the project: In mid-July, we received a letter from the Government of Maharashtra, Water Resources Department stating that our tender offer had been accepted and that we would require to submit a bank guarantee of Rs. 11 hundred thousand and sign a contract document for the period from 20th July 2010 to 20th July 2012. The value of the contract was Rs. 21950000 to be paid to Gomukh by the Government in five instalments.

Gomukh was indeed delighted to know that this was the first time ever that an NGO had been commissioned to prepare a detailed Master Plan for an entire sub-basin.

During the period July to September, Gomukh prepared a detailed concept note based on the inputs received during the brainstorming session in February and the workshop in June. The summary of this report was presented to all the stakeholders in month of September



(25th and 26th September 2010) at the Navegaon Dam site in Gondia District. This place was chosen because the dam is located in the tribal and densely forested areas (where the Gond kings had initially built a traditional tank in the 16th century), and since it could become the rallying point around which the values and aspirations of the tribal and mountain dwelling communities could gravitate. A summary report of this two-day workshop which included field visits to the lower catchments is attached as **Annex II**.



Picture 3 Meeting with Stakeholders.

Subsequently, taking the inputs from the stakeholders and including the principles of negotiated approach to IWRM a detailed inception report was prepared and submitted to the Government of Maharashtra Water Resources Department on the 20th September 2010, after receiving the comments and suggestions a revised and finalized report was submitted on the 20th October 2010. On the basis of the discussion which followed our presentation we got an impression that it was reasonably well received. The Inception Report of around 100 pgs, along with maps, photographs and tables will be printed and published shortly (in early January 2011).



We have now commenced work for the next stage of the project, which involves identification of the key projects which can be undertaken to enable the planning and development of the water resources in the basin. The participating organizations have formed research groups in their areas of expertise including the study on biodiversity, tourism, fisheries, local governance; river based social and religious studies, etc.

A comprehensive questionnaire is being prepared for collecting the data about water, water use, available resources, water-related needs of the people from atleast 40 towns, villages and settlements from the region. This data will be collected from December 2010 to February 2011. This information will be quantitative and qualitative in order to reflect the true needs of the river basin and its people.

Outcomes:

Apart from delivering the Inception Report which gives in detail the approach and framework to be undertaken while developing the Wainganga Integrated Water Resources Management Plan, the WZWP also focused on developing a co-ordinated, co-operative framework for the numerous stakeholder groups in the Wainganga region.

During the year, the West Zone Water Partnership has built a team of member organizations in the Vidarbha region (Eastern Maharashtra) and also functioned as a bridge between them and water-related organizations in Pune. Thus, expansion of the geographical region under the West Zone Water Partnership has been achieved during the Wainganga Master Planning Project. It will prove to be a strong platform for the present and future projects in Water Resource Management.



The WZWP has ensured that lines of communication between the participating organizations and the governmental agencies were opened up by issuing each organization letters for access to data required for their research of the region.

An open framework was achieved in the year between the participating organizations and Gomukh (coordinating and lead agency in the Wainganga Master Planning Project), where organizations could choose their areas of research and work and contribute to the project.



Picture 4 Biodiversity in Traditional Water Tank

Local expertise in the Wainganga region was tapped, inclusive of tribal leaders, scholars, women researchers, social workers, religious groups, etc.

The Inception Report submitted by the Gomukh (as a member of WZWP) to the Godavari Khore Mahamandal, is an attempt to promote the Negotiated Approach to Integrated Approach to River basin management at the actual implementation level. It gives a comprehensive overview of the two major upcoming approaches taken in the planning and



management of water resources. It introduced a paradigm shift in the planning process by involving local communities and stakeholders prior to developing the objectives of the plan, thus making it more relevant to the actual requirements of the basin.

An abridged version of the Inception Report as well as two other research papers has been edited for printing and publication. Printed and soft versions of this abridged Inception report will be available shortly.

Contributing Agencies:

Numerous agencies like NGOs, Governmental institutes and individuals contributed to the efforts of the WZWP. The **Godavari Khore Mahamandal** at Aurangabad, who appointed us for the Wainganga Master Planning project, has been extremely co-operative in calling meetings, discussing ideas and also to open up to the newer concepts that we are trying to include in the planning process.

NGOs from the Wainganga River Basin who are well-versed with the region gave us a thorough idea about the community, their culture and also the primary issues the region faces. The NGOs '**Vrikshamitra**' and '**Vedha**' have a unique outlook toward river basin management based on local self-governance. Their past work and experience in capacity building of tribal communities in decision making, a deep know-how of the social, ecological and economic features of the region have strengthened our ideas of Integrated Water Management with the Negotiated Approach.

Research in the biodiversity, traditional water tanks and water use systems of Bhandara region in the Wainganga River Basin is the forte of '**Bhandara Nisarga Va Sanskriti Abhyas Mandal**'. Documentation of the traditional tanks, architecture and art from the region is being done by the NGO for past several years and is proving of great value to the Wainganga Project.



Apart from the NGO partners, Governmental agencies like the Ground water Survey and Development Agency (GSDA), Water Resources Department, Water and Land Management Institute (Government of Maharashtra, Aurangabad), National Institute of Tropical Meteorology and many others have been providing us data for the Wainganga Master Planning Project.

A holistic perspective in the Project could not have been achieved without the help and support of these organizations.

Lessons learnt:

A plan prepared through peoples' perceptions and that prepared by the government can be substantially different in its approach, objectives procedures and therefore final outcomes. While the Government was more interested in large impounding projects and trans-basin transfers to deficit areas, the peoples' perspective was focused on micro-watershed development approach and making productive use of available water for developing agriculture and fisheries.

The communities were very keen that the traditional water tanks were repaired, desilted and restored for use; the Government has given priority to the construction of the Gosekhurd Dam.

Similarly, while the Government's approach was for increasing water use efficiency and hydrological parameters, the community and stakeholders emphasized on the need for equitable water distribution and utilization.



Picture 5 Agriculture: The means for development in the Wainganga River Basin

It was seen that the Government largely desired that the control of water resource distribution be in a top-down fashion and that benefits of large scale projects should be made available for mega hydro electricity or thermal (coal based) energy generation and then indirectly reach the society for other uses; the local communities felt that the water should be used primarily and by priority for enabling the traditional uses of water like fishing, and irrigation of Kharif and Rabi crops, etc.

People are quite willing to take on responsibilities, and one stakeholder group (**Mendha-Lekha Village Gram Sabha**) comprising of tribals dependant on fisheries was eager to do prepare a comprehensive plan for the whole of '**Kathani tributary**' based on the local self-governance model.

It is indeed commendable that a group of lady teachers (**Nutan Kanya Vidyalaya**) from a school in Bhandara District have of their own accord have taken initiative for the documenting the cultural and religious history of the Wainganga River Basin. They have emphasized the importance of making students aware of the importance of the pilgrimage along the river in particular and water culture in general. Since the teachers were leading the group, they appear to take gender mainstreaming as an obvious outcome.



An important aspect that was brought forth was that the community of the Wainganga basin does not agree to the water use priorities set by the Government of Maharashtra by its State Water Policy in 2003. While the policy states that industrial and commercial use of water is the second priority in water use, the community insists that agriculture, fisheries and agro-based industries must instead be restored to the second priority level as in the case of the National Water Policy. Very strong views have been expressed against the water use priorities set by the State Water Policy, and will be included in redefining the priorities for the Wainganga River basin.

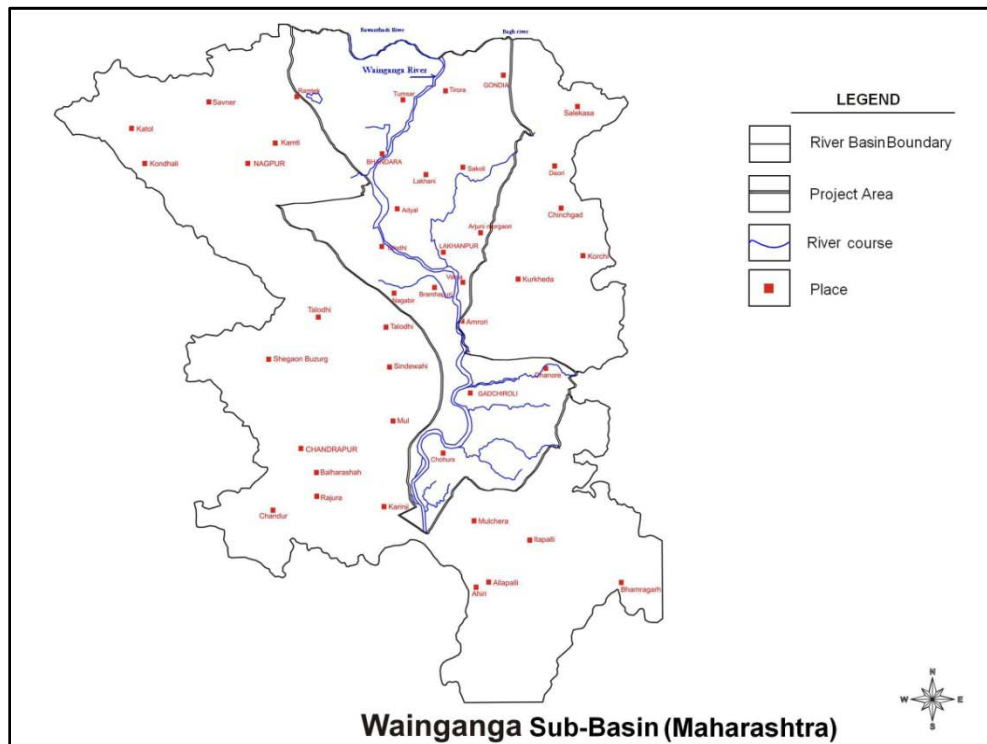
People were inclined toward the development of tourism, agriculture, fisheries, and agro-based industries rather than large-scale investment in conventional industrial development or thermal power plants. This turned out to be a fundamental divergence in the thinking of Government on the one hand and the community on the other hand. Where the society wants gradual development with investments for projects with a low to medium risks and medium returns while the government wants high-impact, high-investment led growth and development.



A SHORT SUMMARY OF THE INCEPTION REPORT

The Inception Report for the Integrated Development and Management of water resources of the Wainganga Sub-basin was submitted to the Water Resources Department, Government of Maharashtra.

The Inception Report gives the International, National and State level policy and legal framework which forms the basis of water development and distribution priorities. It proposes the changes in policies in the context of the Wainganga River basin, owing to the specific socio-economic conditions of the region. The concept of change in water allocation priorities is an important contribution of the stakeholder meetings and our negotiation with the State Government.





A brief background to the emergence of Integrated Water Resources Development and Management is elaborated, and an overarching vision is evolved from the various approaches found from across the world. From the Gomukh's prior research and experience it was found that Integrated Water Resources Management has more or less remained on paper due to the absence of communication between various inter-related administrative departments, stakeholders, etc. Therefore, a new concept is introduced in the process of Integrated planning and Management of Wainganga River basin called the 'Negotiated Approach'

This approach has been defined as, - **"A future where communities (whether living in upper water-sheds, forests, on river banks, in rural or urban areas, estuaries or in flood-plains) are aware that they themselves have to act and respond locally to the multifarious impacts of the water crisis, and build up their own institutional structures and management practices which can be up-scaled from the micro-catchments to the river basins, and which are socially, politically, economically and technically within their control."**

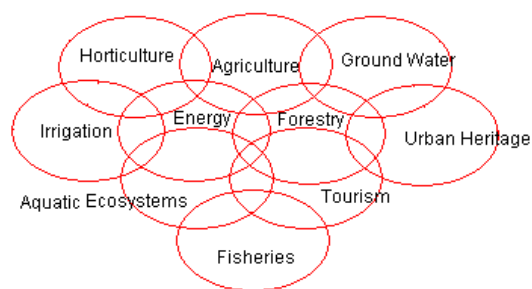


Figure - 1 Simultaneous Integration



The Negotiated Approach involves stakeholder participation, gender equity and participation, bottom up approach, use of appropriate technology and process of negotiation for integration.

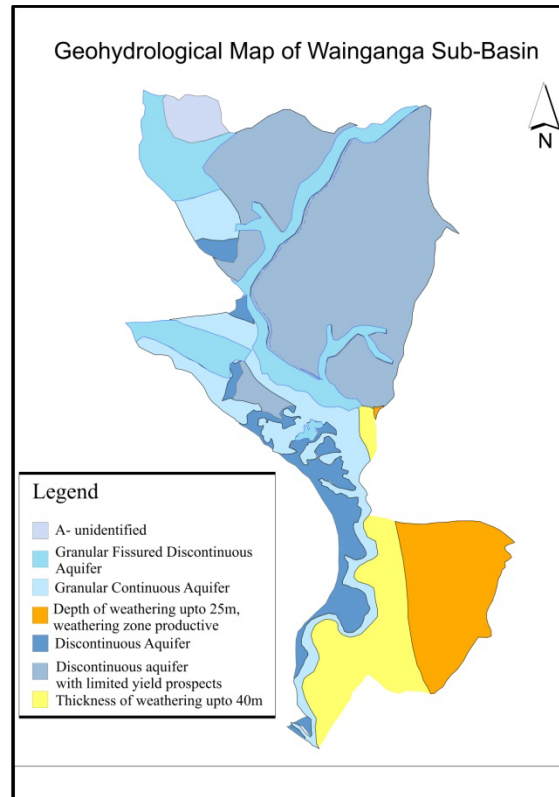
Based on our approach and thorough field work and stakeholder contribution, an overarching objective has been formulated. The objective of the Wainganga River Basin Management Planning is, ***“to develop and manage the water, land and forest resources, by integrating and synergizing the institutional and human resources in such a manner that the basic needs of the present generation are equitably satisfied without compromising the needs of future generations living in the Wainganga sub-basin in Maharashtra”***

Investment priorities have been elaborated based on a few new concepts of economic evaluation criterion- ‘Maximum Social Welfare’ criterion, the ‘Regional Balanced Growth’ criterion, and the ‘Techno-administrative’ criterion. These criteria try to integrate the effects of resource development and projects on societies normally called ‘externalities’ or factors which are not expressed by the market and goes beyond the conventional ‘maximum returns to investment’ factors.

Implementation of the IWRM needs a strong institutional framework, and the principles for such framework are described in the Inception Report, including points such as ‘Water Governance’, ‘Water Management’, etc.

The Inception Report then goes on to elaborate the physical, historical, social, and cultural conditions of the Wainganga River Basin. A thorough analysis of the strengths, weaknesses, threats and opportunities in the Wainganga River Basin is elaborated based on field observations and stakeholder discussions.

The planning and implementation cycle, with the numerous iterations for negotiations and participation have been elaborated so as to explain the process of IWRM and the NA.



Based on this analysis, a strategy for data collection is described in detail. Various parameters affecting the Wainganga River Basin are enlisted. A general overview of the current scenario of these parameters has been described. Our approach to solving the issues related to these factors taking an integrated perspective has been elaborated. These parameters include- Land and Land use Development and Management, Water Resources Development, Water shed Planning and Management Water Resources Management, and development of water uses such as Power, Tourism and Pisciculture.

The Inception Report has been attached as **Annex III**.



Annex- I

Wainganga Khore Abhyas Gat Meeting

27th June 2010

J. M. Patel College, Bhandara

**Organized By : Gomukh Trust, Pune, Convener
(West Zone Water Partnership)**

**Supporting Organizations: Bhandara Nisarga Va Sanskruti Abhyas Mandal, Bhandara.
SRUJAN, Pandharkawda.**

Mr. Ajay Dolke of SRUJAN welcomed the participants from Bhandara, Gondia, Gadchiroli, Chandrapur and Nagpur districts. In his introductory address he stated that the Government of Maharashtra has undertaken the task of preparing basin wise management plans of the major river basins of Maharashtra. The Godavari basin is first selected for preparation of such plans. The Godavari basin is divided under 30 sub basins, Wainganga is one of them. Seven agencies are appointed to undertake the task.

Session – I : 10.30 a.m. to 1.00 p.m.

Prof. Ramesh Ladkhedkar was unanimously requested to preside over the first session.

Agenda.

- a. Concept of Integrated River Basin Management. Background and Principles.
- b. Stock-taking of Natural resources and Human resources within Wainganga.
- c. Presentations by different stake-holders viz.
 - i. Traditional tank builders of Bhandara
 - ii. Fishing Community along the river
 - iii. Farming Community.



- iv. Forest Dwelling Communities (Mendha, Lekha, Gondia)
- v. Representatives of NGOs (SRUJAN, BNSAM etc.)
- vi. Bhandara City representatives
- vii. School Teachers
- viii. Water Resource experts

Introduction:

Prof. Vijay Paranjpye of Gomukh Trust provided the brief background of taking up the approach of basin wise management plans by the Government. Maharashtra State has taken up the water sector review and reforms from 1999-2000. The international financial institutions also promoted these reforms and basin wise management of water resources. In the year 2002, draft of Maharashtra Water Resources Regulatory Authority bill has been prepared and it is finally enacted in 2005. During the same period another act related to water has been passed, i.e. Maharashtra Management of Irrigation Systems by Farmers Act, 2005. He explained the key principles of IWRM and stated how they could be applied in practical terms at the river basin level (IRBM). He stated that this workshop was conducted by the **Gomukh Trust in its capacity as the convener of the West-Zone Water partnership with financial assistance India Partnership.**

He explained that the primary objectives of this meeting and subsequent work-shops were:

- a) **Develop a participatory master plan with inputs from all stakeholders, which could be adopted and owned by the community for implementation.**
- b) **Sub-groups could be formed for collecting base data on key subjects related to Integrated Water Resource Management.**
- c) **Responsibilities could be taken up by individual groups to arrive at a set of proposals or investment projects which would constitute the Master Plan.**
- d) **Arrive at a system of exchanging information between the stakeholders and the sectoral government agencies like Irrigation, Agriculture, Forestry, Fisheries, Hydro-power, Urban Water supply, Pollution Control Board etc.**



Wainganga Basin Development Plan:

Prof. Paranjpye further shared the details of this planning process. This activity should be completed till June 2012 and is meant to plan the water resources according to the needs of various water users.

He further stressed the point that besides the government departments and sectors, integration should also include all natural aquatic eco-systems, and traditional water management systems like the Gond Tanks etc. He also mentioned that the impact of climate change on the Wainganga River System should form the part of study and should include flood forecasting and mitigation.

The plan for Wainganga basin should be supportive and complementary to the plans of other sub-basins in the Godavari River Basin. It should not be planned in isolation, but has to be in symbiosis with other basin plans. It is expected that there should be sectoral, organizational, natural, social, economic and cultural integration in the plan in order to attain high level of synergy.

The plan should be made with the perspective of 20 years, i.e. 2010 to 2030. It should consider the natural changes that will take place in this period. Sustainable development and economic viability should also be important parameters for planning.

Participants' Views:

After the introduction, the session was open for statements by the participants on this planning activity, which were as follows:



Mr. Mohan Hirabai Hiralal:

- ✓ There is the need to integrate the provisions of progressive pro-people acts and policies. Unit of management should be micro watershed.
- ✓ Denial of watershed works in forest prohibits ridge to valley approach of watershed development.
- ✓ Biodiversity act provides a unique platform not just for water but also for other natural resources with equitable sharing of resources.
- ✓ A People's Biodiversity Register needs to be compiled to document natural resources as perceived by forest dwellers, and would subsequently be used for planning and developing the water resources.
- ✓ The Forest Rights Act provides for community rights over forest that could lead to micro watershed based management.

Devaji Tofa and Mohan:

They would like to contribute their experience on Kathani river of Dhanora tahsil and would be willing to compile data and make an assessment of the resource base.

Prof. Vijay Paranjpye:

- ✓ He highlighted the importance of local water management systems, like water tanks in Bhandara, different types constructed by the Kohli community (*bandharas*).
- ✓ He also suggested looking in to the issue of how water related acts could include the role of Biodiversity Management Committees as mentioned in The Biodiversity Act.

Mr. Devaji Tofa:

- ✓ He highlighted the point of people's participation and benefits to people which include information sharing. This will ensure confidence amongst people and their support to developmental activities.



- ✓ He suggested that the budgetary provisions should directly reach to *Galli* (village) from Delhi (state).
- ✓ He suggested that intellectuals and working class people should collectively plan all development activities.
- ✓ He also stated that community tenural rights, as practiced of tribes of Gadchiroli are more appropriate than the system of individual rights regarding natural resources like water, forest etc.
- ✓ Management, measurement and survey by local people will lead to legitimate distribution of resources including water.
- ✓ *Gram Sabha* should be a supreme body for planning and conflict resolution.

Mr. Ramesh Ladkhedkar:

- ✓ He suggested the formation of sub groups that should go into the details of different acts and their impact on development of Wainganga *Khore* development plan.

Dr. Ulhas Phadke:

- ✓ He stressed the importance of water literacy, particularly amongst politicians, which will lead to meaningful planning of Wainganga basin.
- ✓ He also stated that listing of constraints will lead to suggestions on development of river basin.

Mr. Manish Rajankar:

- ✓ He highlighted the undesirable shift in prioritization of water from irrigation to industry.
- ✓ He pointed out the contradictions in approaches of different departments related to water e.g. fishery, agriculture, revenue, forest, irrigation. Each of these departments guards the interests of only their individual departmental programs. They don't have inter-links with others which results in depleting the opportunities for livelihood of the communities dependant on water.



Mr. Mukund Dhurve of Gondia Nisarga Mandal:

- ✓ He insisted on paying attention to wildlife and its need and dependency on water. He sighted example of *Saras* crane and its dependence on water resources and particularly on river during summer. He also noticed that there were huge flocks of *Saras* cranes during the migration season.

Mr. Subodh Kulkarni of Dnyanprabodhini:

- ✓ He highlighted that mistakes made in the past and mistakes likely to be made related to water management should be documented.
- ✓ Current entitlement on water resources should be recorded on an urgent basis like community rights, institutions etc.

Mr. Manohar Bhrushundi, Retd. Director, Fisheries Deptt.:

- ✓ He sought information for developing a perspective plan for fisheries in the proposed integrated plan.

Prof. Paranjpye assured that all information available with Gomukh will be shared with all groups to facilitate further studies.

Mr. Ulhas Phadke:

- ✓ He explained his experiences during his tenure with Chitale commission (which completed and published as the 2nd Water Resources and Irrigation Commission Report in the year 1999). He insisted on deciding priorities and setting standards for utilization of water, since at present irrigation is provided on community basis while farming is an individual activity. He concluded that this leads to disputes on water.



After the sharing of experiences by participants, first session was ended at 1.40 pm and post lunch session commenced at 2.30 pm.

Mr. Mohan Hirabai Hiralal was unanimously requested to preside over the second session.

This session focused on identifying roles of different groups in the Wainganga basin.

Mrs. Rekha Panke, (erstwhile) Head Mistress, *Nutan Kanya Vidyalaya*, stated that their school had undertaken the exercise of studying Wainganga with students' participation. Wainganga *stotra*, a motivation for taking up this exercise, was written by *Shankaracharya* in the ancient past, during his stay at *Pauni*. Cultural heritage of Wainganga basin should also be documented as this is linked to the status of the river. A decision was taken to form a sub group on cultural and religious, philosophical and educational aspects of Wainganga basin.

Mr. Mohan Hirabai Hiralal suggested that small studies should be taken up, the results of which would provide immediate benefits to the local population. International bodies alone can not empower local institutions. Therefore local communities need to take the responsibilities of empowering themselves.

Prof. Paranjpye responded by assuring Mr. Mohan H.H. that efforts would be made to raise financial support for such studies.

Groups formed and responsible persons:

Geological formations and water management
In Wainganga basin

Mrs. Yogini Dolke
Assistance- Mr. Shripad Chitale



Pollution impact on biodiversity in reference
To the Gosekhurd dam

Dr. Ulhas Phadke
Assistance- BNVSAM, Mr.
Bhrushundi, Bhandara fisheries Co-
op. federation.

Integrated Management plan of Kathani sub-basin

Mr. Mohan, Mr. Subodh
Kulkarni, Mr. Devaji Tofa, Mr. Nitin
Barsinge

Traditional water Management and its
importance in Wainganga basin (*Malgujaree* Tanks)

Mr. Manish Rajankar
Assistance- Dr. Shriram
Bhuskute, Dr. Vijay Tiwari
BNVSAM staff, Mr. Bhrushundi.

Aquatic flora and goods and services offered
by Wainganga river

Mr. Keshav Gurnule
Assistance- Mr. Manish, VNHS, Dr.
Shriram Bhuskute.

Impact of the Gosekhurd Dam on prawns
And fishes in an upstream of the reservoir

Mr. Manohar Bhrushundi
Assistance- Dr. Ulhas Phadke

Cultural, religious, philosophical and educational
aspects of Wainganga

Mrs. Rekha Panke
Assistance- Nisarga Seva Sangh, Mr.
Harishchandra Borkar, BNVSAM

Wainganga Khore Abhyas Gat an e-group has been formed.

It was also suggested and accepted that all meetings of the study group should be held within Wainganga basin.

Gomukh Trust will issue letters to the groups regarding access to information from government offices.



All the responsible persons of concerned groups should prepare a framework of study and list of resources required in a period of one month and send it to Mr. Manish Rajankar, BNVSAM. The consolidated list will be sent to the Gomukh's office.

Every group agreed to send a brief monthly report to Gomukh trust, Pune.

Persons to be contacted to be included in the group in future:

1. Mr. Vilas Bhongade, Gosekhurd Sangharsh Samiti
2. Prof Kundan Dupare, Dhanora
3. Mr. Suresh Chopne
4. Mr. Sanjay Vaidya
5. Mr. Dudhpachare, Jalburadari, Chandrapur
6. Mr. Avil Borkar, Gramin Yuva Pragatik Mandal

The next meeting of the group will be held at Nawegaon Bandh on 25th/26th September 2010. All participants should reach on 25th morning so the meeting can start by 11.00 a.m. on 25th September, 2010.

Mr. Manish Rajankar expressed the vote of thanks.



List of Participants of the 27th June meeting:

Sr. No.	Name & Address	Contact details
1	Mr. Ramesh Ladkhedkar VNHS, 90, Lendra Park, Ramdaspath, Nagpur.	992304979
2	Mr. Manohar Bhrushundi Hanuman Nagar, Nagpur.	0712-2750511
3	Dr. Ulhas Phadke,	9420515400
4	Mr. Dnyaneshwar Bodkhe,	
5	Mr. Mukund Dhurve, Gondia Nisarga Mandal	9960144505
6	Dr. Amol Padwad, Bhandara Nisarga Va Sanskruti Abhyas Mandal, Tondon Ward, Bhandara.	amolpadwad@gmail.com 9326911033
7	Mr. Devaji Tofa Mendha (Lekha), Tah Dhanora, Dist. Gadchiroli	9421734018
8	Mr. Subodh Kulkarni Dnyanprabodhini,	subodhkiran@gmail.com
9	Mr. Nitin Barsinge, VEDHA, phule ward No.3, Gadchiroli	nitinvedha@rediffmail.com 9423122954
10	Mr. Keshav Gurnule, SRISHTI, At Yerandi, Post Gothangaon, Tah. Kurkheda, Gadchiroli	srishti.org@gmail.com 9420144035
11	Mr. Mohan Hirabai Hiralal Vrikshmitra, Near Chiddarwar Hospital, Ramnagar, Chandrapur	mohanhh@gmail.com 9422835234
12	Mr. Umaji Kadrupawar Lokmangal, Ghot, Dist Gadchiroli	



13	Mr. Mukesh Thantharate Bhandara Fisheries cooperative Federation, Bhandara	
14	Mrs. Rekha Panke, Nutan Kanya Vidyalaya, Bhandara	07184-254328
15	Mrs. Dipti Kurode, Nutan Kanya Vidyalaya, Bhandara	
16	Mrs. Nilu Bhadade Nutan Kanya Vidyalaya, Bhandara	
17	Mr. Roshan Chaudhary, BNVSAM	9325273477
18	Mr. Dilip Pandhare BNVSAM	dilip.bnvsam@gmail.com 9403906703
19	Mr. Ajay Dolke SRUJAN	9371136429
20	Mr. Devdatta Shrotri Gomukh Trust, Pune	9822743541 datta_shrotri@rediffmail.com
21	Prof. Vijay Paranjpye Gomukh Trust, Pune	9922009749 paranjpye@yahoo.com
22	Mr. Rama Wairkar Amhi Amchya Arogyasathi, Kurkheda, Gadchiroli	9623462100
23	Mr. Manish Rajankar BNVSAM	manishrajankar@gmail.com 9423118307
24	Mr. Ijamsai Katenge Amhi Amchya Arogyasathi Kurkheda, Gadchiroli	9422728937
25	Mr. Waman Turile Correspondent, Loksatta, Bhandara	9404531740



Annex II

Report of the second meeting of the stakeholders

Wainganga Sub-basin, Godavari, Navegaon Bandh National Park (Dist. Gondia), on the 25th September 2010

Direct participation and contribution of stakeholders has been found to be of crucial importance in the Integrated Water Resources Development and Management Planning. It ensures realistic and socio-culturally grounded problem identification, analysis and leads to deliverable solutions.

In view of this, Gomukh had invited Civil Society Organisations and Research organisations active in the Wainganga River Basin Area to participate in the IWRDM Planning process.

Several experts, social workers, scientists/researchers, representatives of local communities from CSOs and individuals have come together to form the 'Abhyas Gat'. The members of the Abhyas Gat have an extensive outreach in the large and small communities – tribal, urban, rural, pastoral, and agricultural – in the project area and are well acquainted with the local perspectives and aspirations.

Their opinions, ideas and suggestions thus, will substantially determine the planning process.

The first meeting of the Abhyas Gat was held on the 27th June 2010, at Bhandara, where the organisations were first introduced to the project, its purpose, etc. They came to the consensus that they would contribute toward the process and will form a formal team of researchers for this purpose. The 2nd Abhyasgat Meeting followed the preparation of the Draft Inception Report, which gives a general idea about the scope of the work to be done, the resources that are needed and Gomukh's approach towards planning of the water resources of the Wainganga Basin.

The objective of the meeting was to evolve a process of building stakeholder participation and the forum necessary to involve and include as many segments of society as possible in the decision making process. Each participant NGO was welcomed to speak about the framework, approach, or methodology they would take to encourage stakeholder participation in their selected region and field of work. The models and methodologies adopted by these NGOs will in future help in developing a grounded approach toward the Master Plan.



The following were the main speakers of the meeting:

Speaker:

Mr. Mohan Hirabai Hiralal spoke about the

Importance of local self-governments and its role in water management

Need to increase accountability between gram sabha, gram panchayat and authorities like Irrigation Department, Agriculture Department, etc.

Need to develop adaptive management techniques for resource management

Need for training of village/ local youth in technologies for water collection and harvesting, creating farm ponds, sewage treatment methods etc. from government departments

Authentication of innovative approaches taken by communities for resource development and management by related government departments

Speaker:

Mr. Mohan Bhrushundi gave the points on which a fisheries development plan can be based and also gave a general idea about the problems associated with it, based on his experiences in the Wainganga river basin.

Finance and organisational form (co-operative/ individual/ government/ schemes)

Water bodies (already available/need to develop)

Market demand (export oriented/ local market approach)

Manpower available

Cold storage facilities

Environmental impact of selected species

Ecosystems view in fisheries (fish diversity, selection of local species)

User rights over new water storages, policy for fish farms, etc.



Speaker:

Mr. Panke suggested that an ethical and theological approach to river basin management can have a larger outreach in the community. He suggested the following points

Undertook a 'Wainganga Lok Yatra' or a walk along the entire length of the Wainganga River in Maharashtra

Development of this concept for creating public awareness regarding the sanctity, ecological importance, need for conservation, ways of conservation of Wainganga River.

Described cultural avenues toward protection of Wainganga and community awareness eg. mobilising school students, documenting folk literature about the river, etc.

Undertook the renovation of the main temple at Pauni in his capacity as trustee and wishes to promote the center for eco-tourism and pilgrimage.

Speaker:

Mr. Rajkamal Job represented the socio-cultural group and proposed the following aspects on which activities will be developed

Comparative study of current and traditional water systems based on their suitability for the geo-climatic conditions of the Wainganga river basin

Identification of tourism and traditional sites for development of eco-tourism plans

Developing water literacy material

Documentation historically important sites, folk art, folk songs, etc.

Document natural heritage sites

Document the inter-relationship between culture and flora and fauna



Speaker:

Mr. Nitin Barshinge spoke about the

Need for development of livelihoods, especially in Naxalite areas

Training of community for resource management and also about the capacity building of local communities to be resilient towards exogenous influences

Ownership rights over water resources in villages should rest on the village community, but the community must also be able generate employment opportunities from the same

Speaker:

Mr. Keshav Gurnule spoke about the fishing community (Dhiwars) and the problems associated with the tributaries of the Wainganga River

There is a drop in the catch and also in the diversity of fishes in the catch

Need for re-establishing natural water course along the rivers, with habitats for prawns, areas for laying fish eggs, etc.

Need for establishing and training co-operatives of fishing communities, which can then be entrusted to carry out restoration activities

Speaker:

Mr. Manish Rajankar spoke about the

Need for studying the Traditional tank systems,

Need for studying the flora and fauna supported and protected by tank systems

Need for listing of species, populations, of the flora and fauna of the region

Need to study the effect of invasive as well as introduced species of fish on local fish species, especially species introduced under pisciculture



Minutes of meeting:

Proceedings of NGO meetings, discussions, reports given to WRD, etc. will be circulated among the participant organisation, in hard and soft versions

All proposals can be in Marathi and English (and Gond) if possible. Preferably translations can be done by the organisation/ individual generating the initial document.

However, translations may also be done at Pune by professionals, and copies of which will be sent for review by members of the study group. The translator and author of original report can stay in communication to ensure meaningful, context specific translation.

All lists / draft study proposals to be sent to Pune Office on or before 10th October 2010.

Draft proposals of potential development projects by all participating NGOs can be submitted on or before 15th November 2010, ahead of the next stakeholders' meeting.

MoUs will be prepared by the Pune Office in the month of October, after receiving lists/ draft proposals from NGOs.

The WRD (Godavari Khore) will be requested to provide a letter stating that - all data should be made available to the study groups, that the group is collecting data on Gomukh's behalf and that there is an MOU to that effect, by the Pune Office.

All projects consistent with the legal and institutional framework mentioned in the Draft Inception Report can be included in the Draft Master Plan.

An NGO can divide itself into sub groups which can generate two kinds of data – secondary data, primary data. They are welcome to use 'resource persons' and expertise appointed by the Pune Office.

They are to focus on project identification and elaborating development projects rather than implementation. Implementation of projects will be proposed to the State Government through the Master Plan.

All NGOs will make an effort to understand the Governmental logic behind certain schemes and policies enacted in the Project Area, while finding the solutions or alternatives to these.

Conduct rapid, result oriented surveys, raise questions, enlist pros and cons, possible solutions and then develop proposals.



Give details of how decisions can be reached upon ie. focus on developing approaches to ensure holistic, grounded solutions rather than on finding final solutions.

Prepare budget – short term (2 months) , long term (8 months)

Creating simplified data, establish bottom-up and top-down flow of information and act as a facilitating agency in addition to carrying out pro-active work and plans.

Final decisions are to be taken by NGO groups as a whole, by discussing alternatives on conflicting issues.

The organisational set-up of stakeholders will be in the form of round-table.

Peer level data generated will be disclosed to people, preferably in the cognitive framework most preferred by them (models, numeric, symbolic, etc.)

Gram-sabha centered participation to be encouraged in project areas. People are to be encouraged to prepare Water registers at village level on the lines of Biodiversity Register.

The study group will deliberate on the 'decision making and management' procedures, institutional structure, strategies and on enabling institutional framework. Shri. Mohanbhai has agreed to prepare the initial concept note.

Mr. Paritosh Job was requested to help in analyse, compare and prepare a note about the District Gazetteers of 1908 and 197(8), history of the Project region and other significant aspects covered in them. He has agreed to do the same.

Next meeting is to be held in Lekha-Mendha, Gadchiroli on the 21st and 22nd of November 2010. Attendance for this meeting by all NGOs will be made obligatory in order to ensure commitment to the subject and constituency which the group represents. All efforts will be made to inform groups/ individuals/ stakeholders in time in order to ensure maximum attendance and involvement/ participation.

Gram Sabha is to participate in meeting to be held at Lekha-Mendha. They are to be introduced to concept of River Basin Management Plan, and shall contribute in brainstorming and project identification, discussion of proposals. Shri. Mohanbhai and colleagues to take responsibility of the arrangements

Mr. Manish Rajankar gave a vote of thanks



Expected Outcomes:

Plans on:

Urban water management

Eco – Tourism

Kathani River Sub- Basin Plan ensuring environmental Flows

Fisheries

Sustainable Agriculture

Biodiversity

Water related Heritage Conservation (18th century Gond Talavs/Malguzari Talavs)



List of Attendees

Sr. No.	Name	Group Represented	Organisation
1	Vijay Paranjpye	Project Co-ordinator	Gomukh
2	Manish Rajankar	Gond Tanks	BNVSM
3	Mohan Hirabai Hiralal	Kathani River	Vrikshamitra
4	Rajkamal Job	Cultural/Historical	BNVSM
5	Mr. Nitin Barshinge	Dhiwar Community	Vrikshamita
6	Mr. Prabhakar Panke	Tourism/ Spirituality	Independant
7	Mr. Dileep Pandhare		BNVSM
8	Mr. Keshav Gurnule	Aquatic Flora	Srushti
9	Mr.Paritosh Job	History/ Architecture	BNVSM
10	Mr. Ashwin Paranjpe	Agriculture	Gomukh
11	Mr. Bhrushundi	Pisciculture	Independant
12	Ms. Indira Vethi	Social	BNVSM
13	Ms. Anuja Date		Gomukh
14	Ms. Manda Kejharkar		Srushti
15	Ms. Ranjana Job		Individual
16	Ms. Suhasini Job		Individual
17	Mr. Avil Borkar	Agriculture	Individual



INCEPTION REPORT

PREPARING A MASTER PLAN FOR INTEGRATED DEVELOPMENT AND MANAGEMENT OF WATER
RESOURCES OF

WAINGANGA SUB-BASIN (GODAVARI) IN MAHARASHTRA



Mudhara, Origin of Wainganga, (Ugama Sthana).

Submitted to:

Chief Engineer, Water Resources Department

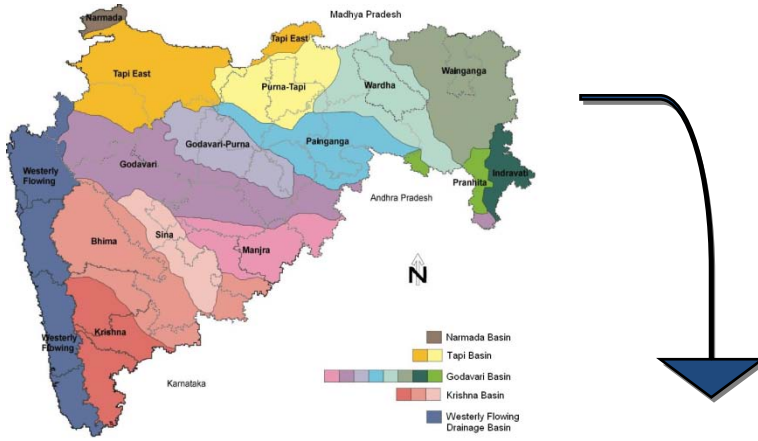
Government of Maharashtra, Aurangabad

Gomukh Environmental Trust for Sustainable Development

19th October 2010



WAINGANGA SUB BASIN



River Basins in Maharashtra



Wainganga River Course
showing its Major
Tributaries

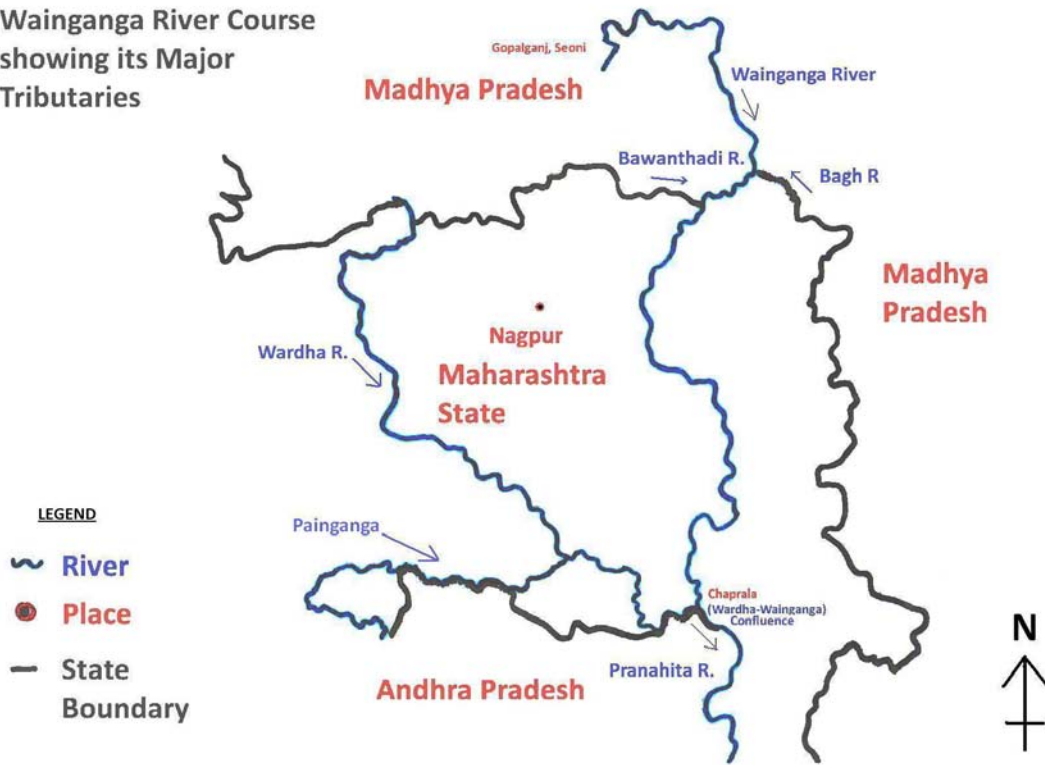




Table of Contents

Particulars.	Page No.
<u>PART - A. Approach, Objectives & Conceptual Framework</u>	1-19
1. <u>Background and Concepts.</u>	1-9
1.1 Policy and statutory framework.	1-4
1.2 Approach and Conceptual Framework.	4-9
1.2.1 The Long Term Vision	4-5
1.2.2 IWRM Principles as a Negotiated Approach	5-9
2. <u>Objectives.</u>	9-11
2.1 General Objective	9
2.2 Specific Objectives.	9-11
3. <u>Methodology.</u>	11-14
3.1 Stages & sequences of developing the Master Plan.	11-12
3.2 Planning Cycle.	12-14
4. <u>Investment Priorities & Financial Aspects.</u>	15-16
4.1 Investment Priorities.	15-16
4.2 Financial Aspects.	16
4.3 Expected Socio-Economic Impacts.	17
5. <u>Institutional & Legal Arrangements.</u>	17-19
5.1 Importance of enabling institutions (Legal & Administrative Arrangement).	17
5.2 Water Governance	17-18
5.3 Water Management	18
5.4 General vs. functional water management.	18-19
5.5 Weakness & Gaps in Management.	19



Table of Contents (Contd..)

Page No.

PART - B.

6.	<u>Current Status of the Wainganga River Basin.</u>	20-29
6.1	Geographical Area & Location of the Project Area (Pr. A.).	20
6.2	The Project Area within the Wainganga Sub-basin.	20-21
6.3	Description of River System.	21-23
6.4	History of the Wainganga Sub-basin.	24
6.5	The Status of Human Development in Wainganga Sub-basin (Socio-Economic Indicators)	25-26
6.6	Status of Forests	27-29
6.7	Traditional Water Management Systems.	29

PART - C. Constituents of the Wainganga Sub-basin Master Plan.

7.	Assessment of the Project Area (Pre-Plan)	30-33
	<u>SWOT Analysis of Wainganga Basin.</u>	30-33
7.1	Strengths.	30
7.2	Weaknesses.	31-32
7.3	Opportunities.	32
7.4	Threats.	32-33
8.	<u>Land Use Planning, Development & Management.</u>	34-39
10.1	Geology.	34
10.2	Soils.	34
8.3	Land Use Pattern.	34-39



Table of Contents (Contd..)

Page No.

8.4	Development and Management of Galper Lands.	40
8.5	Diversion of agricultural land to non-agricultural activities.	40
8.6	Land acquisition, Resettlement and Rehabilitation.	40
9.	<u>Water Resources Development.</u>	40-51
9.1	Geo hydrology.	40-45
9.2	Ground Water Availability.	46-48
9.3	Hydrometeorology (Hydrology).	49
9.4	Surface Water Availability.	49-50
9.5	Tribunal Awards.	50
9.6	Prevention of Water Losses& Evaporation Control.	50-51
10.	<u>Water ResourcesManagement.</u>	51-60
10.1	Irrigation Management Plan.	51-53
10.2	Domestic & Industrial Water Supply (Urban & Rural).	53
10.3	Use of Modern Tools & Water Saving Techniques.	53
10.4	Ground Water Management/Conjunctive Irrigation.	53-54
10.5	Watershed Development & Management.	55-58
10.6	Recycling, Reuse and Multiple use of Water.	59
10.7	Water Quality.	59
10.8	Drought mitigation.	59-60
10.9	Traditional Water Devices for Water Management.	60
10.10	Intra-Basin Divergence.	60
10.11	Water Balance.	60-61



11.	<u>Disaster Management (Flood, Earthquake, Drought).</u>	61-62
12.	<u>Water for Energy.</u>	62-63
13.	<u>Tourism.</u>	63-64
14.	<u>Fisheries.</u>	64-65
15.	<u>The Issue of Farmers' Suicide/Financial Institutions.</u>	65
16.	<u>Action Plan.</u>	65
17.	<u>Establishment of Offices in the Sub-basin.</u>	66
18.	<u>Work Plan.</u>	66-67

Annex I	:	List of Abbreviations.
Annex II	:	List of References.
Annex III	:	Bhandara the Lake District; Paper by Vijay Paranjpye, 2002.
Annex IV	:	List of fish species in Wainganga River.
Annex V	:	List of Staff Members along with Tasks assigned.
Annex VI	:	List of Tables, Maps, Figures.
Annex VII	:	A3 size map of Project Area Demarcated.
Annex VIII	:	PERT Chart of Work Planned.



PART - A. Approach, Objectives & Conceptual Framework.

1. Background and Conceptual Framework.

1.1 Policy and statutory framework.

The need for integrating different sectors working within river basins has been felt since the 1980's. A special Working Group for the Chapter on Irrigation and Flood Control appointed by the Planning Commission of the Government of India for the 7th and 8th Five Year Plans had made recommendations asking for the preparation of river basin plans which looked at ground water, surface water, irrigation and flood control, rural and urban water supply as a whole, for planning and development purposes. However, due to various administrative and legal problems, such river basin plans did not get prepared. The same problem existed at the global level as well, since the sectoral approach, limited by administrative and political boundaries, continued to prevail as the basis of water resource development.

At the international level The Government of India (GOI) became one of the early signatories and parties to the key documents which emerged from the United Nations Conference on Environmental Development (UNCED) held at Rio-de-Janeiro, Brazil, 1992. One of the key documents was Agenda-21, wherein for the first time the concept of Integrated Water Resources Management was elaborated and accepted at the scientific as well as geo-political level. Chapter-18 on "Protection of the Quality and Supply of Water Resources: Application of Integrated Approach for the Development and Management of Water Resources" laid out the elaborate background, rationale, principles and logic of IWRM principles.

The Central Water Commission, GOI, has also been periodically advising the state governments to prepare river basin plans during the past two decades, and it was in the National Water Policy, 1987 and later in the revised National Water Policy, 2002 (NWP) that the preparation of plans for each "*hydrological unit such as drainage basin as a whole or for a sub-basin multi-sectorally, taking into account surface and ground water for sustainable use incorporating quantity and quality of the aspects as well as environmental considerations*" was promulgated as a part of National Policy. Further, the idea of treating it as a "*multi-disciplinary and participatory approach*" was elaborated, and the need for harmonizing various water uses was established. In addition, project planning was to be done by emphasizing on the "*preservation of the quality of environment and ecological balance*", as a primary consideration. Similarly, the policy asked for a "*dose integration between water use and land use policies*", and the reclamation of water-logged or saline-affected lands was to be treated as a part of irrigation planning process. It was stated that, inter-alia, the "*minimum flow should be ensured in the perennial streams for maintaining ecology and for social considerations*".

(These policy recommendations are of special significance to the Wainganga River Basin because the Wainganga is probably the only river in Maharashtra which is perennial in nature.



Accordingly, these key directives of the National Water Policy mentioned above have been considered and included in the objectives elaborated for Master Plan of Wainganga River Basin.)

Subsequently, the **Government of Maharashtra (GOM) announced its State Water Policy (SWP) in 2003**. Although the policy broadly follows the National Policy framework, the Maharashtra State Policy has made certain important additions relevant to the river basin planning, which need to be highlighted.

1. The state policy has recognized **“drinking water as a human right”** which fundamentally goes far beyond the concept of ‘satisfaction of basic needs’.

2. Secondly, the GOM did not stop merely at declaring the policy, but it went on to convert the policy into a statute i.e. (**Maharashtra Act No.XVIII of 2005**); ‘to provide for the establishment of **Maharashtra Water Resources Regulatory Authority (MWRRA)** to regulate water resources within the State of Maharashtra’. The priorities laid down by the GOM are as follows:

Water Use Priorities (MWRRA 2005)

- a. Domestic use for drinking, cooling, hygiene and sanitation needs including livestock.
- b. Industrial, commercial use and agro-based industrial use.
- c. Agriculture and hydropower.
- d. Environment and recreation uses.
- e. All other uses.

Since, the National Policy provides for **“modifications in the priorities, if warranted by the area/region specific considerations”**, we strongly recommend the modification in the priorities for the Wainganga River Basin. A major location specific consideration is the percentage area under forest. The area under forest in the districts of Bhandara (32.74%), Gadchiroli (75.96%), Gondia (44.55%) and Chandrapur (35.52%) are considerably larger than the percentage area under forest in any other district in Maharashtra. Further, the percentage of population dependant on forests and forest based occupations (directly or indirectly) is at least 40% of the total population within the river basin. Similarly, and contrary to general belief, the population directly dependant on fisheries and other water based occupations like harvesting of aquatic plants (roots, stems, flowers, seeds etc.) in inland ponds, tanks and streams is also considerably larger than most other districts/river basins in Maharashtra. **Keeping these characteristics in mind, we strongly recommend that agriculture, forestry and fisheries be given the second priority after drinking and domestic water use, in order to reflect the location specific needs of the Wainganga river basin.**



3. Another important addition made in the State Water Policy is related to the **volumetric supply/release** of water from various sources, creation of bulk entitlements to different user groups and the determination of **water-rates**.

4. However, the positive additional points notwithstanding, there has been an important deletion in the State Water Policy, viz. the maintenance of environmental flows. In

view of the fact that maintaining environmental flows is now (and in future) going to be an obligatory function, we strongly recommend the inclusion of 'environmental flows' as an important consideration for river basin planning (Ref. Cauvery Tribunal Award). **Since the Wainganga is the only perennial river in Maharashtra today, maintaining its ecological integrity is important for ensuring the livelihood needs of a large proportion of the inhabitants within the Wainganga sub-basin.**

Other Acts, relevant to Master Planning of River Basins or sub-basins:

i) The GOM has also passed an important Act viz. "**The Maharashtra Management of Irrigation Systems by Farmers, Act, 2005**" (MMISF) in pursuance of the National and State Water policies. This helped to create a legal framework for motivating farmers to participate through the Water Users' Associations (WUAs). The MWRRRA act, 2005 has further spelt out the ways in which the directions and intentions of the National and State Water policies shall be put into operation. It is within this broad policy and law framework, that the objectives, methodology and work plan have been elaborated in this inception report.

Some other acts also have been taken into consideration, while preparing this Inception Report, which are as follows.

ii) **The Maharashtra Groundwater (Regulation of Drinking Water Purposes) Act, 1993** and the amendments made till 2009.

This act provides for the protection of groundwater used for drinking purposes from over-exploitation, and the legal processes to be followed during water scarcity period.

This law will be considered while planning location of wells and their uses or identifying wells which are used in violation of this law.

Besides the important laws mentioned above, the implications and provisions of the policies and laws and bills stated below will be considered for preparing any resettlement plan, especially in case of major/medium or minor projects/tanks to be suggested in the report.



- iii) Maharashtra Resettlement of Project Displaced Person Act of 1976.
- iv) Maharashtra Project Affected Persons Rehabilitation Act of 1986.
- v) National Policy on Resettlement and Rehabilitation of Project Affected Persons, 2004.
- vi) The Rehabilitation and Resettlement Bill, 2007.
- vii) Land Acquisition Bill, 2010.
- viii) Relevant Provisions from the Indian Constitution (e.g. Article 56 and the 72th & 73rd Amendments of the Indian Constitution).
- ix) Clause 7, of the Development Board of Vidarbha, Marathwada & the rest of Maharashtra.

It may also be mentioned here that, the **Directives dated 27th May, 2009** given by the Hon'ble Governor of Maharashtra under **Clause 7, The Development Boards for Vidarbha, Marathwada and Rest of Maharashtra Order 1994**, relating to the removal of development backlogs, have also been kept in mind while formulating the Inception Report. This directive is of special significance to the Wainganga Project Area because it constitutes districts which have historically suffered from the **Development Backlogs**.

And last but not the least, the **Terms of Reference** provided by the Godavari Khore Authorities in the contract specific to the Wainganga Khore and the checklists provided from time to time will form the basic framework for the preparation of the Master Plan.

1.2 APPROACH AND CONCEPTUAL FRAMEWORK.

1.2.1 The Long Term Vision:

The Gomukh Trust believes that, if human beings are to enjoy a healthy and productive life in harmony with nature, then sovereign states have to ensure that the resultant benefits are equitably distributed within and between generations, without damaging the productive and intrinsic capacity of the natural environment.

Further, the River Basin Approach elaborated here seeks to focus on the implementation of the universally acknowledged 'IWRM Principles' for a better co-ordination amongst water management entities within a river basin, with the objective of allocating and delivering reliable water services, (UNESCO-IWRM guidelines, 2009).

In order to align our approach with the international discourse we have accepted the definition of IWRM provided by The Global Water Partnership (GWP, 2000) as **"a process, which**



promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems”.

Another helpful definition of IWRM given in a recent training manual of Cap-Net (2008) is, **“a systematic process for the sustainable development, allocation and monitoring of water resource use in the context of social, economic and environmental objectives.”**

Further, in recent national/inter-national literature it has been stressed that the IWRM principles, although meant for water resources as a whole, can be best applied at the basin level. Further, they also provide the foundation for progressing towards the longer, global objective of adaptation to climate change and disaster management. Thus, in practice, the operation of these principles is made through the application of the concept of ‘Integrated River Basin Management’ (IRBM).

Have the IWRM principles really been implemented?

We believe that the conceptual frame-work mentioned above has not been put into practice in Maharashtra or other states partly because it has largely remained on paper and on drawing boards, and was rarely implemented on the ground. Further, in the absence of an institutional framework for negotiations between communities and water-users, e.g. industrial and urban consumers, forest dwellers and government departments/sectors etc., a true dialogue or integration could not take place. Further we believe that the removal of these shortcomings will be possible only when a people-centric negotiated approach is adopted for the planning, implementation, execution and evaluation of any river basin plan. We, therefore, propose, **the adoption of The Negotiated Approach, which we propose to use as a strategic tool for management of water resources.**

1.2.2 IWRM Principles as a Negotiated Approach.

The basin assumption of the Negotiated Approach is that unless all the decision makers of various governmental levels and sectors and all the stakeholders keeping within the river basin agree to discuss, negotiate and take consensus decisions through peer level process through the entire project cycle, optimum use of resources cannot be achieved for delivering services or goods.

Therefore the ‘Negotiated Approach’ has a vision which can be elaborated as follows:

“A future where communities (whether living in upper water-sheds, forests, on river banks, in rural or urban areas, estuaries or in flood-plains) are aware that they themselves have to act and respond locally to the multifarious impacts of the water crisis, and build up their own institutional structures and management practices which can be up-scaled from the



micro-catchments to the river basins, and which are socially, politically, economically and technically within their control.”

“Further, we envision communities which have acquired sufficient acumen and competence to be able to effectively negotiate co-manage or self-manage water-related affairs within their respective catchments or at the level of river basins.”

We propose to make a projection regarding the development scenario which is expected to emerge by 2030. It is our expectation that the socio-economic status of the communities in the project area will be improved substantially to enable them to take on the responsibility of co-managing water resources along with government agencies or managing independently.

The Negotiated Approach, when it is applied to IRBM includes the following key elements/principles in order to achieve the required results.

A. Integration:

When the planning, development or management process of any sub-sector or sector within a river basin simultaneously takes into consideration the parameters and important principles of all the other relevant sectors/sub-sectors into the analytical framework (e.g. riparian rights of downstream water users, requirement of navigation, need for maintaining environmental flows, requirements of downstream irrigation etc.), and also looks for alternative options which can simultaneously optimize the objectives of all such sectors, then such a process can be described as integration.

If carried out correctly, an integrative process, leads to synergies or value additions represented by the following symbolic equation:

$2 + 2 + 2 = 8$ (and not six) measured in terms of either physical output or socio-economic benefits. This synergy needs to be especially understood in terms of qualitative advantages (e.g. more equitable distribution of the same service or product; or a better or more reliable quality of service or product etc., which are not easily quantifiable in numerical or cardinal terms).

Further we would like to classify Integration in the following categories:

- (a)** Integration among all **Sectors** (Government Departments, Agencies etc.);
- (b)** Integration among all social, legal, economic, financial and other **Institutions**;
- (c)** Integration among all **Natural Sub-Eco-Systems** lying within the different regions of the river basin.

Integration recognizes the advantages of pro-active **interfaces and linkages** between sectors and eco-systems, leading to synergetic benefits in terms of value addition, cost and time saving etc.



The objective of our planning process will be to introduce a simultaneous integration e.g. synergies will be created by integrating Fisheries with Tourism, which can be further synergized by adding Aquatic Ecosystems and Energy, and then the four could be integrated further by adding Horticulture and Agriculture and so on. The following schematic diagram depicts such an integrating process.

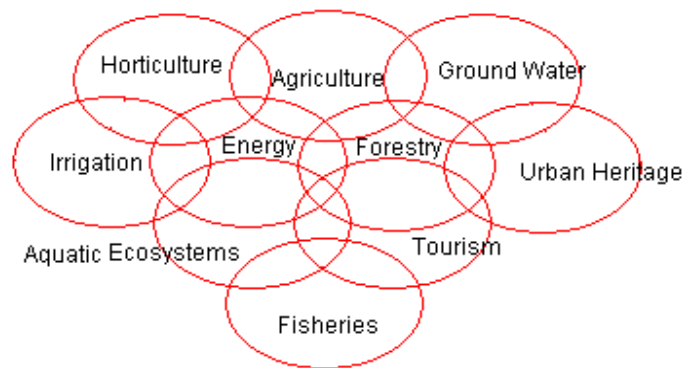


Figure - 1 Simultaneous Integration

The integration process is expected to reduce overhead costs, remove bottle-necks between sectors and improve the product and service delivery by using common facilities and capacities, and improving the competence of personnel working in combination with other sectors. In the figure above, the interfaces shown indicate complementarities between apparently disconnected sectors. For example, the energy sector is able to combine with ground water, surface water, water-lifting and delivery systems, energy (forestry plantations), agriculture, horticulture and eco-systems. Integration also leads to additional ideas and procedures for overall time, cost and energy reduction.

For Integration to take place effectively, an important condition needs to be satisfied. All individual sector experts have to agree to appreciate the importance and value of other sectors, and be willing to make small compromises in order to achieve the larger objectives. Such give and take is possible only through **peer level negotiations**.

B. Up-scaling.

While our approach, in general, would be to proceed from the Basin as a whole (Macro) to Micro, i.e. village as the smallest unit of planning, in terms of integration and capacity



building the approach will be to start from the micro basin and proceed to the macro basin. We believe that both the approaches would be relevant depending on the nature of the activity.

C. Gender Perspective.

The current demographic trends suggest that the population below eighteen years is going to be very large in the near future and with economic development, the proportion of female children is expected to rise in future. Further, women play a central role in provision, management and safeguarding of water. The planning approach will place a special emphasis on ensuring that a proportionate share of the benefits goes to the women, and in case of certain services, even a higher than proportionate share is allocated to the females. In addition, trends suggest that the population of senior citizens (non-working) will also be increasing during the next few decades. Therefore, care will be taken to ensure that the children, old people and women get fair share of the benefits of development.

D. Stakeholders Participation.

Key project stakeholders will be consulted extensively as part of the IDWR. The following participants will be consulted, i.e. government agencies, NGOs, academia experts and others involved in irrigation/water resources management, local people and their representatives (Panchayat Raj, Institutions, State Legislature and Members of Parliament). Specific consultations will also be held focusing on resettlement and tribal issues where the potentially project affected (positive and negative) parties and other stakeholders will be able to participate. Specific consultation will have to be organized to incorporate the views of women, children and elderly citizens on the project design and implementation. District level workshop will be organized for seeking participation of the stakeholders at large. Gomukh Trust will formulate and adopt an effective consultation and participation strategy to get the views of stakeholders on the IDWR. Complete transparency will be maintained throughout the stakeholders' consultation process in order to gain meaningful participation. IDWR will be made public upon its completion and approval with the authorities' permission.

During the last two months, two stakeholder workshops have been conducted and six sub-groups have been formed by the stakeholders. Minutes of these meetings are given in Annexure.

For Kathani sub-basin, the local communities will draw an independent plan in consultation with us (Gomukh Trust). This plan will indicate the documentation and consultation of the existing skills and techniques used by local communities while earning their livelihood. This will form the basis for identifying areas where additional training and skills, techniques could be imparted for enabling them to add value to their services or products. The objective of such training would be to bring about an improvement in their income and living standards.

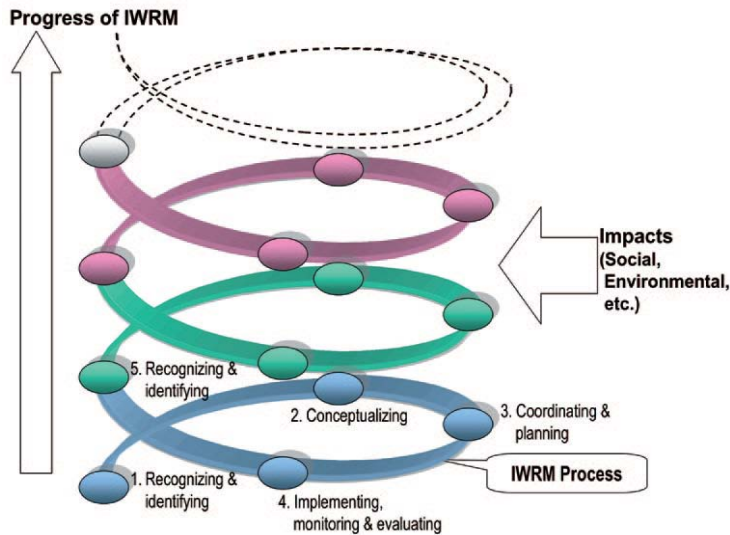


E. Appropriate Technology (AT)

'AT' maybe defined as a technique which is:

- i) Sophisticated to satisfy the time and location specific purpose for which it is to be used;
- ii) Simple enough to be applied, repaired and maintained by the users (given their level of training, education etc.);
- iii) Affordable within the development context (i.e. budgetary constraints, social priorities etc.); and
- iv) Replicable in a contiguous/similar socio-economic and geographical region.

F. IWRM is an iterative, evolutionary and adaptive process, conceptualized as a 'Spiral', which permits immediate action, builds understanding, develops local capacity and creates ownership.



(Source: Guidelines to Principles of IWRM at River basin level, United Nations, 2009.)
Figure - 2 The IWRM Process

G. Our approach will specially aim at developing institutional structures wherein decisions are taken at the lowest appropriate levels. This is now internationally accepted as **the Principle of Subsidiarity**.

H. The precautionary principle: This principle requires that in case of probable threats, steps need to be taken well in advance, rather than waiting too long for the damage to take

place e.g. efforts will be made to anticipate the impacts of Climate Change over the next 20-25 years, to recognize and perceive the problems at the sub basin level and to develop adaptation



and mitigation techniques and procedures in order to ameliorate the negative impacts of Climate change.

I. Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment.

J. Water has an economic value in all its competing uses and should be recognized as an economic good.

2. Objectives.

2.1 General Objective.

The long term, overarching objective of the Master Plan, is to ***develop and manage the water, land and forest resources, by integrating and synergizing the institutional and human resources in such a manner that the basic needs of the present generation are equitably satisfied without compromising the needs of future generations living in the Wainganga sub-basin in Maharashtra.***

In terms of planning, the main objective will be to identify and invest in projects which would quickly improve the people's social and economical status in such a fashion that the socio-economic indicators and the Human Development Indicators (HDI) related to water, sanitation, irrigation and livelihood of the people in the basin can be brought at least up to the State averages by 2020, and later to the level of the most developed districts in the Country by 2030.

2.2 Specific Objectives.

This long term objective is further de-bundled into the following sub- objectives.

2.2.1 The key objective is **to develop and conserve surface water resources and ground water resources in an integrated and simultaneous manner** since water is a dynamic resource capable of supporting all human activities and natural sub ecosystems. We understand that such development would include the development of water impounding structures, equitable distribution and efficient utilization of water resources, in order to maximize the output from agriculture, provide adequate quantities of drinking water and water for domestic purposes for all, adequate supply of water to forest based livelihoods and forest based industries, supply of water to conventional industries while maintaining minimum flows for ensuring the integrity and sustainability of the riverine natural sub-ecosystems.

2.2.2 The second objective is **to identify and set priorities for promoting water resources development projects** in the sub-basin. While identifying development projects the existing shortfalls/surpluses will be assessed in order to find out the specific needs of the Wainganga sub-basin so that they match with the urgent, medium, and



long term needs of all sectors. Since the Wainganga basin is relatively underdeveloped in terms of conventional industrial establishments, special efforts will be made to identify projects which would benefit the existing industries and ensure water for potential industrial units likely to be established till 2030.

2.2.3 The next objective is **to formulate a short term and long term action plan** consistent with the financial allocations and priorities of the State Government in the sub-basin as mentioned in the 11th Five Year Plan of the Government of Maharashtra (2007-2012).

2.2.4 Another objective is **to identify steps to promote water conservation, preservation and enhancement of water quality** in the sub-basin including extensive measures for reducing evaporation and control of leakages. The steps will include hardware techniques (physical and engineering options) as well as software techniques (creating awareness, institution and capacity building in/within the community). Water use efficiency includes techniques for reducing evaporation losses at the reservoir, reducing losses and leakages in the canals and tributaries, and applying affordable techniques of water use at the farmyard level. It would also include measures for tapping and using return flows from agriculture, industry, and urban supply. The quality standards indicated by the MPCB for different water uses will be further sub-classified in order to satisfy the location specific needs.

2.2.5 Improvement in water resource management and irrigated agricultural productivity in the sub-basin. This objective includes negotiations between sectors and major stakeholders in order to optimize water use in the upstream, midstream, and downstream areas. Further it also includes institutional mechanisms (in addition to formation of societies under the **MMISF** Act, Government of Maharashtra, 2005) which enable inter-sectoral consensus building and decision making by the district and taluka level administrators. Finally it also includes consensus building between the supply authorities and farmers associations for an agreed cropping pattern for each reservoir.

2.2.6 Formulation of a plan for management of irrigation, domestic water, industrial water, water for environment, pisciculture, tourism, navigation and allied uses for all the sub-basin in conformity with the State Water Policy and Acts promulgated by the state. The achievement of this objective implies the creation of platforms and fora where representatives of different sectors can negotiate and arrive at trade-offs and agreements within the legal framework.

2.2.7 Employment generation and enlargement of livelihood opportunities: Rural employment generation through agriculture extension activities, tourism, pisciculture, etc. will form an important part of the approach. Although, the IDWR will include multi-sectoral uses of available water with the basin relating to agricultural development, hydropower, drinking and domestic water, industries, tourism, fisheries, wild life transportation and environment. It will pay special attention to potentials for employment generation and economic well-being, through the creation of livelihood opportunities.



2.2.8 Formulation of an Action Plan for the development of hydropower and water needs for other energy sources for the sub-basin. This objective will be pursued along with objective two and three in order to make the financial needs of the identified hydropower projects consistent with planned priorities and financial allocation.

2.2.9 Drawing a long-term plan for management of floods, droughts, water quality, Galper land, Irrigation based on treated sewage, groundwater, soil and water conservation in the sub-basin. This sector also requires the establishment of platforms and for a mentioned under objective six in order to arrive at optimal solutions.

2.2.10 We propose to add an objective related to the anticipation (and if possible quantification) of the **impact of climate change**, and to construct an adaptation mechanism in order to respond to meteorological and surface/groundwater flow changes occurring due to such changes.

2.2.11 Further we wish to add an objective about **securing and ensuring 'environmental flows'** in order to maintain the ecological integrity of the Wainganga sub-basin. Although this objective is partly covered under objective six, as water for environment, we propose to keep it as an independent objective of the IDWRW. Some research projects or systems can be identified for perusing this objective.

2.2.12 To develop an appropriate Institutional Framework for implementing 'integrated water resources development and management' in the sub-basin. We understand institutions as formal as well as non-formal organizations, inclusive of the NGOs and other civil society organizations which can provide an interface between the statutory arrangements and customary arrangements specific to the Wainganga area. The objectives and related physical targets will need to be discussed with all stakeholders through at least two iterations so that the plan becomes realistic rather than being merely idealistic. Further, the procedures for coordination will be developed.

2.2.13 Identification and documentation of the location and extent of water bodies (natural or artificial) which existed in the past but have been reclaimed or lost, and to study the feasibility of restoring such sites to their original status.

3. Methodology.

3.1 Stages and sequences for developing the Master Plan.

a. Baseline Survey for collecting physical and socio-economic data.**

Developing a sample frame for collecting data from various departments of GOM and Non-Governmental organizations and other stakeholders. All hydrological data, ground water, surface water, watersheds, sub-basin etc. will be collected. Relevant socio-



economic data, data on village level traditional water structures will be collected. Further investments made through the Local Sector, Zilla Parishads Sector, Minor Irrigation, Medium & Large Irrigation, Hydro Power etc. will also be collected.

b. Taking stock of the status of resources, projects, investments and human development in general.

The next step logically deals with taking stock of all existing resources, and the assessment of the investments and progress made in water resource sector (historically) over the last few decades. This review includes the assessment and analysis of the final results in terms of successes and failures, and should technically be the basis for deciding the direction of further planning, investment and development in future.

c. Formulation of the Inception Report.

On the basis of the result of the baseline survey and secondary data, the rapid assessment will be placed before the stakeholders during an interactive workshop where the preliminary ideas will be iterated for the first time. Based on their inputs and the studies carried out, the Inception Report will be finalized.

d. Developing data entry programmes for analyzing the primary and secondary data. Maintaining and supervising the project database and arranging data entry.

e. Conduct a series of field visits for collecting data (approximately 8 days in a month). Till the formulation of the Draft Interim Report.

f. Project Identification Report.

When the basic data is collected, a Project Identification Report will be finalized and submitted as per the contract requirements. This report will be treated as the result of the 2nd iterative analysis.

g. Draft Interim Report.

Analyze the data, extract meaningful information and formulate the Draft Interim Report (DIR) when the objections and suggestions received from WRD, inputs received from stakeholders and others are included and investments/options between different sectors are reconciled. The DIR will thus be the result of the 3rd iterative analysis.

h. Draft Final Report (DFP) will be prepared after completing the process similar to the one conducted in point (g) above and after taking into account suggestions and recommendations by members of the Planning, Review & Implementation Committee (WRD, GOM, Aurangabad).



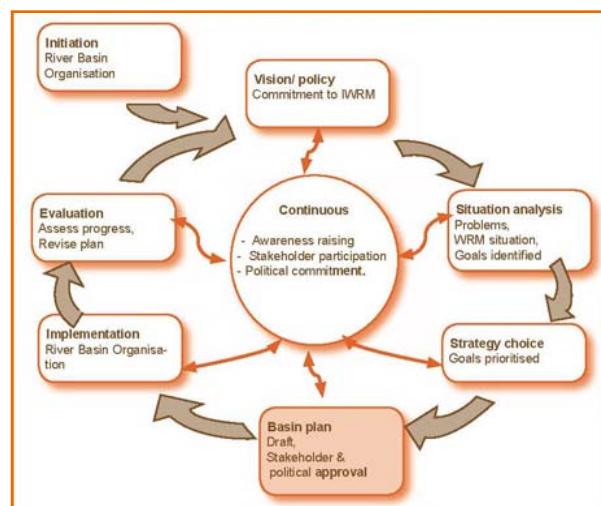
**** Need for Base-line Survey for Primary Data Collection:**

Our experience indicates that certain types of data are not available or not reliable because there are great variations between various agencies. In anticipation of such difficulties, we will prepare a time schedule for collecting data from different sources needed for the stages of the planning process. In case of primary data, all efforts will be made to collect relevant and comprehensive data through surveys. It is expected that primary data will be collected, analyzed and interpreted by the end of April 2011. In order to overcome the difficulties regarding data availability, we propose to base our calculations on secondary data sources, which are considered to be most reliable. In addition, wherever data is missing, forecasting, hind-casting and extrapolation will be used to cover the data gaps. A comprehensive questionnaire will be prepared and used for collecting data from villages and towns.

3.2 Planning Cycle

However, we would like to stress that, Master Planning is not merely about data collection and analysis, but a process of strategic planning of water resources within a basin, which can also act as a tool for social mobilization and for building platforms for negotiations about various issues related to natural resources management (not limited to water resources). Hence, Basin Planning process needs to be looked with a broader view.

As shown in the figure below, the planning cycle is a logical sequence of phases that is driven and supported by continuous management support and consultation events shown here in the centre of the figure:



Source: IWRM Management Plans, CapNet, 2008

Figure - 3 Planning Cycle for IWRM



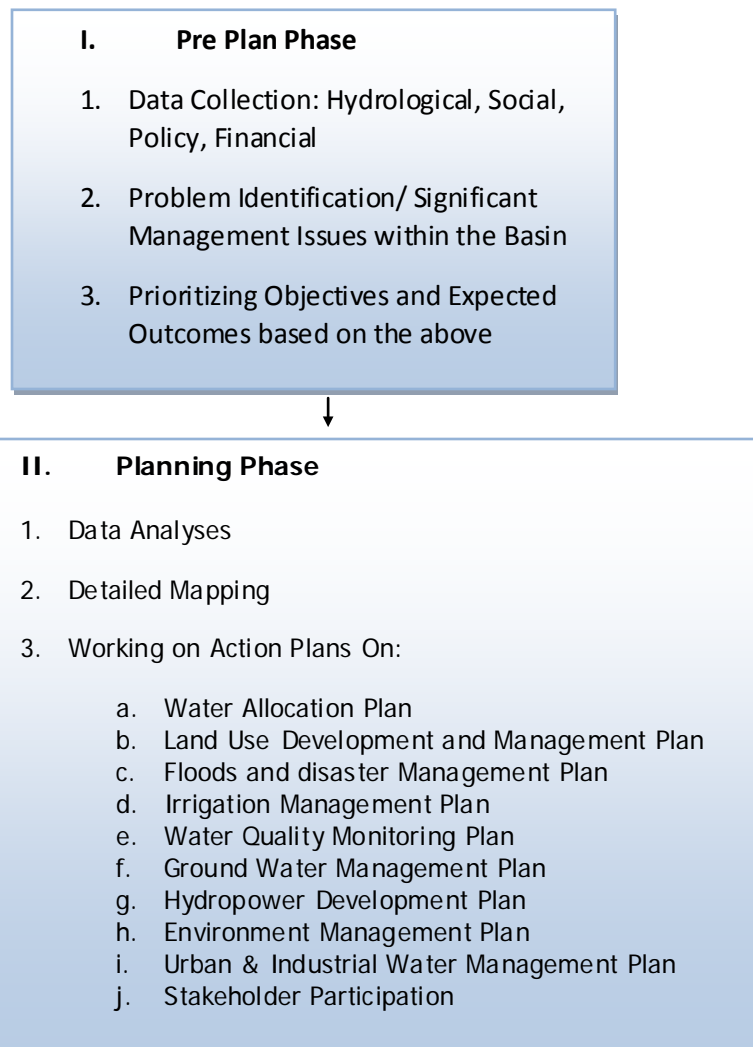
Phases of River Basin Master Planning:

As indicated in the schematic representation above, River basin planning process consists of:

- **Pre Planning Phase** (This phase, i.e. assessment of the current status, identification of problems and causes of past failures has been completed, and the results are included in the report at hand i.e. Inception Report.)
- **Planning Phase** (This phase will take place over the next 22 months)
- **Implementation** (This phase will take place after the approval of the Final IDWR by the Government)
- Cross cutting issues relevant to all three stages: **Reporting, Monitoring and Evaluation**

This process is cyclic and not linear. This follows the principle of IWRM Spiral, where the process of planning and implementation will evolve as the process matures.

Pre Plan Phase:





4. Investment Priorities and Financial Aspects.

4.1 Investment Priorities:

Investment plans will be formulated to ensure timely completion of the schemes/projects at the least cost & maximum benefits. Project priorities and selection will be made consistent with current and projected financing to ensure the timely completion of projects.

In the case of the Wainganga sub-basin, the selection and identification of investment criteria forms an important and critical aspect of an integrated river basin development plan. These criteria will reflect the specific socio-economic circumstances prevailing in the sub-basin mentioned earlier, and the extent to which investments have already been made as seen in the District Statistical Abstracts(March, 2009), and the vision and objectives that the prospective plan proposes to achieve till 2030.

Further, investment priorities will co-relate the investments with the location specific priorities and their impact on the various development indicators. At the present stage, the investments made in the basin do not seem to be made keeping in mind the socio-economic indicators but they appear to be made with the sole consideration of completing large and medium irrigation projects.

Conventional Investment Criteria.

In strict economic terms, investment criteria are restricted to the achievement of highest annual 'rate of returns on investment', in the short run and the long run. This implies that in a situation when there are several investment options, the investor goes through an exercise of finding out and choosing the option which would yield the highest financial rate of return in the shortest period of time, for attaining the highest quality of services rendered, or the largest volume of goods produced.

However, in case of public expenditure where there is a complex set of social, economic, ecological objectives, the strict economic criteria are not applied. The relevant procedure in such a case is to conduct an assessment of different development options (projects) each resulting into a different set of goods produced and services rendered, and each having a different environmental impact (positive and/or negative), and each resulting into a higher or lower degree of equity in terms of the distribution of benefits and burdens of cost. Further each project results into a unique set of direct costs and benefits (measurable costs and benefits within the project cycle) and indirect costs and benefits (externalities i.e. negative and/or positive social and environmental outcomes which may or may not be measurable in monetary terms).



In order to avoid errors in large amounts of public investment being made on sub-optimal projects or projects which become almost in-fructuous in the short-run, and in order to satisfy the objectives and expectations of a **Welfare-State**, we need to enlarge the scope of Investment Criteria in the following terms-

A. Criteria based on National and State socio-economic development objectives in a pre-determined order of priorities, with water resources as the vehicle for development

The Maximum Social Welfare criterion (MSW) (as different from Maximum Returns to Investment measured in financial terms)

B. **Regional Balanced Growth (RBG)** Criterion which represents the current status of development of water resources of the sub-basin, as compared to other regions in the state, i.e. Western, Northern and Central Maharashtra commonly understood in terms of the '**backlog**' of development in a particular region as compared to other regions.

C. The **Technical and Administrative** criterion relevant to the region of Bhandara, Gondia, Gadchiroli, Nagpur and Chandrapur. This includes the

1. Technical options-assessment based on physical and environmental conditions.

2. Budgetary constraints, cost overruns of ongoing projects, objections or conditions laid down by the Central Ministries, Laws and Notifications, etc.

Model 'Feasibility' Study for a Lift Irrigation Scheme.

We propose to prepare feasibility and justification study for one of the lift irrigation schemes on the right bank of the Gosekhurd reservoir in order to develop a methodology for evaluating such schemes. The benefit-cost ratio (B-C ratio) commonly understood as either the economic rate of return (ERR) or the financial rate of return (FRR). The procedure of discounting and compounding benefits and cost streams will be applied. In addition all the indirect costs and benefits (theoretically known as externalities) will be included and the impact of subsidies and taxes will be appropriately reconciled.

4.2 Financial Aspects:

This chapter will present the total expenditure incurred so far in the sub-basin, district wise, on major, medium, minor irrigation (completed and ongoing), funds required to complete new administratively approved projects, the total potential achieved so far and likely to be achieved. Similar information will be given for local sector water conservation schemes and water supply schemes. The allocation for the Eleventh Plan and for 2010-11 will be given.

The financial assessment will also provide indicative recommendations for reducing financial wastages/losses in order to optimize the use of scarce financial resources.



4.3 Expected Socio-Economic Impact.

A summary of socio economic impacts of water management on the area will be given to throw light on the nature of development, which will be elucidated appropriately. We will study the socio-economic impacts of selected/representative development projects undertaken by WRD (e.g. Gosekhurd Dam) and other complete/partly completed projects. Efforts will be made to identify issues and flaws with the objective of enabling WRD to make *en-route* corrections. We will submit a plan to take corrective measures if necessary and suggest our strategy to overcome any problems faced while implementing earlier schemes.

5. Institutional & Legal Arrangements.

5.1 The importance of enabling institutions (Legal & administrative arrangements)

An important objective of this chapter is to map the institutional framework and to identify the gaps and weaknesses which hamper IWRM implementation or the distortions that have crept in. But more importantly, the objective will be to indicate how the N.A. would be able to induce corrections or fill in the gaps by creating new institutional reforms in varying circumstances.

In addition, an attempt will be made to de-bundle the concept of water management as different from water resource development. This involves an understanding of management regimes, and the process of decision-making within the establishment. And finally, it is expected that for the water practitioners in the establishment and the community-based organizations, the analysis demonstrates how the NA is crucial to the satisfactory implementation of IWRM.

Understanding water governance and management

5.2 Water governance:

Water governance as a concept broadly accepts the view that management of all water bodies, especially the river basins, is the prerogative of the state and is therefore a part of the political and legislative domain. Consequently, making laws, policies and regulations for the development and management of water resources are essentially part of a political decision-making process. Since this perception applies to the global as well as national levels, it is necessary to understand the broader context of water governance.

Governance, in general, is “the exercise of economic, political and administrative authority to manage a country’s affairs at all levels”, and further, “it comprises the mechanisms, processes and institutions through which citizens and groups articulate their interests, exercise their legal rights, fulfill their obligations and mediate their differences” (UNDP, 2001). And in the same vein, water governance refers to “the range of political, economic, social and administrative systems that are in place to develop and manage water resources, and the delivery of water resources at different levels of society” (GWP, 2002).



To put it more categorically, water governance involves:

- i. questions related to financial accountability, administrative efficiency related especially to allocations for water resource development projects and service-delivery systems;
- ii. questions related to human rights and participatory processes, respecting and honoring the legitimacy of democratic institutions like the freedom of press, media, right to (freedom of) information, right to protest (non-violent) etc.; and
- iii. questions related to 'fair play' and equity in the distribution of benefits, sharing of costs and socio-environmental burdens, as well as allocation of financial resources (this includes allocation policies and regulations related to water).

Water governance implies direct management of water resources through statutory institutions and other formal or non-formal institutions mandated to perform managerial functions through a hierarchical (or non-hierarchical) framework. Governance also has an element of pragmatic politics, where legislators and bureaucrats are involved in negotiating through varied interest groups belonging to political parties and factions for maintaining political credibility.

5.3 Water management

Formally, the objective of water resources management is *to produce an optimal mix of goods and services for the benefit of the society as a whole, now and in the future* (OECD, 1987). The management problem can be viewed as organizing the interaction among all actors: the providers, the producers and the appropriators of the water resources. The general question is: how to stimulate and organize for coordinated actions to prevent appropriators who strive for optimizing their individual profits from over-exploitation and even elimination of the productive capacities of resources.

Management thus deals with all tasks involved in the production of desired water related goods and services. Consequently, it should involve both public and private agencies, who together: (i) set goals and targets and decide what mix of goods and services will be produced by the WRS, when, where and for whom; and (ii) produce the goods and services in response to the demand from society.

Water management in practice consists of many different tasks that are allocated to a host of public, common and private agencies and organizations. Together they form the institutional environment that should enable the NA to develop and be applied. For mapping of actors and a discussion of methods, tools and examples to apply the NA in water resources management it is useful to differentiate between general and functional management.

5.4 General vs. functional water management

- *"General management"* refers to tasks that are not specifically related to concrete water resources systems such as river basins. Such tasks deal with institutional and legal arrangements defining for example which tasks are carried out by which agencies, what their mandates, responsibilities and capacities are and what instruments they should have to carry out their tasks (who does what and how?). These general management tasks refer mainly to



administrative tasks that correspond to existing government agencies and can be executed in administrative areas such as a country or provinces. Being the caretaker of the public resource water government agencies provide access and are responsible to define the way and the conditions under which the resources are used and to account for this use through democratic mechanisms.

- “*Functional management*” includes all tasks to keep concrete water resources systems in good conditions to produce the water related goods and services demanded by the society at large. In other words functional management is an input into the production function of the water resources system. Tasks include for example the actual provision/delivery of water for specific uses such as irrigation water, protection against flooding, or treatment of contaminated surface waters.

Note: Though general management deals exclusively with creating an enabling environment for functional water management, functional management can also deal with establishing enabling institutional arrangements, for example for the implementation of concrete action plans or licensing and monitoring arrangements.

5.5 Weakness & Gaps in Management System:

Finally, the task envisaged is to identify the weakness and gaps in the management system. In other words, to find out what is generally referred ‘*system che dosh*’, and to recommend ways to correct systemic or structural flaws.



PART-B

6. Current Status of the Wainganga River Basin.

6.1 Geographical Area and Location of the Wainganga Sub-basin.

The Wainganga river basin is located in the central portion of the Godavari basin as a whole, and towards the eastern border of Godavari sub-basin within the State of Maharashtra.

Geographically, the origin of the river is located in the upper regime of Wainganga at Mundhara, Pratappur village, near the town of Gopalganj, Dist. Seoni in Madhya Pradesh. Further, the origin lies in the southern foothills of the Ambagadh Hill Range, which in turn is an outlier of the Satpuda mountains. Initially it flows northwards, takes a turn to the east and then flows down to the border of Maharashtra, after passing through the districts of Seoni and Balaghat in Madhya Pradesh.

The Bawanthadi River forms the northern border of the Wainganga basin to the northwest (right bank), while Bagh river forms the north border to the eastern bank (left bank). The Bagh River is also a major contributor to the Wainganga. The Wainganga enters the district of Bhandara near its confluence with Bawanthadi. The Wainganga river basin as a discrete unit within Maharashtra covers a total of 36306 sq. kms. The total length of Wainganga River in Maharashtra is 368 kms. Immediately after entering Bhandara, the ridge is crowned by the fortress of Ambagad characterised by a remarkable basaltic precipice with a sheer drop of 200 ft. (**Bhandara District Gazetteer, 1908 Government of Maharashtra, reprinted in 2002**)

6.2 The project area within the Wainganga basin.

The precise project area (13663 Sq. Kms.) is located in the central portion of the larger Wainganga basin (36306 Sq. Kms.) within the state of Maharashtra.

Notably, the sub basins of Bagh, Khobragadi and Gadhavi on the left banks of Wainganga; and PENCH, Kanhan, Andhari, Kolar, Venna, Erahi and Nag which lie on the right banks are not included. In addition, the Indravati and Pranhita sub basins which lie in the lower regime of the Wainganga, are also not included in the project area. The lower extremity of this basin (excluding the Pranhita sub-basin to the south) is limited by the confluence between Wardha and Wainganga near a place called Chaprala.

Identification of the Project Area (Latitudinal and Longitudinal limits).

North:	Latitude - 21° 37' 26.28" N;	Long – 79° 30' 28.09" E
South:	Latitude - 19° 38' 37.30" N;	Long – 79° 46' 56.02" E
East:	Latitude - 20° 15' 29.06" N	Long – 80° 33' 15.05" E
West:	Latitude - 21° 02' 10.26" N;	Long – 79° 26' 35.72" E



As Wainganga enters Maharashtra and proceeds south to Bhandara city, the basin cuts across the Gaikhuri Range which divides the Wainganga and the Bagh river basin. Further south lie the Pratap hills also known as the Navegaon hills (7 peaks packed together) with the peak Nishani rising up to 2314 ft. (705 meters). In the south-western part of basin, lies the Pauni town on the right bank of the river. The width of the river as it passes Bhandara and Gadchiroli is approximately 457.2 meters at most places and is probably at its broadest near the town of Pauni where it broadens to about 1.6 kms. At Tidhi, near its confluence with Kanhan river there is a geological formation in form of a dyke or barrier. It then proceeds southwards till its confluence with the Wardha River which comes from the west, and thereafter the river is known as Pranahita. However, our project area ends at this confluence.

The northern and central valleys of the Wainganga run through Gadchiroli right up to the Wardha confluence. They have been historically renowned as forests of great biodiversity and aesthetic beauty. These forests form a part of the ancient Dandakaranya where the great Aranya Sankriti has been known to flourish for millennia. During the British period, the administrators and naturalists of British descent recognized the unique value of these forests. It is therefore no surprise that Rudyard Kipling, a naturalist, was one of the earlier commissioners of the Bhandara (Seoni-Balaghat) Districts, and that he used the forests in the upper regime of Wainganga as the geographical and literary setting of his famous classic 'The Jungle Book', in the forests of Seoni, Betul tehsil, Balaghat and Bhandara. The Wainganga basin therefore combines within itself the two great traditions in India viz.

- i) ***Sarita Sanskriti (River Valley Civilization) and***
- ii) ***Aranya Sanskriti (Forest Civilization).***

6.3 Description of River System:

In its upper regime (Madhya Pradesh), the Wainganga drains water from seven sub-basins viz. Halon, Sagar, Hiri, Nahar, Bagh, Chandan and Bawanthadi. It enters the Bhandara District in Maharashtra and flows southwards to enter Chandrapur District. It then joins the main Godavari River at Chaprala in Gadchiroli District (Maharashtra).

The Main River and its tributaries are as follows:

Before entering Maharashtra, the River Wainganga flows 274 km in Madhya Pradesh and naturally brings annually an average of 10589 Mm³ water from 109078 sq. km drainage area.

Bawanthadi: It flows through two states: Madhya Pradesh and Maharashtra. It meets the Wainganga from its right bank at Bapera, Tumsar Taluka, district Bhandara. It is 42 kms in length. It is fed by several small streams from Bhandara District; however it does not have any tributaries of its own. A major Bawanthadi Dam Project has been constructed on it.



Ambagad: It originates in the Ambagad mountains and meets the Wainganga from its right bank at Tumsar (Tumsar Taluka, Bhandara District). It is believed that it is the original route of Bawanthadi, as its valley is much larger than its basin.

Bodalkasa: It originates in the mountains of Gaykhuri and meets Wainganga at Tiroda (Bhandara District) from its left bank. There are several medium and minor projects on this river and its streams.

Sur: It originates at Ramtek and joins Wainganga near Bhandara. It is 68 kms in length and flows through the Mohadi Taluka in Bhandara. Gaymukh is its main tributary. It meets the Wainganga in Takwi in Mohadi taluka from its right bank.

Kanhan: It flows in two states: Madhya Pradesh and Maharashtra. Originating in Chindawada, it enters Maharashtra in Nagpur District to meet Wainganga at Tidhi, Bhandara District. It has several tributaries like Chandrabhaga, Pench, Kolar, Nag, etc.

Aamb: It originates in the Jambgad hills and meets the Wainganga at Umred in Nagpur District.

Mor/Maru: It originates in Chandrapur and meets Wainganga at Bhiwapur Taluka in Nagpur District.

Chulband: It originates in the Gaykhuri mountains, flows through the Goregaon and Sadak Arjuni Talukas and meets the Wainganga near Lakhanpur Taluka (Bhandara District).

Gadhvi or Itiyadoh: It originates in the Sakori taluka in Bhandara and meets Wainganga near Armori (Gadchiroli Taluka) from the left bank. It flows through the Deori and Morgav Arjuni Talukas of Bhandara district before it meets the Wainganga.

Khobragadi: It originates in Gadchiroli District in the mountain Tipagad. It flows through the Gadchiroli district and meets the Wainganga at Wairagad.

Paal: Originating in Dhanora taluka it meets Wainganga at Purla (District Gadchiroli).

Kathani: It originates in Dhanora taluka and meets the Wainganga. It is 70 kms in length.

Karvappa:

Phuhar: Originates near Karvappa in Gadchiroli and joins the Wainganga

Potfodi: Originates in the Chirli mountains in Gadchiroli District and meets the Wainganga.

Andhari: Originates near Chimur Hills in Kolar in Chandrapur District. Mul River is the main tributary on Andhari.



Booti: It originates in Chandrapur District and joins the Wainganga. Its entire length is around 45 kms. It is believed that the river represents the ancient flow of Wainganga River.

Wardha: It flows through three states – Madhya Pradesh, Maharashtra, and Andhra Pradesh. It meets the Wainganga from the right bank in Chandrapur District. It is 515 kms in length of which Maharashtra has 486 kms. Very little portion of Wardha lies in the project area, nevertheless, it represents the main tributary of Wainganga. After their confluence, Wainganga is called Pranhita, which later joins Godavari.

Out of the tributaries mentioned above, some are not part of our Project Area as mentioned earlier, but they have been included in this because they directly contribute water to Wainganga as it flows in to the designated Project Area. In Maharashtra, Wainganga flows a distance of about 368 (+35 kms. on the border)kms. Several rivers from Maharashtra join the Wainganga River, which form an important part of the Middle Wainganga watershed.

Although the complete Wainganga river basin drains an area of 74,049 sq. kms (inclusive of Madhya Pradesh 37743 Sq. Kms. and in Maharashtra 36306 sq. kms.), the project area demarcated for our agency for master planning is 13,663 Sq. Kms. which largely falls in the districts of Bhandara, Gadchiroli, Gondia and small portions of Nagpur and Chandrapur as well.

Table - 1

The list of talukas through which the Wainganga flows is given below:

No	DISTRICT	ENTIRE TALUKA IN PROJECT AREA	PARTIAL TALUKA IN PROJECT AREA
I	NAGPUR		BHIWAPUR KUI RAMTEK
II	BHANDARA	Bhandara Lakhni Lakhandur Mohadi Pauni Sakoli Tumsar	
III	CHANDRAPUR		Bramhpuri Saoli Gondpipri Rajura Chamorshi Mulchera Desaiganj Armori Aheri
IV	GADCHIROLI	Gadchiroli Dhanora	Gondia Goregaon Arjuni More. Sadak Arjuni
V	GONDIA	Tirora	
Total	5 Districts	10 Complete Talukas	16 Partial Talukas

Source: District Gazetteer and District Maps (GOM).



6.4 History of the Wainganga Basin

The human settlements along the Wainganga suggest that there have been several communities residing in the basin. The Gawli community dominated the region before the 7th century, however at present it is a small group. Kohlis which now are included in the category of OBCs were responsible for constructing the water tanks. Tribals such as the Gond, Halba and Govari dominate the region. The nomadic tribes called Dhiwar are settled along the river and all of them practice fishing as their principle profession. (Source: Bhandara District Gazetteer, 1978)

In the 7th century, the area was probably ruled by the Rajput kings of Chhattisgarh whose kingdom was known as Maha Kosál. In the 10th century the area was probably ruled by Panwars (Parmars) who are believed to be Rajput descendants.

Perhaps the most significant and dominant part of Wainganga history lies in the Gond period, ruled by a group of Gond chieftains who left behind practically no structural monument or stone inscriptions which carried their symbols or edicts during the 12th to 16th century. In the 17th century the Gond prince of Deogarh in Chhindwada incorporated this area within his dominion. The 17th and 18th century are remembered by the rule of Raj Khan under the ruler Bakht Buland (Epigraphia Indica, Vol.1, pg. 32; District Gazetteer of Bhandara, 1908)

The most significant contribution of the Gond Rajas was a vast number of tanks constructed by the Kohli community which dot the entire area of the Wainganga sub-basin. These traditional tanks have been constructed in the 17th and 18th centuries. It is this technological legacy left behind by the great hydro-engineers of the Kohli community that needs to be protected, studied and replicated wherever possible, both in terms of **construction-typology as well as irrigation management systems**.

The history of the region suggests that it was a socio-economically flourishing region and that this was achieved by the community's focus on water resource development and management. However, today's status of the river sub-basin is quite the contrary of its rich history. Despite being blessed by natural resources and favorable climatic conditions, the region is ironically, one of the least developed areas in the State.

6.5 The Status of Human Development in the Wainganga sub-basin (Socio-Economic Indicators)

'State of Human Development Report, 2002' (Maharashtra State) has analyzed the economic status of all the districts in Maharashtra, and the picture which emerges is very dismal. It clearly indicates that the developmental policies have not succeeded in delivering goods and services like water supply, sanitation, irrigation, hydro power and all other related policies such as health, industries and tourism etc. The following statistics related to key indicators support findings of the Human Development report:



A) Drinking Water:

It is a matter of great concern that even though the huge investments in the water sector have been made, **63.5% of the people of Bhandara and Gondia districts do not have access to potable drinking water, while in Gadchiroli 61.3% of the population does not have access to potable water.**

B) Sanitation:

Similarly, **93% of people in Gadchiroli and over 86% in Bhandara and Gondia districts do not have access to sanitation i.e. toilets with running water.**

C) Access to Power:

Further, **37% of the population in Bhandara and Gondia has no access to electricity, while almost 70% of the population in Gadchiroli has no access to electricity, and is therefore living in the dark literally and figuratively.**

D) Access to groundwater:

Another important report of the 'Water Supply and Sanitation Department' (Govt. of Maharashtra, 2009) states that:

"64 out of the 120 villages in Gondia are facing problems of groundwater depletion, they have no water conservation (harvesting) programmes due to lack of finance, and in Gadchiroli 200 out of 214 villages, (over 90%) and in Chandrapur 704 out of 845 villages have no access to funds for water conservation and watershed development, even though the groundwater table is depleting rapidly."

E) Quality of Potable Water:

The drinking water quality in Bhandara and Gondia was studied by the World Bank researchers and their Report on Water Supply and Sanitation Project for Maharashtra (2005) states that **in Bhandara district 57% of the drinking water sources are polluted and are of poor quality, while, in Chandrapur- 64% of drinking water samples are polluted and contains fluoride and chloride, harmful to human being.**

F) Human Development Indicators:

The Maharashtra state HDR, 2002 further states that **51% of the households in Bhandara, 58.26% in Gadchiroli and almost 61% of households in Gondia districts are below the poverty line (BPL).** These happen to be the most backward districts in Maharashtra and rival the poorest districts, in the most under-developed states of India.



G) Status of Tribals:

Further, it is revealed that in Gadchiroli the percentage of Scheduled Castes and Scheduled Tribes is 11.2% and 38.35% respectively. **By inference, about 50% population of Gadchiroli, mostly comprising of SC and ST communities is below the poverty line.** These communities have been excluded from economic development and all water based development in terms of drinking water, sanitation and food supply.

H) Status of Water for Irrigation in the Wainganga Project Area:

It is a matter of deep concern that in the Chandrapur and Gadchiroli the cultivated area under irrigation has increased from 21.62% to 25.69%, over a period of 100 years. (i.e. even after 50 years of transfer of the Gond tanks to the Government) and in the case of Bhandara and Gondia districts the area under irrigation has increased from 24.91% to 51.33% between 1908 to 2009.

Table - 2 Irrigation potential developed in the Wainganga Basin (Area in Hectares)

District	Total area under cultivation in 1908	Total irrigated area in 1908	% of irrigated area	Total area under cultivation in 2009
Bhandara	342367.7	85312.9	24.91	227000
Gondia				223000
Total				450000
Chandrapur	231698.4	50109	21.62	523000
Gadchiroli				197000
Total				720000

Source: 1. Data for 1908- Bhandara and Chanda District Gazetteer, Gaz. of Central Provinces.

2. Data for 2009- District Statistical Abstract of Bhandara, Gondia, Chandrapur and Gadchiroli Districts, Govt. of Maharashtra March 2009.

Note: We are aware that the statistical inference derived from the Government reports quoted above, are based mainly on the schemes and programs implemented by the Government, and may have excluded many of the traditional water systems. The rather grim statistical inferences drawn above may therefore be misleading, if taken literally.

Nevertheless, the statistics given above will be taken seriously while preparing the River Basin Master Plan.



6.6 Status of forests (District wise):

Bhandara District:

Area: Total 1,217 Sq.Kms. land is under Forest, i.e. approx. 32.74% of total land. Most of the forest land is located in Bhandara, Tumsar & Sakoli talukas (Ambagad, Gai Khuri Hills). Out of this area, 47.82 % is Reserved forest, 25.6 % is Protected forest and 26.21 % is Non-classified forest area.

Revenue: The forest contains a very good quality of Sagwan wood. Also it contains Bija, Halda, Tiwas, Sisam, Moha, Khair, Garadi etc. types of trees. Various types of useful trees are also found viz. Tendu leaves for eating paan, Moha flowers, Palas for Lakh, Dadhai, Dhavda for Gum, Khair for Kattha etc. Bamboo plantation is also done for Paper mills. Silk cocoon for Silk is developed. Revenue from the forest in the year ended 31st March, 2009 was ` 21.89 lakhs out of which ` 9.99 lakhs from wood for fuel use, ` 11.90 lakhs from wood for construction. Apart from this from Bamboo, Grass, Tendu leaves and other minor products ` 287.94 lakhs revenue was generated. Total revenue was ` 309.83 lakhs.

Forest Development plan: Following steps will be taken to protect forest from flood, heavy rain falls, erosion etc. These are taken at the district level every year.

1. Establishment of centralized Ropamala
2. Reforestation of poor quality forests
3. Protection of forests, wild life and nature

Gondia District:

Area: Total 2,513 sq.kms. land is under Forest, i.e. approx. 44.55% of total land. Most of the forest land is located in Tiroda, Deori & Amorgaon talukas (Pratapgad Hills). Out of this area, 42.85 % is Reserved forest, 31.15 % is Protected forest and 25.98 % is Non-classified forest area.

Revenue: The forest contains a very good quality of Sagwan wood. Also it contains Bija, Halda, Tiwas, Sisam, Moha, Khair, Garadi etc. types of trees. Various types of useful trees are also found viz. Tendu leaves for eating paan, Moha flowers, Palas for Lakh, Dadhai, Dhavda for Gum, Khair for Kattha etc. Bamboo plantation is also done for Paper mills. Silk cocoon for Silk is developed. Revenue from the forest in the year ended 31st March, 2009 was ` 363.22 lakhs out of which ` 112.51 lakhs from wood for burning, ` 250.71 lakhs from wood for construction. Apart from this from Bamboo, Grass, Tendu leaves and other minor products ` 932.32 lakhs revenue was generated. Total revenue was ` 1295.54 lakhs.

Forest Development plan: Following steps will be taken to protect forest from flood, heavy rain falls, erosion etc. These are taken at the district level every year.



1. Establishment of centralized Ropamala
2. Reforestation of poor quality forests
3. Protection of forests, wild life and nature

Gadchiroli District:

Area: The area under forest land is the largest area in Maharashtra state. Total 12,504 Sq.Kms. land is under Forest, i.e. approx. 75.96 % of total land. Out of this area, 144 sq.kms. are under Revenue Department and the remaining (12360 Sq. Kms.) is under Forest Department out of which 9415 sq.kms (76.17 %) is Reserved forest, 2791 sq.kms. (22.58 %) is Protected forest and 154 sq.kms. (1.25 %) is Non-classified forest area. A social forestation cell has been established in the district. Through this cell, plantation of 20.21 lakhs trees was made in 45 Hectares of land in the year ended 31st March, 2009.

Revenue: The forest revenue has large part to be played in the district revenue. Total revenue in the year 2007-2008 was ` 87.21 crores. It includes wood for construction, Bamboo, wood for fuel, Tendu leaves, grass and gum etc. Revenue from construction wood was ` 60.94 crores, from Bamboo ` 4.75 crores and from Tendu leaves ` 12.25 crores. Sagwan wood is a very valuable type in the district. Sagwan wood from Aheri and Alapalli is world famous. Bamboo is found in a big quantity in Alapalli and Bhamragad areas, which is used in paper mills. The forest also contains Bija, Aina, Halda, Sisam, Char, Moha, Khair, Dhavda, Behda, Tendu, Awla etc. types of trees. Production of Kosa Silk is being done from 200 years.

Forest Development plan: There are five forest divisions in the district viz. Wadsa, Gadchiroli, Bhamragad, Alapalli and Sironcha. They are involved in reforestation of poor quality forests and tree plantation on fallow land. Further steps will be taken to implement the policy.

Chandrapur District:

Area: Total 4,765 sq.kms. land is under Forest, i.e. approx. 35.52% of total land. Most of the forest land is located in Bhandara, Tumsar & Sakoli talukas (Ambagad, Gai Khuri Hills). Out of this area, 76.28 % is Reserved forest, 20.42 % is Protected forest and 3.30 % is Non-classified forest area.

Revenue: Revenue from the forest in the year ended 31st March, 2009 was ` 14.13 crores. Maximum revenue was from Bamboo and Tendu leaves. After that most revenue was from construction wood.

Forest Development plan: Following steps will be taken to increase forest revenue:

1. Tree plantation on public and Panchayat lands.
2. Tree plantation on the sides of roads and canals.
3. Tree plantation per every child.



Nagpur District:

Area: Total 2,371 sq.kms. land is under Forest, i.e. approx. 23.97 % of total land. Out of this area, 191 sq.kms. is under Revenue Department and the remaining (2180 sq. kms.) is under Forest Department out of which 48 % is Reserved forest, 30 % is Protected forest and 22 % is Non-classified forest area.

Revenue: Revenue from the forest in the year ended 31st March, 2009 was ` 1893.28 lakhs. Good quality Sagwan trees are found in Ramtek, Sawner, Hingana, Narkhed, Bhivapur and Kuhi areas. Apart from this Salai, Dhavda, Khair, Bamboo, Palas and Tendu trees are also found in the district

Forest Development plan: Following steps will be taken for development of forests:

1. Scheme for plantation of trees for industrial and commercial use.
2. Reforestation of poor quality forest.
3. Development of grass for feeding animals.
4. Development of revenue from minor forest products.

Since, a large area is covered under forests, due attention will be given to forest development, reforestation, development of forest-based industries in the planning process. Plantation of Ayurvedic medicinal plants and trees might be considered and if it is found feasible, it will be incorporated in the plan, since there is a growing trend towards the use of Ayurvedic medicines and cosmetics in India and all over the world.

6.7 Status of traditional water management systems:

It is indeed unfortunate that the great traditions of Wainganga basin suffered a major blow at the hands of the British in the 20th century in spite of the appointment of naturalists like Kipling as commissioners in the 19th century. The Maalguzaari talavs (as they were known) had been taken over by the British Government in order to simultaneously earn revenue and control the water resources. After independence the Maalguzaari talavs were taken over by Government of India and in 1964 by Government of Maharashtra. Unfortunately during this pre and post independence period this traditional system of water development and management has suffered great neglect and has become derelict.

These ex-Maalguzaari tanks as they are now known, 3372 of which are still believed to be functional, need to be restructured, strengthened, and refurbished and others that face dereliction also need to be restored. It is ironical that the **Maharashtra Water and Irrigation Commission Report of the Government of Maharashtra (June 1999)**, has stated as follows-



“In course of time after the country attained independence the Government tried to bring Maalguzaari tanks within its control. This system which flourished by people’s participation, has been ruined as a result of that (i.e. being taken over by the Government). Several Maalguzaari tanks have become extinct today.”

PART - C: Constituents of the Wainganga Sub-basin Master Plan

In the previous section we have described the historical, geographical, and development (socio-economic) status of the project area, based on secondary data. In this section, we will provide the inferences drawn based on our field visits and stakeholders’ workshops conducted during June to September 2010, in the form of a SWOT analysis which will form the basis for presenting the constituents of the proposed Master Plan for the Wainganga sub-basin

7. Assessment of the Project Area (Pre-Plan)

7.1 Strengths:

7.1.1 The Wainganga basin has a rich socio-cultural heritage which is a combination of the various human settlements that reside in the basin. The communities like the Gawlis, Kohlis, Gonds, Dhiwars still form part of the local community, and most of them still follow their traditional ecosystem based lifestyles.

7.1.2 The project area has a forest cover of almost 60 % and represents a vast source of natural resources and biodiversity, and a forest dwelling community which has preserved its skills and techniques for living in harmony with nature. When well documented it could prove worthy of emulation in other similar areas in Maharashtra.

7.1.3 Most of the basin receives an average rainfall of about 1300-1400 mm in the monsoon months, and can be called as a water surplus region. Also it falls in the category of Assured Rainfall Zone.

7.1.4 The Kathani River has a special status and represents the only significant virgin rivers in Maharashtra as it has no dams and is known for its natural flow-regimes. It can prove to be a reference case for river restoration projects not only for the sub-basin, but also in other parts of Maharashtra.

7.1.5 The Wainganga Basin and its tributaries are home to numerous fish species, some of which may be endemic to the area. A tributary of river Wainganga ‘Kathani’ represented 38 fish species, during a sample survey.

7.1.6 Traditional Tank systems established in the Project area are a unique feature which would well justify being entitled as "Lake Region of Maharashtra". There are 238 large tanks



with a size of 10 hectares and above, 3007 tanks with size between 10 to 4 hectares, 7534 tanks with size between 2 to 4 hectares, 13,289 tanks with size between 1 to 2 hectares, and 19,313 tanks with size below 1 hectare. **The 43,381 tanks therefore form a unique point of strength while preparing a Master Plan for Water Resource Development.**

7.1.7 The Bhandara district which has large and rich tracts of agricultural lands, has well established agrarian management institutions embedded in its socio-cultural ethos; which are still intact and can form the basic building blocks for a new agricultural revolution.

7.2 Weaknesses:

7.2.1 Investment in water resources has not resulted in increase in standard of living of people and studies show that access to water, sanitation is extremely poor, and the level of community's confidence in the government (public) investments is very low.

7.2.2 Flooding of the river in the monsoons is a major problem faced by the basin inhabitants. The floods in 1994 and 2005 were severe, daiming many lives. At the same time, the community's perception about reservoir operations, coordination and integration in communication between the state of Maharashtra and Madhya Pradesh in case of Sanjay Sarovar Project (erstwhile Upper Wainganga Project) are not adequate.

7.2.3 Updated and state-of-the-art flood forecasting and disaster management plans and procedures are absent, which may result in severe loss of life and property during emergencies.

7.2.4 Our experience with government agencies so far suggests that the quality of data and its availability are a major weakness embedded in our administrative and institutional procedures. In some cases data is either not available or has not been collected in the way where it can be relied upon as secondary data. Sometimes government officials are reluctant to part with data. This may be due to various legal and technical reasons. In addition, data is often not maintained for continuous periods of time at continuous time intervals.

7.2.5 Different departments, research institutions and authorities provide varying measurements of area, varying percentages drawn from data etc., which lead to difficulties in comparative analysis.

7.2.6 There is an absence of aquifer management systems and a relatively low-level of groundwater use, so also relatively low levels of Government investments in groundwater development or management. This imbalance is a major obstade in reservoir optimization.

7.2.7 Non-consideration or application of technology either for reducing transmission and distribution losses or for leak detection and preventing evaporation losses

7.2.8 The secondary information available for these districts indicates that there are very few urban centers in these districts and the level of industrialization is also very low. The urban-rural population ratios do not indicate a rapid urbanization.



7.2.9 Traditional Maalguzaari tanks (Gond Talabs) were taken over by the British Government and some were strengthened or augmented etc. Further, after independence and then after the formation of Maharashtra state, these Gond Talabs were taken over by GOM for management. Unfortunately, since GOM was unable to allocate sufficient funds or administrative/management inputs, a large number of them have suffered dereliction and deterioration, leading to immense socio-economic losses and break down of traditional water management practices.

7.2.10 The region consists of a very large percentage of tribal population (ST) which has been excluded from the main-stream development and growth. Deliberate and specific efforts have not been made to provide direct or indirect benefits resulting from water resources.

7.2.11 Absence of allied agricultural activities like oil processing units (from Soya beans, cotton seed), power looms and mills (processing cotton), vegetable processing units, etc.; has resulted in stagnant economic growth of the region.

7.2.12 Inadequate investments for creating additional the demand for energy within the river basin is also identified as a major weakness.

7.3 Opportunities:

7.3.1 The region is water surplus and therefore there is tremendous scope for agriculture and agro-based industries.

7.3.2 There are many tribal communities which inhabit the region and they possess traditional knowledge of forests, arts and skills. These can be gamered for new avenues in livelihoods.

7.3.3 Innovative and promoting rural technologies can be used for enlarging employment and livelihood opportunities.

7.3.4 There is a scope for upgrading forest based livelihoods through training and capacity building.

7.3.5 There is an opportunity for the development of Forest, Wildlife and Water Based Eco-tourism.

7.3.6 There is a very good scope for Sustainable Village Centered Development.

7.3.7 Gond tanks can be developed as a model for water management system, where the community is the decision maker in locating, developing and using a water resource.

7.4 Threats:

7.4.1 The traditional sustainable lifestyles and knowledge base are threatened due to a succession of events which took place consequent to the nationalization of tanks. The



institutional system of managing agricultural systems, cropping patterns, and value addition to the sugar crop via the Jaggary production are eminently facing dereliction. This threat will continue so long as the traditional tank is not restored and handed back to the community.

7.4.2 A huge investment (running into thousands of crores of rupees), is being made for the Adani Thermal-Power Project situated at Tiroda MIDC. Though the Government is not likely to make any investments in this project, the requirement of water for this project will be huge, for which the Government has made a large capital investment. Even though we concur with the national need for power generation, use of water resources of this basin, without ensuring an adequate share of the power for the residents residing within the basin, or without creating the infra-structure for power distribution, is identified as a potential threat to social equity and justice.

7.4.3 There is an additional problem with Adani Thermal Power Plant which is related to the impact on forest. It is understood that the forest department has registered offences against Adani Power Maharashtra Ltd for violation of Forest Conservation Act, 1980. The Forest Advisory Committee of the Ministry of Environment and Forests is yet to clear the APML proposal as the forest land falls within the 10 km eco-sensitive zone of Nagzira Wildlife Sanctuary. This complicates the procedure for planning the development and use of water resources in Wainganga.

7.4.4 Mining poses a major potential problem. Pollution, due to the disposal of mining wastes and debris is likely to be a major threat during the next few decades. This activity along with the establishment of thermal power plants is likely to divert cultivable agricultural lands to mining and energy generation. Such diversion of land is likely to take place not only from cultivable/ agricultural land but also from forest areas. Such diversion of land and pollution of streams and water bodies is likely to be a major threat in the near future.

7.4.5 The Naxalite movement may be gradually gaining in the project area and poses a threat to social stability and therefore development of the region in general.

7.4.5 Untreated waste water from the rapidly expanding Nagpur city is released in Wainganga and its tributaries, resulting in the pollution of surface water and groundwater. It poses severe threat to biodiversity and the general quality of water in the Wainganga basin.

Taking into consideration the various strengths and weaknesses, the Management Planning will be approached by categorizing the issues in broad areas namely, Land Management, Water Resources Development, Water Resource Management, and others like Pisciculture, Tourism, Energy, etc. Each area will be assessed with available information, analyzed for possible approaches towards solutions, and integrated with other issues and solutions, based on the framework given in Part A.

An important conclusion derived from the SWOT analysis is that the achievement of Millennium Development Goals/human development goals is related to the development of Human resources, besides of course the development of the water resources. Large segments of



population of Bhandara and Gadchiroli Districts are dependent on forest resources or aquatic resources (fisheries, aquatic plants etc.) and therefore, employment generation activities need to be preceded by training and enhancement of extant skillset of these communities. Such upgradation of skills can lead to more efficient and productive practices, ultimately leading to increased income.

And finally, the development of water resources, forests and lands resources will have to be followed by follow-up procedures, wherein the 'decision making and management functions' can be quickly transferred to the resident communities. Transferring the responsibility of looking after managing and equitably enjoying the benefits of water resources development will be the ultimate objective of the master plan.

Major sub-plans and activities:

Brief descriptions of the different chapters on sub-plans and activities to be undertaken for the Master Plan are given below. These will be finally adjusted, reconciled and integrated in order to achieve optimum benefits.

8. Land Use Planning, Development and Management.

8.1 Geology:

The region falls in the Northern Deccan Plateau, and the metamorphic belt of Maharashtra. It has summits, spurs, undulating lands and hills, alluvial plains and valleys. The oldest metamorphic rocks of Archaean age occur in the bottom-most part of the sub-basin. It is overlain by sedimentary rocks of the Gondwana, followed by layers of lava flows of the Deccan trap. It is then covered by the recent layers of local alluvium. This formation creates ideal conditions for groundwater percolation and accumulation. We will provide a broad description of the main geological formations and geo-hydrology in the watersheds of sub-basin. Details of rock formation, their porosity, gradient, fractures, and faults shear zones, water bearing strata, type of rocks etc. will be elaborated with the help of geological maps. Earthquake prone areas, subsidence zones, flood-prone areas, river migration channels will be identified. Settlements and industries occurring on recharge areas will be identified. (Source: GSDA, 2009)

Mineral resources occurring in the project area will be identified from available data. The type of mining practice followed in a region can affect water use and water quality. The best practices for water conservation in the mining industry will be compiled.

8.2 Soil Structures:

The region falls in the flat, undulating parts of the Deccan plateau. The soils of the project area are formed of the tropical sub-humid weathering of crystalline metamorphic and igneous rocks. They are essentially residual, though along the southern extremes of the Wainganga valley, downstream of Pauni, alluvial soils predominate. Kanhars (rich alluvial soils bearing double crops), Morand soils and Sihar which are slightly acidic in nature are cultivable soils, for wheat and rice respectively. Immature soils on the banks of the rivers are used for



garden crops. The region offers remarkable scope for not just for agriculture, but also for silviculture and horticulture. It has only a very slight soil loss as compared to that of other regions in Maharashtra. However, deforestation has led to an increasing trend in soil erosion. Soil conservation is therefore needed in this area. Detailed information on soil types in the watersheds of sub-basin based on available soil survey data will be provided.

Information about physical properties such as colour, texture, chemical properties such as pH, soluble salts, alkaline salinity, soil erosion, infiltration, soil classification such as family, series, land capability classification, irrigability classification (class A, B, C, D & Infiltration characteristics of the different areas will be detailed out. The crops, forestry species, natural vegetation, etc. capable of growing in such soils will be suggested. Soil remediation (in case of acidity/ alkalinity), conservation techniques suited for the terrain will be suggested.

8.3 Land Use Patterns:

Information about the geographical area of each watershed of the sub basin, forest area (reserved, degraded), cultivable area, net sown area, gross cropped area, grass lands, fallow area etc. will be indicated on a map and analyzed for preparing the **Proposed Land Use Plan (PLU)**.

The gross cropped area, season-wise with type and area of coverage of major crops. Area irrigated under each crop with source (canal, groundwater). The productivity levels, for rain fed and irrigated crops, achieved for important crops vis-à-vis. state average for the same crop will be described. Projection of food grain requirements of the basin/state and suggestions for cropping pattern for each of the watersheds/group of watersheds to meet the demand would be made.

The current cropping pattern suggests a declining trend in the plantation of sugarcane. However, over time, other crops have taken a back seat and only paddy rice has become a predominant crop. It is understood that a sugar research institute used to function at Sindewahi in the past. Efforts will be made to suggest the revival of this tradition by incorporating it in the action plan. In view of the fact, that sugarcane is agro-dimatically suited to this region, i.e. Bhandara, the irrigation planning and crop planning will try to restore the pre-eminence of sugarcane. Since mangoes are a predominant horticultural/agricultural crop which currently gives a low price and income to the farmers, technology for processing, canning, bottling, solar drying, etc. will be recommended, along with the appropriate technologies and investment options.

Further, we will propose a cropping pattern wherein the current practice of only taking the Kharif crop will be supplemented by planning for Rabbi as well as summer crops, since there is an abundance of water.

Location of agricultural universities, research stations, and experimental farms in the basin will be consulted for preparing this plan. An assessment of available credit facilities through agricultural, financial institutions and existing agricultural extension services would be



made. Estimates of the fodder available from the current cropping patterns and the available grasslands / forest areas with assessed future requirements would be made.

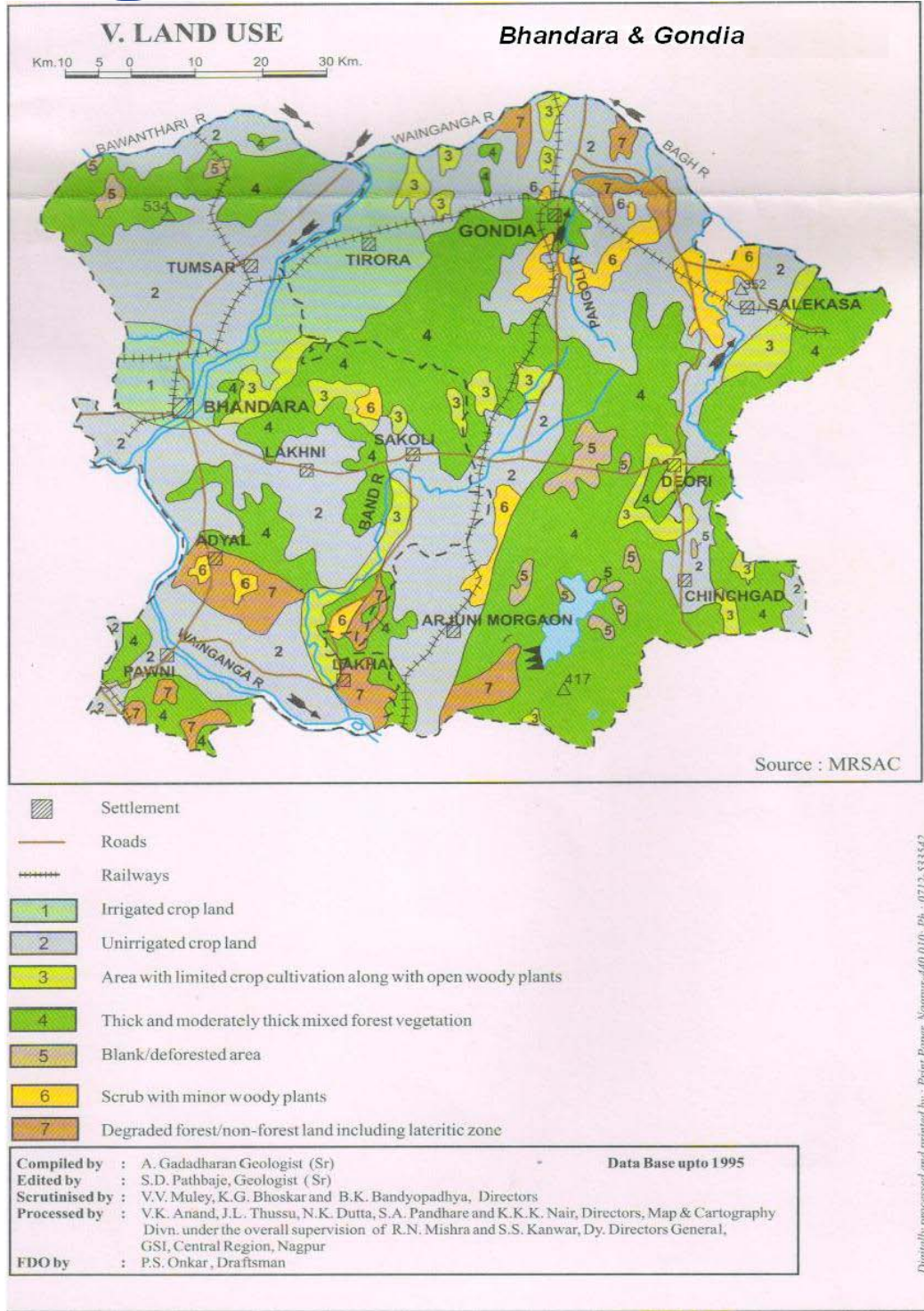
We have procured District wise data for land-use based on the District Abstracts (given for 2001-2002)

Table - 3 Land Use in Pr.A (Area in Hectares)

	Total Area	Forest Land	% of total	Land under Cultivation	% of total
Bhandara	342012	64558	18.87	227004	66.38
Gadchiroli	1491554	1132969	75.96	196649	13.19
Gondia	585895	215115	36.72	223198	38.1

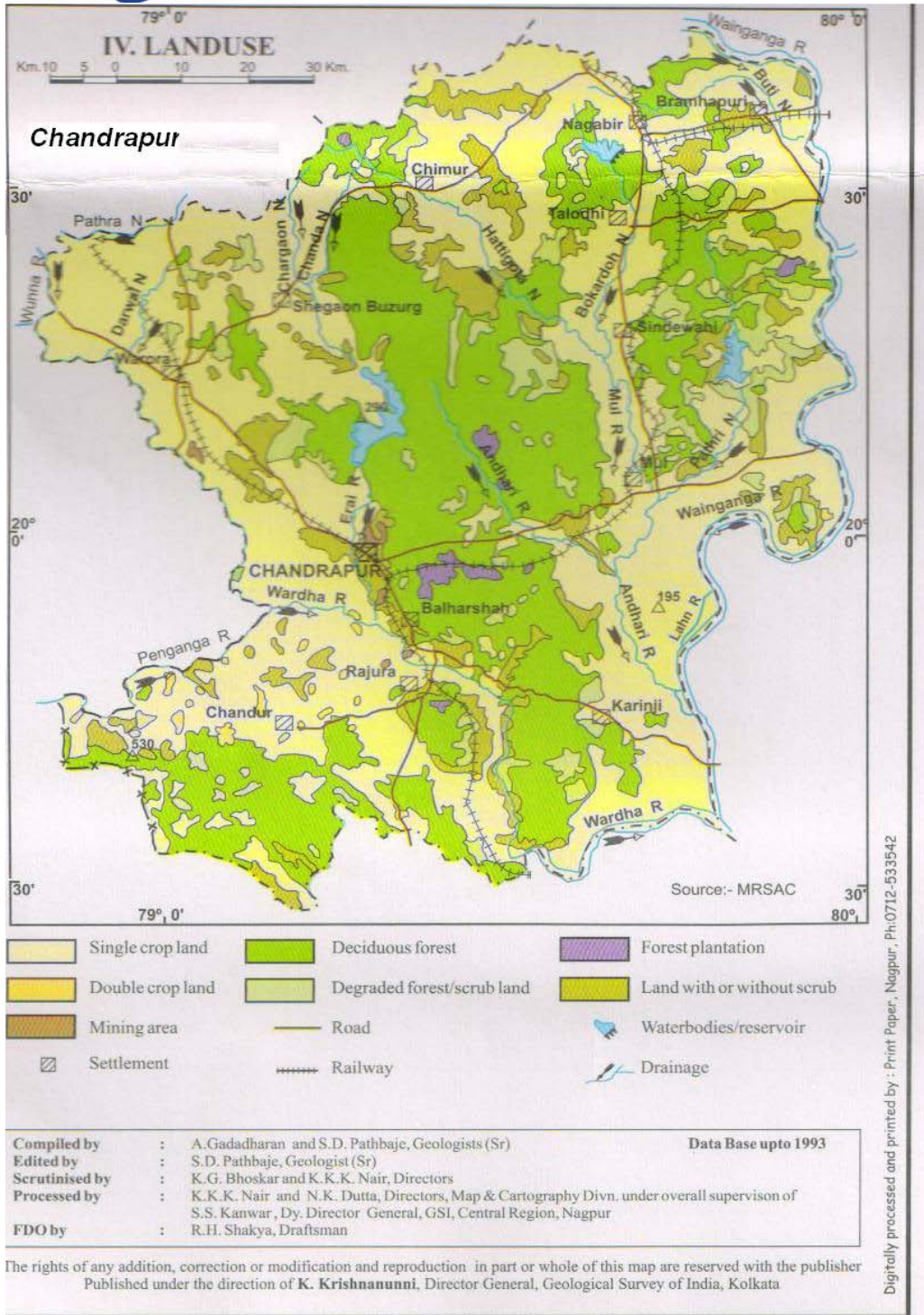
Consideration will be given to the increasing urbanization and food requirements while suggesting agricultural, urban, and industrial land use. Sites suitable for different types of industries (whether chemical, paper and pulp, manufacturing, food, agro-based, etc.) will be identified based on the current land use. Emphasis will be laid on developing a gradual urban-rural transformation while selecting sites for increasing urban areas, industrial zones, etc. Sites likely to be affected by transportation of pollutants from urban centers from the surface and groundwater will be identified for planning corrective measures.

Sites will be identified for urban and industrial water supply stations, waste disposal (solid, liquid) in view of the projected developments in the next twenty years. Land use pattern maps which are currently available are given below:



Digitally processed and printed by : Print Paper, Nagpur-440 010, Ph. : 0712-533542.

Map - 1 Land Use of Bhandara and Gondia Districts



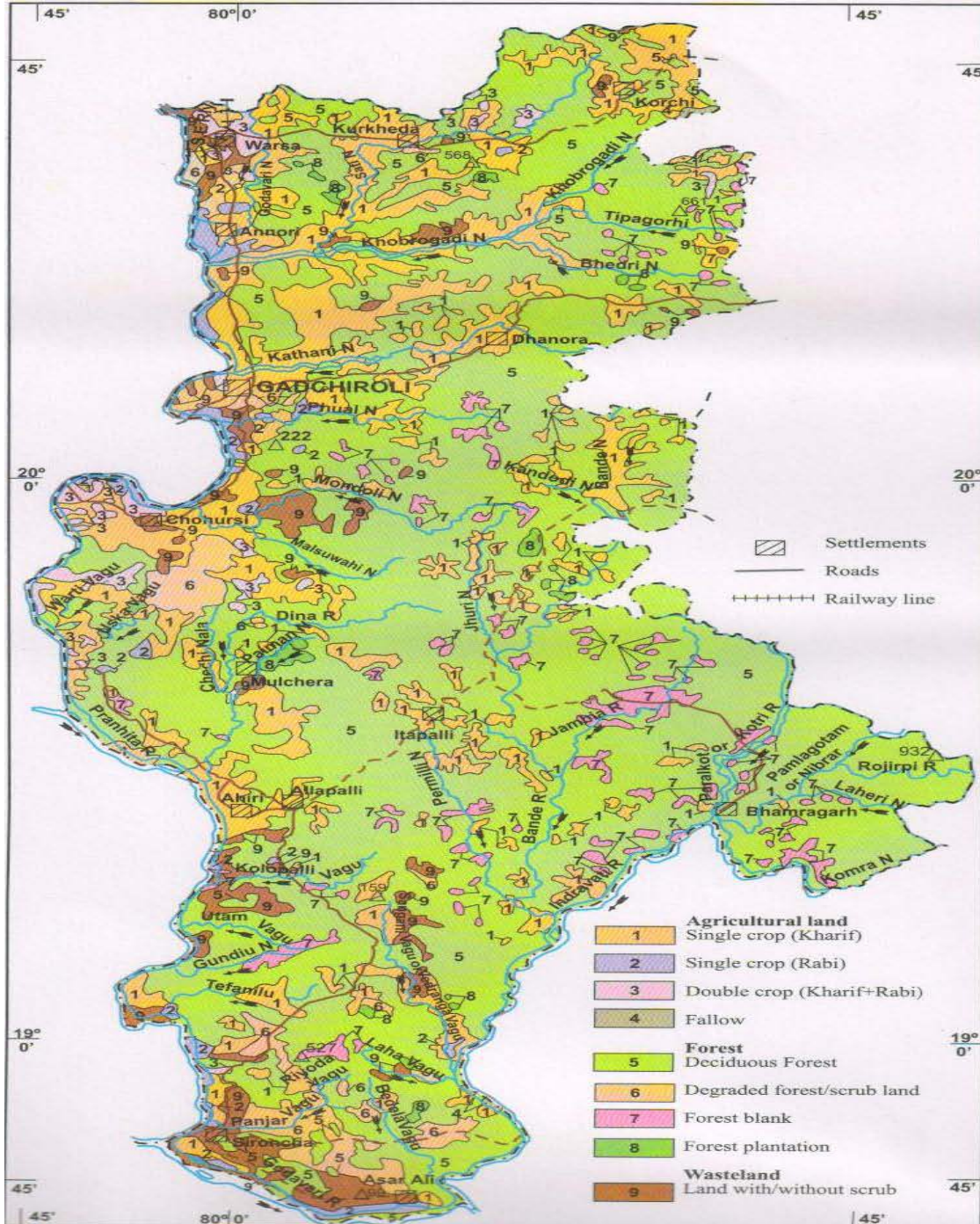
Map - 2 Land Use of Chandrapur District



Gadchiroli

III. LANDUSE

Km. 10 5 0 10 20 30 Km.



Map - 3 Land Use of Gadchiroli District



8.4 Development and Management of Galper Lands

We will collect data and analyze the present status of the Galper land on the peripheries of reservoirs and water bodies. The total area under Galper land, the area under cultivation, the area unutilized, crops grown, and revenue collected, etc. will be made available. A comprehensive plan for utilization of Galper lands will be drawn up. The type of interventions and land management done in Galper lands will be assessed for their effect on the water bodies with respect to nutrient release, soil erosion and deposition, etc. Efforts will be made to suggest improvisations in the management system so as to benefit the agriculture system as well as protecting water quality in the reservoirs.

8.5 Diversion of agricultural land to non-agricultural activities

Data on the present status of such conversion will be made available by conducting detailed survey and/or the available statistics. An alternative plan for developmental activities without encroaching upon the irrigated/cultivable lands will be drawn.

8.6 Land acquisition, Resettlement and Rehabilitation

The water resource projects cause displacement of population and villages in large numbers. They have to be resettled and rehabilitated. The extent of future requirement in this regard will be assessed. The status of land acquisition at watershed level will be studied. A plan to utilize the surplus (acquired) lands will also be required. A comprehensive plan of land acquisition and R&R will be prepared for existing/planned development projects.

Different rehabilitation packages and models will be assessed, e.g. the one offered to earthquake victims at Latur, the R & R package offered to Project Affected Families in case of the Narmada Dams, and the R & R packages offered by MIDC etc. These are expected to give us a framework for preparing a basin specific Model and R&R Plan for Wainganga.

9. Water Resources Development

9.1 Geo-hydrology

The project area has three basic conditions with respect to geo-hydrology.

1) The Archean metamorphic rock: This rock is impervious and therefore, cannot hold much groundwater. However, due to the weathering of this rock, there are many fractures, joints, and cracks which give it secondary porosity. Therefore, this bed rock creates good groundwater storages. This can be seen in parts of Bhandara, Gadchiroli and Chandrapur districts.



But, if the weathering leads to clayey materials then the porosity is affected and groundwater may not be found in such areas. e.g. Gondia district.

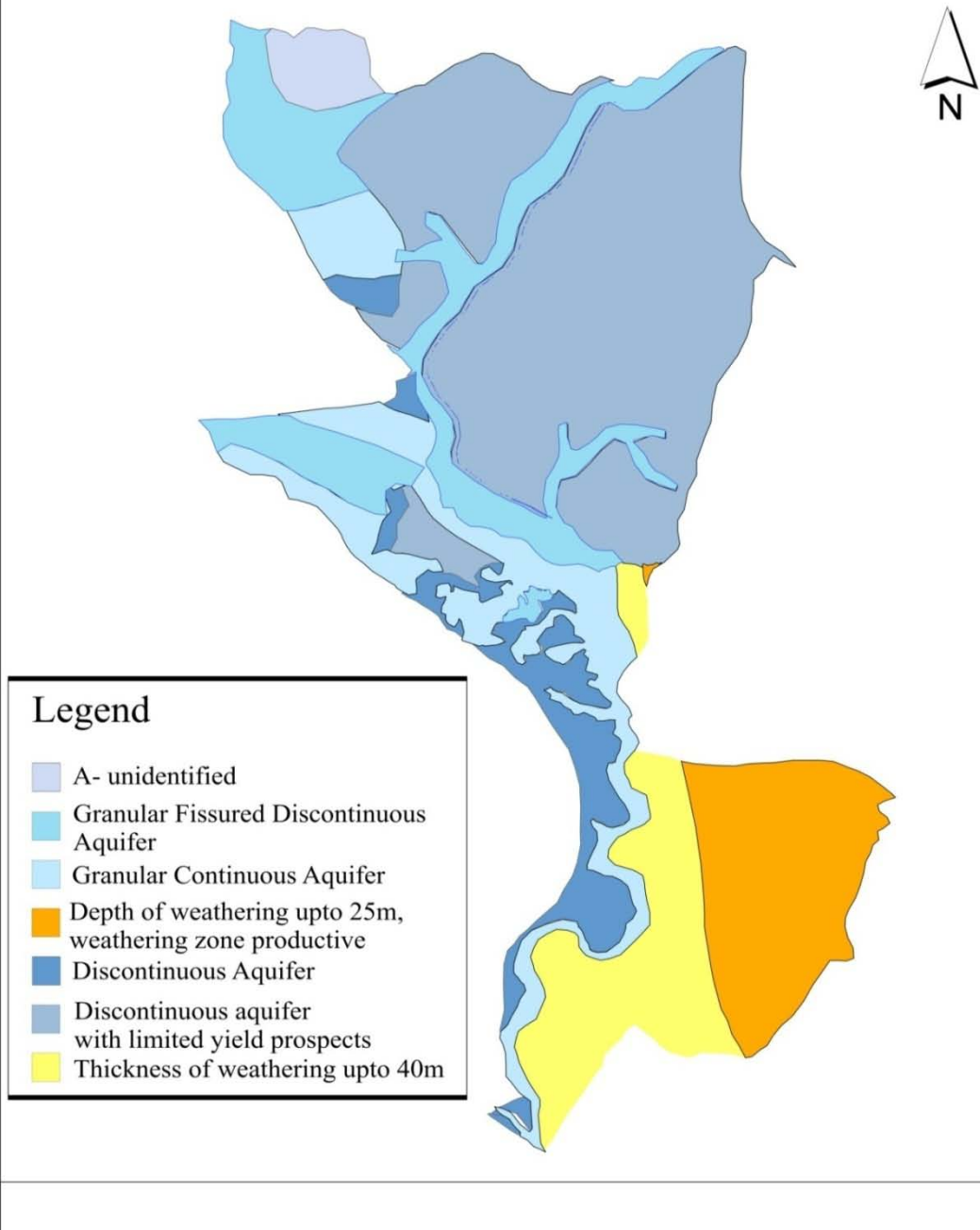
2) The Sedimentary rocks from the Vindhyan System: They have good porosity and transitivity. Groundwater may be found in a confined or unconfined state, at 6-9 meters depth. This type of rock can be seen in Chandrapur, Gadchiroli, and Bhandara

3) Alluvium deposits along the rivers also form ideal conditions for groundwater percolation and storage. This can be seen along the Wainganga river in Bhandara, Gondia, Chandrapur, Gadchiroli.

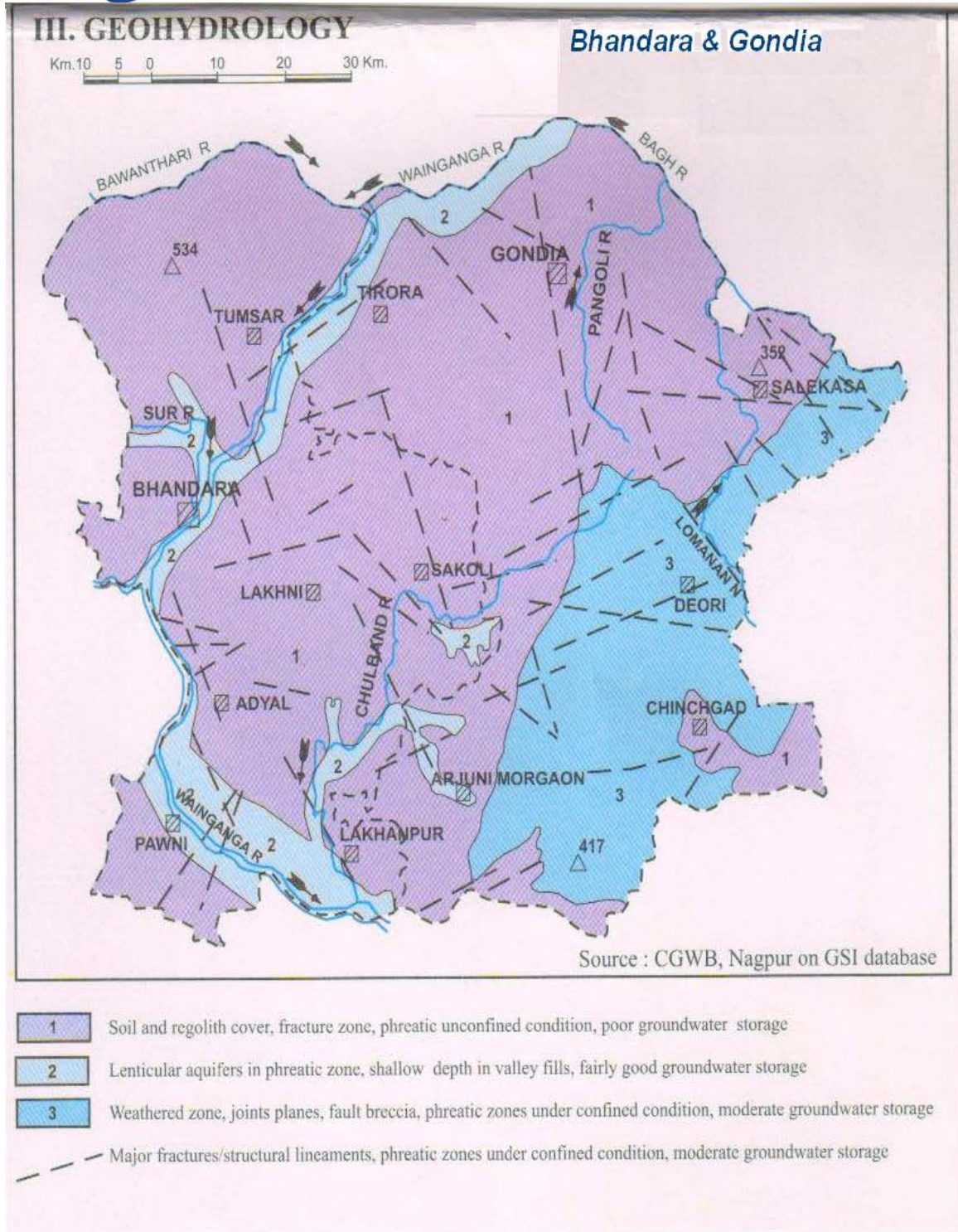
Aquifers will be marked for groundwater development based on the geological maps. Recharge zones, flow patterns will be marked. Urban and industrial centres occurring over recharge zones will be identified. Geo-hydrological maps which are currently available are given below:



Geohydrological Map of Wainganga Sub-Basin



Map - 4 Geo hydrological Map of Wainganga Sub-basin (Pr.A)



Map - 5 Geohydrology of Bhandara and Gondia Districts





Map -7 Geohydrology of Gadchiroli District

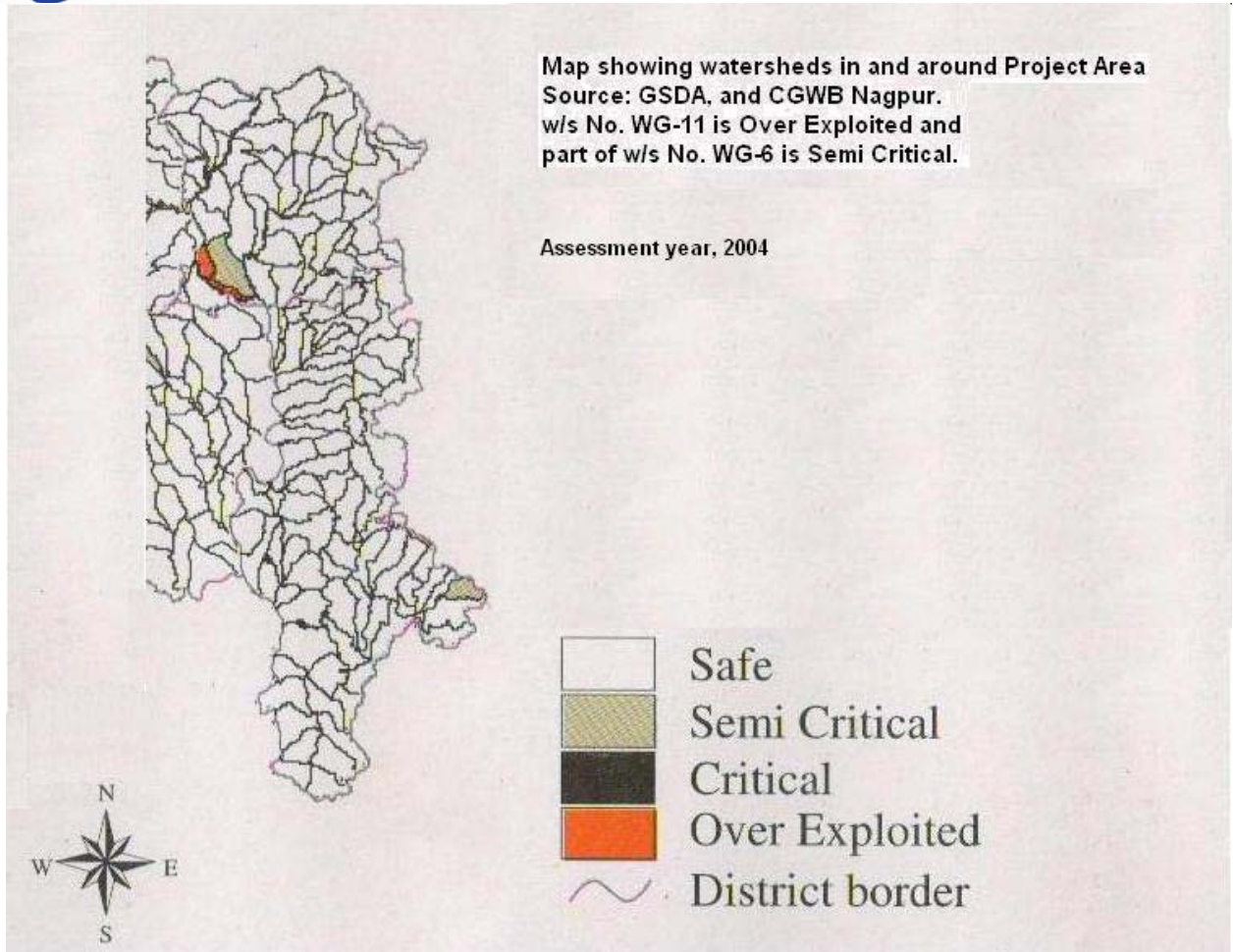


9.2 Groundwater availability

The groundwater potential with present status of each watershed will be assessed. The information regarding number of wells like open wells, bore wells, tube wells etc. with details as wells in operation, not in operation, wells in urban areas and rural areas, wells with power connection and without power connection etc. will be collected watershed wise in a systematic way to understand the true groundwater scenario in each watershed. Detailed classification based on use such as irrigation wells/bores, drinking water wells, wells for industrial water etc. will be made. Physical survey to assess the ground realities on factual basis by contacting the Talathi, Sarpanch or other resourceful persons of the village for collecting the data in respect of Open Wells, Bore Wells, Tube Wells etc., through visiting villages in the watershed to acquire the required data. A comparative statement (data as collected from the government departments and data as per ground realities) will be given.

Two watersheds in the project area, lying in the Bhandara district (WS 11 and WS 9) were identified as unsafe in 2004 (Groundwater Resources of Maharashtra 2004) (in the 2007 assessment, the talukas were noted as safe, Groundwater survey 2007-08) to have over-exploitation of groundwater. The reasons for over-exploitation will be identified. As stated earlier, large number of villages with poor groundwater quality have been found.

Steps will be suggested to address the problems through land use modification and watershed management to overcome these issues. Since the region has sufficient groundwater, groundwater development and utilization will be the key feature in water resource development and management. Also, groundwater can be managed by local communities, and therefore gives an added advantage in the institutional framework.



Map - 8 Watersheds in Pr. A.



Table - 5

**District wise Net GW Availability and Draft Details -
Groundwater Assessment 2007- 08**

Unit: Ham.

Sr. No.	District	Annual Replenishable Groundwater Resource	Natural Discharge during non-monsoon Season	Net Annual Groundwater Availability	Annual Groundwater Draft			Proj. Demand for Domestic & Indus. uses for 25 yrs.	Allocation for Projected Demand	Groundwater Availability for future Irrigation
					Irrigation	Domestic & Inds. uses	Total			
1	2	3	4	5	6	7	8	9	10	11
1	BHANDARA	54029	311	50913	12150	1967	14117	3935	3935	32861
2	CHANDRAPUR	109155	563	103523	8754	6292	15046	12584	12559	75917
3	GADCHIROLI	137473	925	128222	17064	2174	19238	4347	4340	104645
4	GONDIA	61880	370	58171	4821	6118	10939	12236	10999	36234
5	NAGPUR	111697	565	106046	34360	6421	40780	12842	11427	53838
	TOTAL	474234	2736	446875	77149	22972	100120	45944	43260	303495

Source: GSDA, Groundwater Assessment for 2007-08. (Report published in 2009).

Table - 6

**District wise No. of Dug wells, bore wells and Draft
Data - Groundwater Assessment 2007- 08**

Unit: Ham.

Sr. No.	District	Irrigation Dug-well		Irrigation Bore-well		Domestic Dug-well		Domestic Bore-well		Industrial Dug-well		Industrial Bore-well	
		No.	Draft	No.	Draft	No.	Draft	No.	Draft	No.	Draft	No.	Draft
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	BHANDARA	15017	12149.83	0	0.00	2821	618.49	4311	1311.26	24	37.70	0	0.00
2	CHANDRAPUR	12043	8678.37	455	75.95	9442	3511.62	7553	3016.80	0	0.00	0	0.00
3	GADCHIROLI	9939	17011.51	107	52.40	8061	1112.28	6944	1061.46	0	0.00	0	0.00
4	GONDIA	4924	4699.49	357	121.73	23182	3873.85	7411	2213.04	155	6.11	621	24.84
5	NAGPUR	43362	34224.23	94	135.36	7638	3485.81	6309	2935.07	0	0.00	0	0.00
	TOTAL												

Source: GSDA, Groundwater Assessment for 2007-08. (Report published in 2009).



9.3 Hydrometeorology (Hydrology):

The region receives an average rainfall of about 1250 mm. The area receives rainfall from both the South-West and the North-East monsoon winds. It falls in the moderate to high rainfall zones in Maharashtra. The area can be termed as a water surplus region owing to the average rainfall and ideal conditions for groundwater collection. It is also classified as Assured Rainfall Zone.

The available data of the region will be assessed for variability in rainfall, frequency of floods or droughts, occurrence of cloud bursts, etc. Climate change and its local effects will be considered and adaptations, precautions, etc. will be suggested.

9.4 Surface Water Availability:

Information about Rainfall pattern in the watersheds of sub-basin and its spatial and temporal variability will be gathered. The name, location and type of rain gauges in the watersheds of sub-basin-wise and watershed-wise for each watershed area of a sub-basin, normal rainfall and 10 daily rainfall/monthly rainfall for last 30 to 60 years ending up to December 2009 will be presented. The existing network of gauge stations will be reviewed and recommendation for expansion will be made.

We have procured data for Rainfall from the Meteorological Department, Airport Campus, Nagpur, for the year **2008**, which is as follows:

Table - 7

Information Provided by Metrological Department, Airport, Nagpur													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Bramhapuri	2.6	25.4	33.6	0	1.4	127.8	436.1	191.1	79.2	0	0	0	897.20
Chandrapur	0	0	0	0	0	120.9	285.7	606.1	200.9	12.4	0	0	1226.00
Gondia	1	27.6	52.4	0	0.6	593	297.2	426.8	139.5	22.8	0	0	1560.90
Nagpur	0	0	17.9	8.2	15.8	205.4	304.6	195.1	178	52	0	0	977.00
Sironcha	0	0	97.13	0	0.8	263	309.3	663.1	168.3	16	0	0	1517.63
Wardha			25.5	3	2	130.3	309.3	244.1	190.4	16.7	0	0	921.30
													Total 7100.03
													Avg. 1183.34

Also the following data will be procured from the State Data Storage Centre, Nasik and Hydrology Project Circle (Analysis), Jai Vigyan Bhavan, Dindori Road, Nasik:

GD - Gauge Discharge Stations (Gauge river discharge data on hourly basis and at some station twice a day at 8.30 hrs and 17.30 hrs.),

ARG - Autographic Rain Gauge Stations (Rainfall charts at 8.30 hrs and hourly rainfall abstracts,

SRG - Standard Rain Gauge Stations (Daily Rainfall at 8.30 hrs.)



FCS - Full Climate Station:

1. Temperature a) Max, b) Minimum, c) Dry Bulb, d) Wet Bulb,
2. Rainfall a) for SRG – Daily, b) ARG – Hourly
3. Evaporation – Twice daily at 8.30 hrs and 17.30 hrs
4. Wind direction - Twice daily at 8.30 hrs and 17.30 hrs
5. Wind Speed - Twice daily at 8.30 hrs and 17.30 hrs

This data will be procured from different gauge stations for Wainganga Sub-basin.

The data regarding the surface water availability will be collected from all the rain gauge stations of the Meteorological Department (**33** rain gauge stations) and other stations established by Jeevan Pradhikaran, GSDA, and WRD etc. In addition, data will also be collected from **18** River Gauge Stations (RGS). Efforts will be made for setting a 'village- level rain gauge station' to provide a model for increasing the network of field stations and data accuracy.

Assessment of water resources of the watersheds in the sub-basin at important points made by the Irrigation Commission, Tribunal, CWC, and State Government (90% dependability for Drinking Water supply, 75% dependability, 50% dependability and average) will be worked out. For each watershed of the sub basin, assessment of water (90% dependability for drinking water supply, 75% dependability, 50% dependability and average) made from the rain gauge and river-gauging stations for period ending December 2009 will be made. Fresh figures at sub-basin, watershed level will be compared with the figures adopted by Tribunals, Irrigation Commission, CWC, of the State Government wherever available. This will be done by the latest updated scientific approach. Imports/Exports of water from watersheds of the sub-basin will be assessed.

9.5 Tribunal Awards:

After reviewing the Godavari Tribunal Award and considering all the deletions and additions recommended in the Tribunal directives, we have come to the conclusion that the total surface water availability restricted specifically to the project area would be approx. **7,655 Mm³**. Consideration will be given to the Tribunal Awards while suggesting inter-basin transfers or intra-basin transfers, if any, so as not to contradict its regulations.

The legal issues and limitations arising out of Godavari Water Disputes Tribunal will be discussed and a copy of the relevant portions/statements in the award and other allocation agreements will be included in the interim and final reports.

9.6 Prevention of Water Losses and Evaporation control

A detailed plan for saving water by reducing leakages and wastages in the canal systems, minors and distributaries, and finally techniques for reducing on-farm losses would be described.



Prevention of losses through water delivery systems such as dams, reservoirs, canals, distributaries, pipelines, disnets etc. for distribution of non-irrigation water will be discussed. The application of **MMISF** Act on all irrigation projects shall ensure the volumetric measurement of water. We will evaluate the feasibility of distribution systems of water through pipe line instead of canals. The plan will suggest the application of an 8 monthly irrigation rotation to reduce water losses. We will make assessment of losses of domestic and industrial water supply schemes and measures to be taken to reduce such losses.

Evaporation of water from reservoirs, agricultural runoff, etc. is a major problem of water loss and therefore watershed-wise information will be compiled regarding the same. The quantum of water being lost through evaporation from reservoir or irrigated area will be measured. Techniques and remedial measures to minimize the evaporation losses through the system will be suggested.

10. Water Resources Management

10.1 Irrigation Management Plan:

Information on individual projects and data regarding benefited area, cropped area, basic area, land holding, number of beneficiaries and Water Users, Associations etc. will be compiled for each watershed. A comprehensive Participatory Irrigation Management (PIM) Plan will be prepared.

The irrigation plan will address the issue of **fragmentation in institutional structure** of irrigation management, such as Zilla Parishad, Revenue Departments, Soil and Water conservation (Agriculture Department), Soil and Water conservation (Forest Department), Drought Prone Area Plan, etc. **Such fragmentation leads to discordant management and therefore, this issue will be studied and a procedure for integrating the various departments with a common strategy and line of command will be developed with consensus among different departments.**

The comprehensive Participatory Irrigation Management Plan (**PIM**) will also consist of the **phasing-in of modern efficient practices** and **phasing-out of obsolete practices** and techniques. The areas to be covered with such improved practices will be identified and implementation phases over the next twenty years will be suggested.

However, the irrigation plan itself will cover important aspects such as micro-irrigation, **more for achieving the objective of productivity and quality of produce, rather than using it merely as a water saving device.** Large areas in Bhandara have deep soils and are amenable to pipe disnet systems. Therefore, the relevant irrigation plans will recommend such systems for increasing productivity wherever found appropriate.



The irrigation plan will emphasize the fact that such water management actually reduces the cost of production and increases income per hectare. The plan will also recommend training of farmers in the use of such techniques especially in order to avoid mistakes committed in the past and adopt best practices developed in other areas.

It may be noted that although the basin is water surplus area, there may be a scarcity of water for irrigation for specific months or days and therefore adopting techniques which will avoid such scarcity periods would be advocated in the irrigation management plan.

The relevance or otherwise of the new irrigation practices such as: **Volumetric and controlled release of water** at different sources e.g. wells, canals, tanks etc. and the use of **gravity-based, siphon-based and energy-based systems** (pumps etc.); **micro irrigation techniques** like **drips, sprinklers and shed netwith foggers/moisturizers**; variety and combination of **shaping, profiling, rows and furrows, creating meanders in order to maintain the appropriate soil moisture levels in the root zone areas; sub-soil piping system, optimal volumes of water (Delta recommendations)** for different crops in different soil categories will be assessed, as per the irrigation capability studies in different regimes of Wainganga river basin.

There are several major and medium projects which have been completed and many others in different stages of completion. These projects will be broadly assessed and evaluated in order to find out flaws in execution, implementation of projects or utilization of water. Bottlenecks and inefficiencies will be identified and corrective measures will be recommended. The Annual Irrigation Status Reports (*Varshik Sinchan Ahawal*), Benchmarking reports, and other publications of WRD will be studied in order to recommend corrective measures.

Project Identification:

During the next phase i.e. 20th October to 20th December 2010, efforts will be made to identify projects which will enable the extension of irrigation in wider areas in the basin. The categories of projects identified will be as follows,

1. Identification and location of balancing reservoirs, (inter sub-basin and intra sub-basin)
2. Lift irrigation schemes with model costing, justification and evaluation procedures downstream, upstream and at the Gosekhurd reservoir.
3. Cluster management of water users' associations.

The current status of Minor Irrigation Projects is given below:



Table - 8 Minor Irrigation Projects: (2008-2009)

Sr. No.	District	Completed Projects	Complete and Working Projects	Benefitted area
1	Bhandara	3282	1737	76079
2	Gadchiroli	2236	2235	38956
3	Gondia	1549	1568	69525

Total number of major and medium irrigation projects in the districts of Bhandra, Gadchiroli and Gondia are 24, out of which 8 are incomplete, majority of which fall in the Gadchiroli District in forest land.

10.2 Domestic & Industrial Water Supply: (Urban & Rural)

Domestic:

The present status of distribution and management of domestic water will be assessed. The requirement of infrastructure for their volumetric distribution will be assessed and a plan for implementation will be prepared. The present data for urban water distribution canals and network of pipelines will be collected and assessed for improvement.

Industrial:

The present status of distribution and management of water to the industries will be discussed and volumetric measurement etc. will be made. The current thinking emerging from the various seminars and workshops conducted by the MWRRRA will form the basis for determining the **water-rates and bulk-entitlements**. Protective investments such as Effluent Treatment Plants (ETP) and Sewage Treatment Plants (STP) will be recommended for maintaining the quality of water in the natural streams and water bodies.

10.3 Use of Modern Tools/Water Saving Techniques:

Potential for using modern tools and techniques will be assessed and recommendations will be made. The potential for adoption of water saving devices such as sprinkler, drip, sub-surface irrigation, green houses etc. will be assessed and a plan will be drawn. The district statistical abstracts indicate that negligible areas have been covered by micro irrigation systems, e.g. Drips, sprinklers, lateral sub-soil, pipes, etc. Therefore, the irrigation plan will provide details regarding investments required and area to be covered through micro irrigation in a phase wise manner.



A plan for phasing in rain water harvesting, storm water collection, monitored water supply and pricing, reuse of water for domestic/industrial purpose etc. will be prepared.

10.4 Groundwater Management in Irrigated area/conjunctive irrigation:

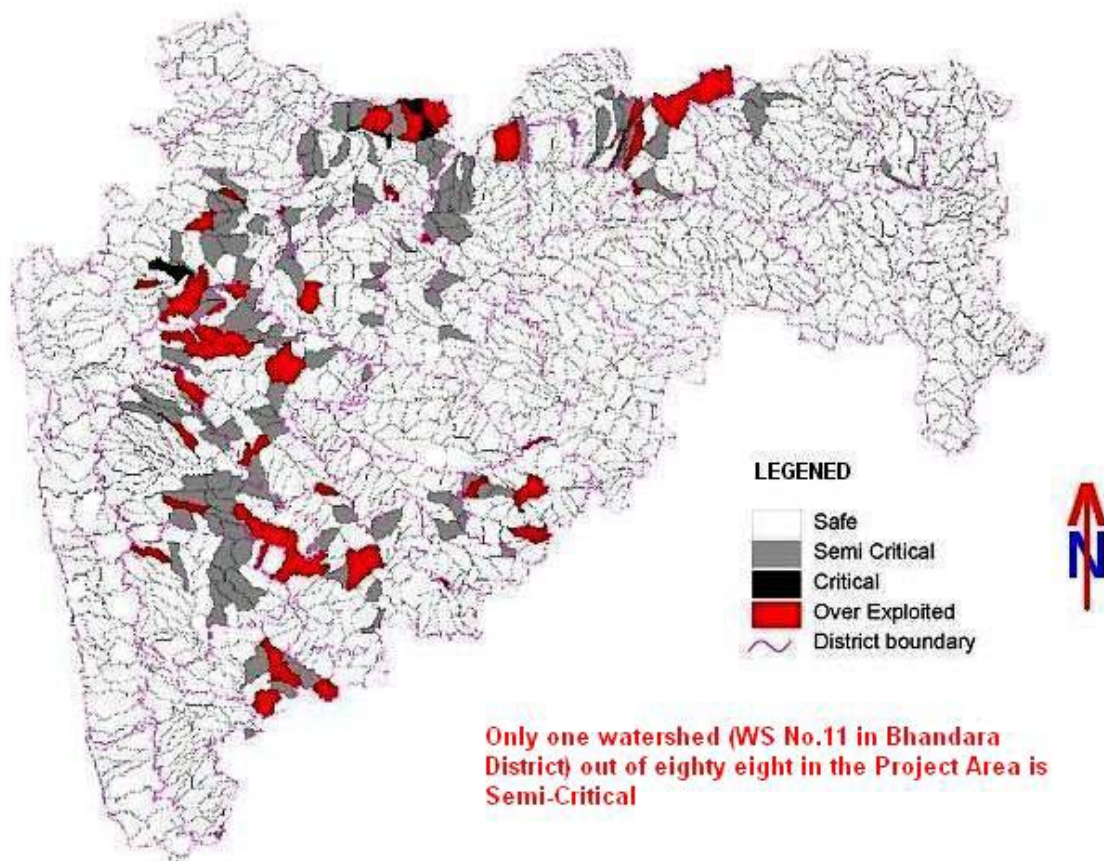
The extent of groundwater development in the service area with its pros and cons will be discussed in detail. Groundwater resources form an integral component of any river basin, so much so that there is growing evidence from different parts of India about the importance of groundwater in maintaining minimum flows in rivers or ecological flows. These terminologies have emerged as a growing concern for the environment. However, the concept of base flows in streams and rivers has been in existence in literature on groundwater for some time now. It would be useful to look at base flow behavior in the project area, primarily as an indicator of groundwater use and potential exploitation.

Groundwater resources behavior in the project area is governed by a diverse geological setting. This becomes crucial in any water resources planning because of the resulting non-homogeneity in groundwater resource behavior in space and time. Trends resulting from such non-homogeneity will constitute an important part of the appraisal on groundwater. This approach will actually pave the way to making realistic predictions on groundwater potential, recharge for augmentation and possible processes and protocol for management. In fact, such management protocols are also likely to ensure positive impacts on river flow and river flow systems.

We will therefore prepare a plan for groundwater utilization which is based on the assessment carried out by the GSDA (2004 and 2007-08) which indicates the current utilization/over exploitation and potential available for further abstraction. The development of such potential will be crucial for deciding when and how this water should be used in conjunction with surface irrigation. For example, it can be used when lifts are not in operation due to various reasons like lack of electricity/diesel, non-availability of surface water, etc. The plan will indicate the optimal combination of surface and groundwater and establish a procedure.



Categorization of Watersheds in Maharashtra, (GSDA, 2007) As Per The Degree of Groundwater Exploitation



Map - 9 Categorization of watersheds in Maharashtra (2007)

Water made available through watershed development activities like surface impoundment, soil moisture and augmentation of shallow aquifers. The advantages and limitations of each of these sources will be elaborated so that the plan implementing agency has clear guidelines on how the system as a whole, should be optimized.

The experience in Maharashtra indicates that mere availability of water in aquifers or mere existence of tube-wells is not sufficient. Availability of energy is a major constraint, and



the rising prices of fossil-fuel based energy puts an additional limitation over the use of pumps. Load shedding and power shortages have become a routine and therefore such difficulties will be factored into the groundwater and surface water management plan.

10.5 Watershed Development & Management:

There are 88 watersheds in the project area. These watersheds will be categorized according to the primary land-use into three categories. The categories are – predominantly agricultural watersheds, forest dominated watersheds, hilly and mountainous watersheds. Plans will be developed separately for each category of watersheds.

Agricultural watersheds: Methods such as contour trench farming, mulching, water ways or diversion channels, grassing waterways, water storage ponds will be adopted in the agricultural watershed, laying emphasis on water conservation and improving soil quality. Raising nurseries for forest, fodder, timber, wood for fuel will be promoted in these regions. Perma-culture may also be introduced in these areas.

Water holes for domestic animals will be promoted. Renovation and augmentation of water sources, desiltation of village tanks for drinking water, irrigation, and fisheries will be suggested.

Forest dominated watersheds: In the watersheds dominated by forests, contour trenching, gully plugging, vegetative drainage-line treatment techniques will be included in the plan. No cement gabions, bunds, etc. will be included in the forest watersheds. Instead, development of vegetative cover by methods such as Analog Forestry, Restoration forestry, etc. will be suggested. The plan will give primary importance not only to water conservation and ground water recharge but also to creating inhabitable spaces for wildlife. Provision for watering holes for animals, restoring natural springs, artificial lake development for fisheries and natural aquatic fauna will be recommended. Special provisions for water for the processing of Non Timber Forest Produce will be considered.

Hilly and Mountainous Watersheds: Hilly areas are especially prone to soil erosion, therefore, perennial vegetative cover of shrubs, contour bunding, live hedging on contour bunds, strip farming techniques will be included in the plan for watershed development of this region. Horticultural development, Perma-culture, Energy plantation, etc. will be suggested along slopes while pasture lands will be maintained in the terrains with gentle slopes. Animal husbandry will be aided by such provisions. Water for husbanded animals will be created in these areas.

Providing for drinking water through village tanks, forest ponds, repairing natural springs in all watersheds will be a priority. Inland fisheries will be promoted in village tanks, farm ponds etc. In all watersheds, silt traps will be suggested as an additional feature so as to increase the life of the reservoirs downstream and to reduce the soil erosion. Drought Prone Area guidelines developed by CAPART will be used as a basis for development of plans in watersheds, although the region is not primarily drought prone.



All the methods will be suitably modified for the high rainfall and moderate rainfall regions and local conditions.

We will further discuss the present status of watershed development and management. The area to be covered under watershed management will be identified and incorporated. We will include a number of schemes/devices and type of schemes/devices implemented so far and ongoing schemes with potential utilization, ultimate potential, balance potential, planned utilization etc.

Data on Minor irrigation schemes in sub basin (Local sector), with planned schemes by Zilla Parishads, Soil Conservation Department will be collected. Number of earthen nala bandh, cement plugs, K.T. weirs, percolation tanks, storage tanks etc. collected from Agriculture department, Zilla Parishads, Water Resources Department, and Forest dept. etc. will be verified for about 25% of the area of sub basin. The current efficiency of percolation tanks will be verified by ground truthing to the extent of 25%.

Creating farm ponds in the ratio of 1:10 will be an important intervention recommended in the watershed development plan. As indicated in the chapter on groundwater such ponds would enable the optimal use of groundwater, canal water and micro- pondages created through watershed development. The objective of most of these interventions will be:

- a) Reducing the rate of runoff;
- b) Reducing erosion and reservoir-sedimentation; and
- c) Multiple use of water through groundwater percolation and return=flows;

This source of water will be integrated into the irrigation plan recommended for each agro-climatic zone. The interface between the three sources will be highlighted and the need to look at the three sources as a holistic system will be emphasized.

Table 9 : District wise Categorisation of Watersheds - Groundwater Assessment 2007- 08

Sr. No.	DISTRICT	Total No. of Watersheds	Categorisation of Watersheds				
			Safe	Semi Critical	Critical	Over Exploited	Unclassified due to
1	BHANDARA	25	24	1	0	0	0
2	CHANDRAPUR	58	58	0	0	0	0
3	GADCHIROLI	83	83	0	0	0	0
4	GONDIA	33	33	0	0	0	0
5	NAGPUR	54	51	3**	0	0	0
	TOTAL	253	249	4	0	0	0



** Although very few watersheds from Nagpur District fall within the Project Area, these three Semi Critical watersheds shown in the table for Nagpur district are not part of the Project Area under study.

Source: GSDA, Groundwater Assessment for 2007-08. (Report published in 2009).

Stage of groundwater development and categorisation of units

The stage of ground water Development is defined by:

$$\text{Stage of groundwater Development (\%)} = \frac{\text{Existing Gross Ground water draft for all uses} \times 100}{\text{Net annual Groundwater Availability}}$$

Categorisation of areas for groundwater development

Table - 10 Stage of groundwater development and categorisation of units

Sr. No.	Stage Of GW Development	Significant Long Term Decline		Category
		Pre-Monsoon	Post- Monsoon	
1	≤ 70 %	No	No	SAFE
2	> 70 to ≤ 90 %	No	No	SAFE
3		Yes/No	No/Yes	SEMI CRITICAL
4	> 90 to ≤ 100 %	Yes/No	No/Yes	SEMI CRITICAL
		Yes	Yes	CRITICAL
	> 100 %	Yes/No	No/Yes	OVER EXPLOITED
		Yes	Yes	OVER EXPLOITED

Development & Management of Water Resources for Urban & Industrial Requirements:

Although water demand for urban and industrial uses may not form even two percent of the total availability at present, it is likely to grow in future. Therefore, water availability is not a problem for industries and urban requirements in the project area.

However, providing the necessary infrastructure, i.e. water purification plants, an efficient and metered water supply and water charge and recovery system, a sewage disposal system and an adequate storm water drainage system; is certainly an important gap in the urban areas as well as the industrial estates or singular industries and thermal power plants. Bhandara city, Tumsar, Pauni and



Gondia towns and all other small towns are facing problem of 'water quality' and reliable supply. Several new mega thermal project plants have been already planned or proposed in this area.

Therefore, there is an urgent need to assess the situation and prepare an urban water management plan where all the sub systems mentioned above will be integrated in to a comprehensive plan. A stakeholder group at Bhandara supported by two professional Architect-Town Planners will prepare a plan for Pauni and Bhandara which can serve as a model for other small towns within the project area. In case of the large industrial units a future demand assessment will be made and an indicative plan for industrial effluent management prepared.

10.6 Recycling, Reuse and Multiple use of Water:

Industrial Effluents: We will discuss the number and types of industries, the present status of recycling and reuse of water by the same etc. The list of industries without water treatment plants and the quantum of water to be recycled, cost aspect etc. will be discussed. The return-flows from industrial uses will be estimated with reference to the norms specified in the report of Maharashtra Water & Irrigation Commission.

Domestic Water: The present status of treatment plants for recycling of used water will be assessed and a plan for future will be drawn. Similarly, the return-flows from domestic uses will be estimated. Scope for community/village level wastewater treatment facility will be assessed. Novel techniques in domestic wastewater treatment will be explored and scope for their implementation will be assessed.

Sewage Irrigation: The present status of treatment and reuse will be assessed and a plan for future will be drawn. The current waste-water-treatment-techniques being used will be assessed for their appropriateness and changes if required will be suggested.

10.7 Water Quality:

The water quality status and the action plan to improve the quality will be discussed in this chapter. This will cover existing and proposed water treatment facilities and monitoring of quality of surface and ground storages. The location of water monitoring stations, the parameters which are monitored, the frequency of monitoring and the data for the last five years at each station along with the norms will be presented. In the absence of such stations, we will carry out these tests. The location of all types of industries, the types of effluent they discharge, whether treatment done or not and point of discharge into rivers will be indicated. The names of such towns discharging untreated sewage, locations, population, total sewage generated, quantity treated will be described.

A River Health Plan will be prepared as per regimes showing status of pollution/water quality/degradation of eco-system. The Pollution Control Board and Municipalities/Corporations will draw an Action Plan to improve the water quality through effluent treatment/sewage treatment and use of treated sewage water for irrigation. The Action Plans will be discussed together with the financial implications and status of implementation. The expected status of water quality and post action plan will be given.



10.8 Drought mitigation:

A drought mitigation plan including measures to be adopted, financial tools, etc. will be given. As per the data available for the year 2008-09, the no. of villages affected by water shortage in Bhandara, Gadchiroli and Gondia districts are as follows:

Table - 11 Villages affected by water shortage

District	Villages	Wadis	% of Total
Bhandara	129	48	6.00 %
Gadchiroli	274	67	17.00 %
Gondia	556	305	54.00 %

Wainganga basin is a water surplus area with assured rainfall and therefore we do not envisage the preparation of a detailed drought mitigation plan.

10.9 Traditional Water Systems for Water Management:

We will contact Talathi, Sarpanch or other resourceful persons of the village for collecting data in respect of Aad, well, step well (Barav), underground water channel, village tank, farm pond, khajana well, Roof Water Harvesting and so on. A visit to villages in the watershed will be made to acquire the required data.

(Details regarding this chapter have already been elaborated in Part B, 'Current situation of traditional tanks'. A report on the study done by us on this subject is attached herewith as **Annex-I**).

We will make an attempt to find out whether the traditional *Phad* systems, and the democratic water distribution procedure adopted in the villages of North-West Maharashtra, can be introduced or combined with the traditional Gond Tank management system, in the Project Area.

10.10 Intra-basin Divergence

At present the major intra-basin water balancing is being carried out through the Gosekhurd Composite project wherein, the right bank canal transfers water to the Asolamendha Reservoir via a tunnel. The Asolamendha technically lies within the Andhari River Basin, and therefore the transfer of 433 Mm³ of water can be treated as an inter-sub-basin transfer from Wainganga to Andhari. In this case, the transfer has led to an optimization and augmentation of the Asolamendha tank which was built a long time ago. Other options for such intra-basin



transfers in other tributaries like Kathani will be studied and an intra-basin divergence/transfer plan will be prepared in order to optimize the water available in the Wainganga sub-basin.

10.11 Water Balance:

We will carry out a water balance study for three groups of watersheds, after accounting for all types of uses; i.e. existing, ongoing and planned (i.e. identified future projects). The summary of water balance of all watersheds will constitute the water balance of the sub-basin. We believe that a water balance study is the only rational and scientific method for deciding equitable water shares and entitlements to different water users dispersed over the entire river basin. This is also an important technique for identifying the increasing or decreasing trends in case of return-flows, multiple use of water etc., if the water balance studies are carried out periodically.

We are aware that both within the basin and between basins disputes over allocation can arise, and negotiations need to be carried out. The resolution of such disputes and conflicts requires reasonably accurate information about water availability in the basin or sub-basin, per hectare and per capita availability (average). This type of information and quantitative dimensions can be understood or established only when a systematic water balance study has been conducted. We will therefore, use all the primary and secondary data wherever available and construct a water balance table for a specified year (e.g. 2011-12).

11. Disaster Management (Flood, Earthquake, Drought).

After making enquiries and holding discussions with relevant government departments, citizens and stakeholders directly affected by floods which took place in 1992 and 2005; we have arrived at a preliminary conclusion that these agencies are not following any flood management procedures in a systematic manner, and that most authorities respond to floods just before or during the occurrence of such floods. Further at present there appears to be a complete absence of post-disaster rehabilitation procedures.

Therefore, the data regarding flood-prone areas, land affected, villages and population affected etc. for floods of 1:25 years and 1:100 years frequencies will be collected. A map of these areas will be made. Flood moderation capacity of reservoirs may be indicated. The dams play a role of flood regulation if properly operated with respect to their ROS and GOS. The Government's directives are to prepare a disaster action plan as per the Dam Security Manual, Chapter-8 guidelines, before the formation of reservoir. As per these directives, this action plan has to be prepared after surveying the lower side area of the dam.

Three types of floods will be considered.

- Natural Flood.
- Spill-way Flood.
- Dam Break Flood.

As per chapter 8, page-3, paragraph 3.1, Dam Break Flood will be calculated (2 multiplied by Design Maximum Outflow of Particular Dam site). As per the flood study, spill-way



projected flood will be calculated. Maximum flood within a span of 25 years or 1.50 X flowing capacity of river, whichever is more, will be determined. At every 500 meters, cross sections should be taken at the lower side area of the dam. According to these, flood control lines for the 3 types of flood should be determined. These should be indicated on the village maps. List of these villages affected by flood should be prepared. During the natural flood, the flowing capacity of the river would be calculated. All the villages, number of houses in them, their population taluka-wise, which will be affected by the three types of flood should be prepared. All three types of flood control lines should be drawn in all the villages and accordingly the affected houses and affected population have to be identified. Considering the Dam Break, the safe places at high altitudes have to be identified. The duties of the departments and the officers related to disaster management are to be shown. The telephone numbers of the officers related to disaster management are to be shown.

The data regarding earthquake events, if any, in the vicinity of reservoirs, will be compiled and analyzed.

Although the region is not a particularly drought prone, droughts due to mismanagement can occur. These may be related to inequitable distribution of water, loss of agricultural produce, water supply pipeline bursts, etc. Steps to overcome such situations will be discussed.

The level of water pollution has reached a stage of being a potential disaster. Especially after the confluence of Kanhan and Wainganga, the water quality appears to have deteriorated. A plan for controlling the water pollution will be recommended but its implementation may have to take place in the Kanhan and Nag basins. Provisions for avoiding and overcoming pollution-related disasters (Air, Soil and Water Pollution) will be made in this plan.

Administrative, economic, technological, capacity building, awareness and education methods for overcoming disasters will be recommended.

12. Water for Energy

Hydropower: The watershed wise data regarding number of hydel projects, existing, ongoing and future with details such as power generation, use of water, location of power stations etc. will be obtained and plan for future will be prepared. Stress will be on small hydel power units. The secondary and tertiary benefits as also social benefits from such micro hydel generations will be accounted for establishing economic feasibility

Thermal Power: The requirement of water for existing, ongoing and future thermal power stations will be assessed and a plan for future expansion will be prepared. A major thermal power plant is being planned by Adani Industrial Group upstream of Bhandara City and a detailed assessment of its requirements and its impacts will be carried out. Minimization of pollution and environmental impacts will be aimed at. Besides individual projects, an



assessment of the aggregate/cumulative impact of Thermal Power Stations will also be discussed.

Table - 12

Sanctioned power projects in Bhandara and Gondia districts and water allotted to them

Sr. No.	Name of Co.	Place of project	Capacity	Water Allotted	Source of water
1 & 2	Adani Power Maharashtra Pvt. Ltd.	Tiroda, Gondia	3300 MW	90 MM ³	Dhapewada Lift Irrigation Scheme on Wainganga river
3	Aspark Power Pvt. Ltd.	Mudikota, Tiroda, Gondia	600 MW		
4	Aspark Power Pvt. Ltd.	Mudikota, Tiroda, Gondia	1320 MW		
5	Jawaharlal Darda Yavatmal Pvt. Ltd.	Gondia	1215 MW	48.33 MM ³	Wainganga river
6	Sunflag Iron and Steel Pvt. Ltd.	Warthi, Bhandara	750 MW	6.91 MM ³	Wainganga river
7	DD Project Pvt. Ltd.	Pandharbodi, Bhandara	1320 MW	40 MM ³	Wainganga river, after Gosikhurd spill way. The company should create their own storage by lifting water after spillway.
8	DD Project Pvt. Ltd.	Pandharbodi, Bhandara	1320 MW	40 MM ³	Wainganga river, after Gosikhurd spill way. The company should create their own storage by lifting water after spillway.
9	Kristināting	Mandhal, Tumsar, Bhandara	50 MW	2.5 MM ³	



Non-conventional energy resources: The present utilization of non-conventional energy resources will be assessed. Most preferred form of non-conventional energy resource, people's inclination towards generation of energy at local levels will be assessed. The present governmental schemes for solar, wind, and biogas energy and their actual outreach will be assessed and ways for improving their programs would be suggested. Considering the area under forests and vegetation in general, we expect that the availability of biomass will be amenable to the production of bio-gas as an efficient source of domestic energy especially in the tribal areas. Since thermal power plants which need huge quantity of water have already been planned, our emphasis will be on studying and implementing the non-conventional and sustainable means of energy generation.

13. Tourism

The current status of tourism in the Project area is restricted to visits to pilgrimage sites, temples and to some extent wildlife tourism in Nagzira and Navegaon national parks.

The knowledge about the rivers and water bodies and what they can support would form the basis for preparing the tourism development plan. Besides conventional tourism which could be very popular in these areas, ecological tourism, wild life tourism, agro tourism, historical and cultural tourism, and other options will be investigated and a Water Resource tourism plan will be prepared.

The entire river front including both the banks, the oxbow features, white waters and meanders, naturally created islands within the river and the thousands of small and large water bodies can be treated as potential tourism sites in future. They offer an enormous potential for developing livelihoods of thousands of people who currently subsist on the water bodies aquatic fauna of the Wainganga basin and its tributaries. These sites offer a growth path in income which has potential of surpassing what they could earlier earn through traditional boat/canoe fishing.

As the Wainganga enters Gadchiroli District it encounters unusual geographical features. The river takes a sharp turn to the east and back to the West along its original fault-line, it creates a situation where the river carves out another braid or channel which joins the two points which again joins where the river takes a sharp turn, thereby creating an island. Since this is an unusual geo-morphological feature, it has a lot of tourism potential to offer. A

completely new kind of tourism facility could be created in the westward straight-line-section of the river may have to be dredged partly in order to enable perennial flow. This would ensure a habitat surrounded by water from all sides.

Similarly, the town of Pauni has been historically renowned for being surrounded by a fortress wall with its Eastern and Southern walls touching the Wainganga. There are several heritage sites, temples, ghats, and a unique feature called 'Garuda Stambha' (estimated to be about 85) which are composite structures partly made of wood, partly of iron and the base and



plinth made in stone. The town of Pauni which has a historic, religious and architectural heritage value is another location for development of a water based tourist site.

The confluence between Kanhan and Wainganga is another marvelous location where a geological dyke cuts across the river keeping a sufficient number of serrations for allowing the river waters to pass through. At present, towards the southern side there is a hillock with temple and towards the northern side, a complex of temples and structures is located. Thus, the entire site inclusive of Kanhan segment has potential for being developed as a tourist site.

On the banks of the Bawanthadi and left bank of Bagh there are several villages along the river which have potential of developing picturesque water front capable of providing specialized eco-tourism facilities, boating and angling options. It can also provide an experience of the Gond Tanks, made in the latter half of the Gond period (mid 17th century to mid 18th century). There are 3 national parks and sanctuaries which may also be incorporated in the tourism plan. As in these two wild life parks, Gadchiroli also has the potential of being developed as a part of wild life tourism. Most of these sites are either along the river or around Gond Tanks.

14. FISHERIES

Since the population directly dependant on fisheries is considerably large (as stated earlier), special attention will be given for development of fisheries. During the stakeholders' meetings a few suggestions came up, which were considered and the relevant points will be included in the Master Plan. This can be a value addition to the plan since it involves the direct contribution from stakeholders. Since our approach is Integrated Development, the following points, which can be synchronized with other sectors, were taken into consideration:

- a) Need for finance and forming of organizations.
- b) Need to develop additional Water bodies.
- c) Explore the Market demand (local market/export oriented).
- d) Estimation of Manpower available and expected employment generation.
- e) Need for Cold storage facilities.
- f) Environmental impact on selected species.
- g) Ownership rights for new water storages.

Fisheries development has multiple benefits, especially in a region where traditional fish eating communities are dominant and has surplus water resources. It primarily serves as a sustainable economic activity, besides indirectly motivates water reuse and conservation. It can be done as an allied activity to agriculture, each contributing to the others (water, nutrientsetc.). Inland and river water fisheries can both bring about the establishment of fish based industries, animal feed production, export of fish, canned/tinned fish, fish pickles etc. Fisheries can be maintained with an ecosystems perspective and are a sustainable source of income and



development. Fish being a good source of protein, will improve the health status of communities e.g. the Dhiwars are a traditional fisherman community and can contribute to the establishment of fisheries in the project area.

There is currently a potential for developing over 12, 512 Ha for fisheries in Bhandara district, 8657 Ha in Gadchiroli, 22,265 Ha in Gondia and 21,553 Ha in Chandrapur, of which around 80% is being utilized (District Abstracts, 2009). Besides this, if fisheries are developed in farm ponds, village tanks, etc., this estimated potential will also greatly increase.

15. The Issue of farmers' suicide/Financial Institutions:

The problem of farmers' suicide has been taken up by the Government of Maharashtra and a high powered committee consisting of the Members of Legislative Assembly has been appointed for dealing with '*Atmahatyagrasta Shetkari Madat Samiti*', 2009-10. The number of suicides registered in 2010 in the district of Bhandara was 12. In this connection, it envisaged that the problem could be tackled through reduction in rural indebtedness by enlarging the rural banking services in the remote areas. The Bank of India which the Lead Bank for these districts has been entrusted with the responsibility of preparing a credit management plan. The inferences and recommendations of this committee will be included in the development planning process with the Master Plan.

16. Action Plan.

The Action Plan will be included in the Interim and the Final Report of the Master Plan. The final action plan will be an integrated, consolidated, comprehensive plan which has been made from

1. Aggregating the sub-action plans in water development, watershed development, water management, land management, etc.
 1. Identifying the inter-relationships between various sub-plans
 2. Reconciliation and adjustment of the sub-plans to make them internally consistent
 3. Developing a conceptual 'Integrated Institutional Framework' for its future implementation



The action plan will give importance to reducing the overhead and personnel costs by suggesting an integrated framework and creating common service cells. It will also suggest facilitative cells for integration.

The action plan will also give emphasis on time scheduling, prioritization, objectives and task planning. It will indicate block financial costs.

17. Establishment of Offices in Sub-basin

We have established a field office at Bhandara town which is located at the centre of the project area and another at Nagpur. The addresses for correspondence are:

- i) **Wainganga Master Plan (Godavari) Office, (Bhandara Office)**
C/o. Mr. Amol Padwad,
Tondon Ward, Bhandara – 441 904.
- ii) **Wainganga Master Plan (Godavari) Office, (Nagpur Office)**
80/7, Ujjwalnagar, ‘Sakshi’,
Wardha Road, Nagpur 440 025.

18. Work Plan

The Integrated Development and Management of Water Resources being a 'master planning' exercise, persons with specific expertise for different elements have been chosen from Gomukh Staff. External experts have also been appointed in areas where Gomukh staff could not be spared or because of higher levels of expertise available externally. Since the project involves development and management as well, individuals in socio-economic analysis and management have also been chosen.

12 people who are expected to work all twenty four months have been appointed in the first month since the inception of the project. Those required for short durations will be appointed at appropriate time. Several of the persons appointed have expertise in two or more subject areas related to river basin planning as we expect to develop synergies and continuous exchanges in information and acumen among staff members.

An advisory board has also been selected and appointed so that the project can take advantage of their knowledge and experience.



Our work structure is a proactive framework and promotes capacity building, creativity and involvement at all levels. The form of organization though represented below is a roundtable, interactive organization.

Figure - 4 Organizational structure

