



Annual Report on IWP sponsored Project

**Integrated Development and
Management Plan
for Water Resources
Wainganga Sub- Basin (Godavari),
Maharashtra**

For the,

Water Resources Department, Government of Maharashtra

**Prepared and Submitted by,
Gomukh Environmental Trust for Sustainable Development,
Pune
24th December, 2012**



Acknowledgements:

The Gomukh Environmental Trust for Sustainable Development commenced with the task of preparing an ‘Integrated Water Resource Development Plan for the Wainganga Sub-basin’. We wish to thank the Water Resources Department of Government of Maharashtra for giving us the opportunity for taking on this immense task.

We would also like to express our sincere gratitude to India Water Partnership (IWP), New Delhi for providing us with the financial assistance in the initial months. This helped us to conduct our stakeholder meetings and workshops on the field. The IWP has also provided us with funds for printing the book the first part of the book on “Wainganga: Planning for Water Resource Development”.

The Trust is especially indebted to Dr. D.M. More for his guidance and unstinting support. We are also thankful to our field-coordinator Mr. Manish Rajankar whose research work and field experiences proved extremely valuable in data collection and procurement of documents from various government agencies and departments.

Finally, we wish to acknowledge all the elderly villages residing on the banks of Wainganga and in settlements and villages in forests who gave us intricate details and important insights about the dynamic interactions of streams, river and forests.

Table of content:

Acknowledgements:.....	2
1. The Wainganga Shodh Yatra	5
2. West Zone Water Partnership Workshops and International Water Forums:	10
3. Drinking Water systems in the Wainganga Basin	11
4. Formation of River Basin Organizations: Some preliminary steps	12
5. Discussions with the Maharashtra Water Resources Regulatory Authority (MWRRA) .	13
6. Wainganga Integrated River Basin Management Master Planning Process:	14
6.1 Agriculture	14
6.2. Study on Floods (Impact of Climate Change)	15
6.3 Examining climate change issues in Wainganga sub-basin	16
6.3: Networking among civil society groups and formation of Wainganga water partnership.....	19
6.4: Preparation of Interim Report (IR) of the Wainganga Sub-basin Planning Project:.	19
7. Publication of work in the form of a book:	21
8. Visit to Mahaweli Ganga Basin	22

Table of Figures:

Figure 1: Wainganga Shodh Yatra.....	5
Figure 2: Sanjay Sarovar Dam, Bhingarh.....	6
Figure 3: Discussion with experts on Wainganga River Basin.....	7
Figure 4: Meeting with villagers.....	8
Figure 5: The Wainganga Shodh Yatra Team.....	10
Figure 6: Meeting for formation of Middle Wainganga Water Partnership.....	13
Figure 7: Rainfall Distribution (1988-1992).....	17
Figure 8: Rainfall Variance (1988-2007).....	18
Figure 9: Gullies carved in stones for rain-water harvesting.....	20
Figure 10: A step well from Bhosale period in Dahegaon Raja village.....	20
Figure 11: A Kund at Bhugaon in Naag Basin.....	21
Figure 12: Visit to Mahaweli Ganga Sub-basin, Sri Lanka.....	22

Annual Report

Wainganga Integrated River Basin Management Master Planning Project

Gomukh Trust carried out various activities to fulfill the objective of drafting the Integrated River Basin Management Plan for the Wainganga River in Maharashtra. The following report summarizes the activities carried out during the year 2012.

1. The Wainganga Shodh Yatra

The annual plan for the Wainganga Integrated River Basin Management articulated with the Wainganga Shodh Yatra. It was a 10 day long expedition that included around 15 local experts and activists exploring the Wainganga River basin from different perspectives. During this period various aspects such as river system, geology, communities, agriculture, architecture, culture and the water infrastructure were studied in detail. The main objective of the undertaken task was to identify the various problems associated with the river basin that will ultimately lead to the development of the Wainganga Master Plan for a sustainable and equitable management of water.



Figure 1: Wainganga Shodh Yatra

The journey commenced on the 9th January, 2012 from the J.M. Patel College in Bhandara,



Maharashtra. A three hour rickety ride northwards through the Pench Tiger Reserve, into Seoni District of Madhya Pradesh led to Mundhra (Pratappur Village, near Gopalganj) where the Wainganga River originates. Unlike most rivers, the Wainganga River originates on plain lands through a spring, which has now been converted into a '*kund*'. Several small temples surround this tank. A typical three tank structure can be seen at the origin, one being the sacred tank, second for drinking water and the last one for animals.

Around five kilometers towards the west of the Wainganga origin into the Pench reserve leads to the origin of the Bawanthadi River, a tributary of Wainganga. The origin of Bawanthadi lies in gently undulating mountains covered with dense deciduous forests of teak, sal, tendu, etc. Small and large herbivores were seen during the visit including deer, Sambar, black buck, etc.

Following the northward course of the river, the team moved to the first major dam on the Wainganga River - Sanjay Sarowar Dam, Bhimgarh. The dam is Asia's largest mud dam and has the capacity to hold 510 MCM of water.



Figure 2: Sanjay Sarowar Dam, Bhimgarh

Later the team headed southwards towards Balaghat and visited the Dhuti Weir. The hundred year old structure is nestled between mountains and is a beautiful site for tourism. The dam is



a stone masonry structure built in 1901 and provides irrigation facilities for several hectares of agricultural land. It's rather simple but efficient design is a must see for civil engineers and experts in water infrastructure.

On 11th January, the team reached the border between Maharashtra and Madhya Pradesh and held meetings with the Gram Panchayat and local communities in the village of Birsola. The village is located at the confluence of the Bagh and Wainganga River and is known for their tradition of making jaggery. The village is also a host to fishing communities and extensive discussions on the fisheries were held. Many villagers reported that since the construction of the two major dams on the Wainganga, there has been a slow decline in the population of local fish species and prawns. The villagers reported that a new Sugar industry has been started in the nearby town of Tiroda and most of them are expecting a rise in sugarcane cultivation. The local women reported that there was no dearth of drinking water supply since most of them had private bore wells apart from public bore wells and dug wells. However, most of them pointed out the serious lack of public sanitation facilities. The educated population from the village tended to immigrate to the cities of Balaghat, Tiroda or Nagpur.



Figure 3: Discussion with experts on Wainganga River Basin

The team then visited Dhapewada, a village which was earlier promised a Lift Irrigation



Scheme by the State Government. The lift irrigation scheme was shifted further southward to the village of Kawlewada and most villagers in Dhapewada are disgruntled by these ad-hoc changes in the scheme. Villagers in Dhapewada reported that while there was no dearth of water even during summer months, they did not have a functioning piped water system and most women had to bring water from public bore-wells in the village.

Although the village at Kawlewada received the benefit of the Lift Irrigation Scheme, the villagers pointed out that the Government has promised almost 70% of its irrigation waters to the Adani Power Plant as they financed the construction of the lift irrigation plant. Serious disputes in the region about the allocation of agricultural water for industrial purposes were observed and the differences in the compensation amounts paid to farmers who lost their agricultural lands due to the lift irrigation scheme have resulted in a grave social conflict. Architectural remains were found in Roha village, which dated back to the 13th century and belonged to the Yadav period.



Figure 4: Meeting with villagers

During discussions in villages like Roha, Khairi, Kothurna, Itan, Soni, etc. (from 13th to 17th January, covering districts of Bhandara, Gondia and Gadchiroli) the following observations were made about the status of drinking water supply and sanitation,

1. Since most villages were on the banks of the Wainganga River, water availability was abundant. However, most habitations depended on groundwater for drinking water supply made available from public bore-wells.



2. Very few villages had installed piped water supply. It was expected that the household tap connection had to be self-financed by households, due to which only two-three houses in a village had access to piped water supply. The piped water supply is largely unreliable, as power supply on which the system depends for pumping of water is unreliable.
3. The water quality in most villages was reported to be quite good most of the year. However, water borne diseases like diahorrea, jaundice, chikungunia, malaria were also reported by few women.
4. Most Grampanchayats used bleaching powder for cleaning water sources, especially during the rainy season. However, the availability of trained personnel for such activities is extremely limited.
5. Most women do not know whether their drinking water is tested for water quality and most assume that 'odorless', 'colourless' water equates to 'clean' water.
6. Condition of storm water, waste water drains is extremely poor in all villages that were visited. Most of these were broken, choked and uncovered. This raises serious concern about health and hygiene in these villages.
7. Public sanitation facilities are in an extremely sorry state in most villages. A lot of training and awareness will be required to ensure that people benefit from sanitation schemes and infrastructure.

The team also visited Ambhora village, a potential tourism site, where the local Dhiwar community showcased their traditional storytelling art called 'Dahaka'. The Gosekhurd Dam site and the rehabilitated villages, Saundad and Mendha were also visited and various rehabilitation schemes were discussed with them.

The Yatra culminated at Chaprala Wild Life Sanctuary on the 17th January 2012 at the confluence of Wainganga and Wardha rivers. Discussions were held with forest based communities at Chaprala.



Figure 5: The Wainganga Shodh Yatra Team

The Wainganga Shodh Yatra revealed various facets of the Wainganga River, its people and rich history. Discussions and exchange of ideas among various experts on the Wainganga Basin made the Yatra a rich experience, which is eventually reflected while formulating the Wainganga Integrated Water Resources Development Plan.

2. West Zone Water Partnership Workshops and International Water Forums:

The West Zone Water Partnership (WZWP) has been organizing various workshops, discussions and debates at various levels for improving the Draft Policy. On 16th of March, 2012, a special session was organized by Both Ends (Netherlands) and World Water Forum (Marseilles, France) to present the citizens and civil society's contribution to the Integrated Water Resource Management (IWRM). The main objective of the forum was to demonstrate the relevance of the participation and equitable management of water resource based on knowledge and initiative of local actors and to discuss the concrete steps taken in these river basins in order to put this commitment into practice. Prof. Vijay Paranjpye spoke about the work done by Gomukh Trust and WZWP in the Bhima and Wainganga river basins and the related outcomes whereas Mr. Sodul, Secretary of IWRRM, spoke about the establishment of participatory decision-making and various processes like water rates and bulk water entitlements to water users' association. The forum resulted in a declaration of a democratic and sustainable management of water use.



A 'National workshop on Water conflicts in India in the context of changing Water Sector Discourse' was organized on 26th and 27th March 2012 by SOPPECOM - a member organization of the WZWP. During this workshop the Draft National Water Policy 2012 and the working Group Reports of the 12th Five Year Plan were discussed in depth.

3. Drinking Water systems in the Wainganga Basin

Although the Wainganga basin falls in the assured rainfall zone, the districts of Bhandara and Gondia in particular and Vidarbha in general become arid from March till the onset of monsoons due to rise in temperatures above 44 degrees. Most rivers, which have intercepts such as weirs, barrages, major and medium dams have reduced or almost have no flows. Water in most tanks is at its lowest level and there is a competition for the limited water resource for drinking water, agriculture, and fisheries. The problem of drinking water scarcity is more pronounced in forest villages which often have administrative problems. For example, many villages in remote areas have non-functional tube-wells or tanks due to lack of maintenance. Often transport of materials, personnel to remote villages in forest areas is difficult due to lack of proper roads further worsening the problem. Thus, the problem of water scarcity in the region during summer months is not only due to climatic factors but also due to socio-economic variables.

The local civil society groups therefore felt a need to specifically assess the status of drinking water supply in the region. Meetings were held in Bhandara, Gondia and Gadchiroli for formulating a plan which would respond to the drinking water scarcity in these regions. Eight 8 villages in the Wainganga basin were specially selected for assessing the drinking water technologies and schemes and their status. Local groups like Bhandara Nisarg Van Sanskruti Abhyas Mandal and Srishti assisted the WZWP in this survey.

Broad issues which form the objectives of the larger Wainganga Master Plan like use of appropriate technologies, building resilience to climate change, equity, gender balance, etc. were included while studying the status of drinking water systems in the region. It will help in reinforcing the need to invest in providing basic infrastructure in the region and also to pin down the specific issues with respect to drinking water supply that plague the region. This study will be integrated into the larger Wainganga Master Plan.



4. Formation of River Basin Organizations: Some preliminary steps

A meeting was held with the stakeholders of the Middle Wainganga Basin i.e. stakeholders from the sub-basins of Bawanthadi, Sur, Kanhan, Maru, Andhari, Kathani, Gadhvi, Khobragadi, and Bodalkasa along with those of the Wainganga River Basin, on the 17th June 2012. Representatives from fifteen organizations attended the meeting. (Annex2). The following decisions were taken during the meeting,

- a. Water partnership should be established for the 'Middle Wainganga' basin since stakeholders from many sub-basins are already involved in the planning process and have been networking on various issues related to the Wainganga basin
- b. The area of the 'Middle Wainganga' for the Water Partnership was decided as per the demarcation made by the Maharashtra Water and Irrigation Commission, 1999.
- c. The Middle Wainganga Water Partnership will focus on,
 - Working with people in flood affected and flood prone areas in the Middle Wainganga basin
 - Revival and re-establishment of people and management of traditional systems of the major Malgajari Tanks
 - Protection of fisheries and fishermen community livelihoods by protection of 'Doha', tanks, etc.
 - Mainstreaming of civil society organizations and Panchayati Raj Institutions working in the forested areas of the Middle Wainganga basin in order to ensure the accrual of development benefit to the communities.
 - Mainstreaming women's participation in water resource management at local level and in the partnership.
 - Conduct hydrological studies at sub-basin level and convert the assessments into simple terms to increase the awareness among community members regarding water availability, water allocations.
 - To translate the conceptual framework of Environmental Flows and interpret them in terms of quantities of environmental flows needed in sub basins.
 - Convert the studies and plans for the sub-basins and the Middle Wainganga basin into Gondi or other local languages for explanation to local communities.
 - To assist negotiations between people regarding water resource planning, water use



priorities and allocation

- Mediate, negotiate among District and State authorities, Maharashtra Water Resources Regulatory Authority on conflicting issues and seek redressal, especially when the conflicts are between the Government agencies, corporate and smaller groups like fishermen, farmers, etc.

A working group of three members was appointed to prepare a Memorandum of Understanding (MOU) and Constitution of the Middle Wainganga Water Partnership as per the general principles laid down by the Global Water Partnership. The MOU and Constitution was finalized by July end and the Partnership was formally registered with the Charity Commissioner.



Figure 6: Meeting for formation of Middle Wainganga Water Partnership

5. Discussions with the Maharashtra Water Resources Regulatory Authority (MWRRA)

The MWRRA is currently in the process of revising its Bulk Water Tariffs for the years 2013-2015. These Bulk Water Tariffs would be applicable for not only for the Wainganga basin, but for the entire State of Maharashtra.

As a convener of the WZWP, Gomukh Trust suggested the inclusion of 'environmental flows' as a 'water-use category' and that the water users should contribute to the costs incurred for maintaining these flows. Such a suggestion was made to ensure that



environmental flows are formally recognized by water managers. Similarly, it was suggested that return water flow from industries, which is often polluted, should be considered as 'consumed water' and should be charged as such since polluted water is cannot be used for any other purposes.

6. Wainganga Integrated River Basin Management Master Planning Process:

6.1 Agriculture

One of the objectives selected for the Wainganga Integrated River Basin Management Planning Project was to study and identify the best agricultural practices being followed in the Wainganga River Basin, which are climate resilient and water effective. As a background for the study, data was collected from the District and State Agriculture Departments regarding the general cropping pattern, cropping intensity, area under irrigation, increase in agricultural productivity using various irrigation techniques, use of water efficient technologies like drip and sprinkler irrigation, etc. This data was used to estimate the agricultural water requirements and overall efficiency in water use in agriculture.

Various sources of data was used for this purpose,

1. The District Statistical Abstracts
2. Comprehensive District Agricultural Plans
3. Agricultural Census
4. Lead Bank Data
5. Reports to the Agricultural Commissioner related to seasonal sowing report, productivity, etc.

Assessment tables were prepared for land use, area under various crops, area under irrigation, cropping in various seasons, productivity of various crops, etc. (see Annex 1) However, when data was assessed it was found that there were significant variations in each of the reports compiled by the District and State Government. The data on agricultural productivity was available only for the chief crops being grown in the region and productivity of minor crops was not reported. More importantly, the data used for preparing the Comprehensive District Agricultural Plans, which determine the investments in the agricultural sector for five years, was based on erroneous data. This raises serious concerns not only about the data collection processes used by the State Agencies, but also on the proposed investment plans.

It is predicted that climate change will cause prolonged dry and wet spells. Under



these circumstances, knowledge of current cropping pattern and timely management of irrigation systems to avoid conditions of either water scarcity or water logging would be important. The steps to be taken would need to be at both farm level and at the administrative level. It would be important for farmers to select climate resilient varieties, select combination of crops for mixed farming such that losses due to sudden weather changes are minimized, construct localized irrigation systems like farm ponds and community tanks, shift to drip and sprinkler irrigation, etc.

However, all these adaptations by farmers must be supported by the administration's schemes and policies. Improved understanding of the existing cropping pattern and its correlation with irrigation cycles, subsidies on local, minor and micro irrigation systems, awareness and capacity building of farmers, etc. based on efficient, updated and dynamic database management systems. In the month of June, ground truthing the data and focused interviews of farmers was organized for studying the local awareness and practices related to resilience to climate change.

6.2. Study on Floods (Impact of Climate Change)

The Wainganga River Basin has experienced three major flood disasters during 1994, 2001, and 2005. The Gosekhurd Multipurpose Project envisages flood prevention as one of its objectives. The Dam is located near Pauni town on the Wainganga River has 33 central gates for discharging flood-waters, each having dimensions of 18.30 m by 16.50 m. Thus, the total spillway length is 904 m, while the height of the dam is 28.5 m above the river bed.

The gross storage capacity of the dam (reservoir) is 1146 million cubic meters (mcm) and the Maximum Flood Level (MFL) of 240.50 m above MSL. The dam has been constructed assuming a 'design-flood' of 67300 cubic meters per second (cumecs) and the spillway has been designed accordingly. As per the studies conducted by the Central Design Organization (CDO) Nashik, once in 25 years return flood is estimated at 22733 cumecs.

The estimated flood in case of the Gosekhurd dam-break is estimated to be 68000 cumecs. In case of a maximum flood discharge from the spill way alone, the flood rate would be 34,000 cumecs and the 25 year return flood would have a velocity of 22,733 cumecs. The zones flooded by each of these are shown in the attached map. The Green-line (Dam-break) indicates the 'Caution Zone', the Red line indicates the 'Restrictive Zone' and the Blue line denotes the 25 years return flood. The zone indicating the embankments of the natural river bed is treated as the Prohibitive Zone.



The flood survey has identified 187 villages along the river with 94 villages on the left bank and 93 on the right bank. The natural flood carrying capacity of the river channel varies between 18000 cumecs and 20,000 cumecs and the villages immediately next to the river banks are the most vulnerable to inundation.

It is expected that the Wainganga Basin would receive higher than average rainfall as an impact of Climate Change. However, there has also been a marked increase in the dry spell in the region, which would necessitate better management of the reservoirs.

Smaller sub-basins like Chulband, Gadhvi, and Khobragadi which are mostly seasonal rivers would also experience floods due climate change and hence, similar studies were conducted on the sub-basins of the Wainganga River System.

6.3 Examining climate change issues in Wainganga sub-basin

Based on the available hydrology data, five-yearly rainfall variation assessments were made for duration of 20 years using computer software called **Arc GIS Environment** (see Figure 7 and Figure 8). It was found that, in contradiction with the IPCC reports, the rainfall has been showing a decreasing trend in Wainganga sub-basin. The high rainfall zones have shown a north-west shift during the last five years. There is a significant change in the intensity and distribution of rainfall.

We are aware that these results need to be validated and the assessment needs to be repeated using at least 40 year, hourly rain gauge data. The present study offers considerable evidence that there is a need for basin wise climate change assessment.

Based on the assessment we propose that several investments need to be made for building climate change resistance. Within the Wainganga sub-basin parts of Wadsa, Korchi (in Gadchiroli district) have shown maximum variance in rainfall. Focused efforts need to be made to build climate change resilience system in this region. This region also represents Naxalism affected area and demonstrates the requirement of a comprehensive area development plan. As regards the rest of the sub-basin, simple village level schemes like,

1. Construction of farm ponds
2. Developing multiple livelihood sources like, fishery, poultry, agro-tourism, etc.
3. Maintaining local and wild seed varieties in village level seed banks
4. Maintaining village level grain stocks
5. Planning disaster management strategies at village level

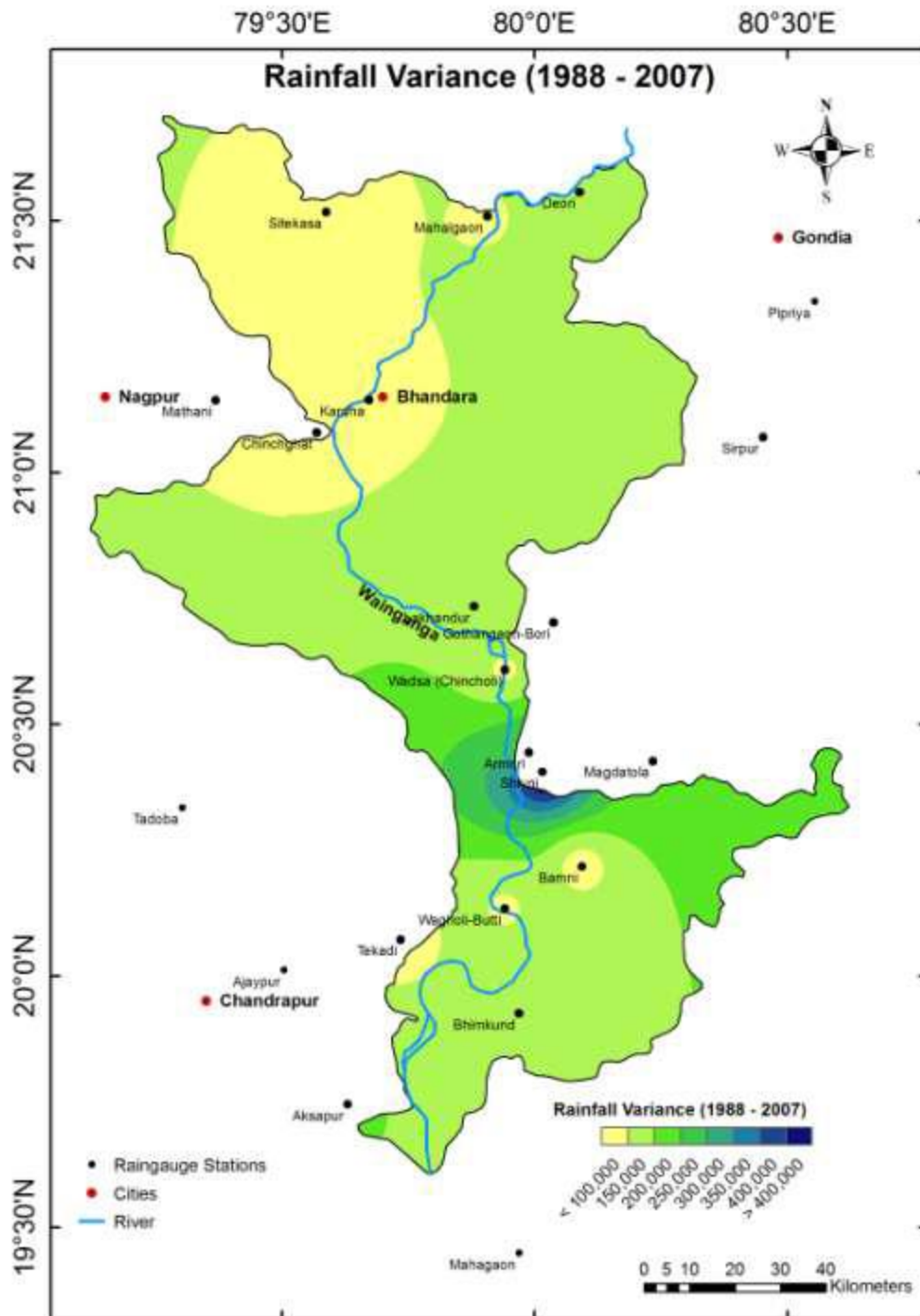
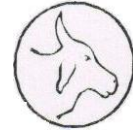


Figure 8: Rainfall Variance (1988-2007)



6.3: Networking among civil society groups and formation of Wainganga water partnership.

On 25th September and 5th October, meetings were held regarding the formation of Wainganga Water Partnership. Civil society groups represented by,

1. Dr. Gogulwar, Aamhi Amchya Arogyasathi
2. Mr. Keshav Gurnule, Srujan
3. Dr. Ajay Dolke
4. Dr. Kamalkishor Heda, participated in the discussion.

The participants discussed the need for bringing together members of Fisheries Associations, Forest Rights groups, Water Users Associations, Urban governing bodies and Industry representatives to participate, negotiate, follow-up and co-ordinate for motivating the Godavari River Basin Authority and the Vidarbha Irrigation Division Corporation, to implement the Wainganga Integrated River Basin Plan.

The participants have been corresponding in order to develop a memorandum of association for the formal registration of the Wainganga Water Partnership.

6.4: Preparation of Interim Report (IR) of the Wainganga Sub-basin Planning Project:

1. Village level surveys for data like, population, area under cultivation, crops, area under industries, revenue etc. were conducted and data of over 1000 villages has been collected. Watershed development works represented on detailed micro-watershed maps prepared by MRSAC were collected.
2. Detailed survey on Traditional Water Harvesting devices is being conducted with public participation and documentation is being done. Several traditional water harvesting devices have been found in the Wainganga River sub-basin. Some of those include, gullies carved in stones for rainwater harvesting (Figure 9), Kunds constructed in the Yadav period (Figure 10) and step-wells from Bhosle period (Figure 11).
3. Discussion on the Interim Report of Wainganga sub-basin was conducted on the 1st October 2012 at Wahi in Bhandara, with Gosekhurd project affected people. The discussion was on the new provisions that are being made and people pleaded that their R&R issues be given priority.
4. Discussions on Interim Report of Wainganga sub-basin with Godavari Khore River basin Planning Authorities have been conducted. We have worked on their feedback and



submitted the final Interim Report.

5. The water balance in the Wainganga sub-basin was finalized. The detailed water balance table can be sent if required.



Figure 9: Gullies carved in stones for rain-water harvesting

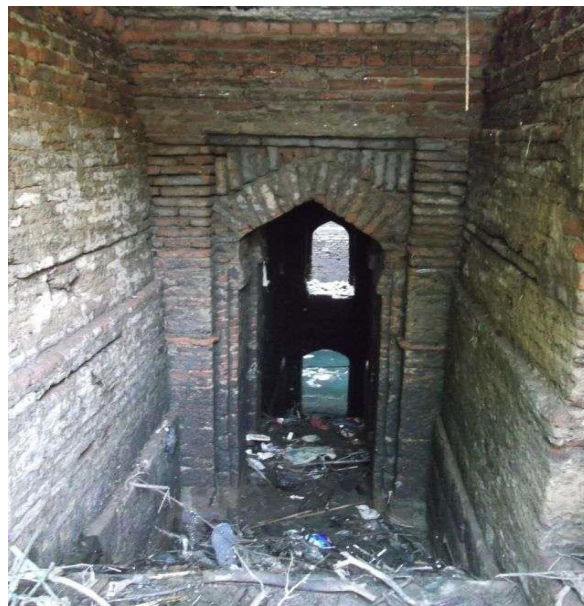


Figure 10: A step well from Bhosale period in Dahegaon Raja village



Figure 11: A Kund at Bhugaon in Naag Basin

7. Publication of work in the form of a book:

To summarize the experiences and findings in the first year, i.e. from July 2010 to December 2011, the book “Wainganga: Planning for Water Resource Department” was published. This book captures the key findings during phase1 of the project that encapsulates the role of communities for development of an Integrated River Basin Management Plan. The first part of the book contains the descriptions of the Wainganga basin, the conceptual framework, natural resource assessment, needs assessment and the projects identified by the community. All these form the basis for formulating the final plan.

The second part of the book is expected to be complete and published in 2013. The second part will reflect the actual plans and participatory processes that helped in formulating the final development and management plan for the basin. We hope to come up with an inter-sectoral and inter-stakeholder integration that will help the local communities to adapt and implement the final IWRM plan.



8. Visit to Mahaweli Ganga Basin

A team representing the WZWP visited Sri-Lanka during December, 2012. The team members included Dr. More and Mrs. More, Engineer Mr. Shelke and Mrs. Shelke, Mr. and Mrs. Kulkarni and Prof. Paranjpye. The team had visited practically all the dams on the Mahaweli-Ganga Basin and had detailed discussion with Director General of Mahaweli Ganga, Shri Gamini Rajakaruna and Executive Director, Mr. Navaratne. The team also had detailed discussions about integration between globally acknowledged ancient river basin systems, viz. Cascade of tanks and the iconic terminal reservoir, Parakrama Samudra, located at Polannarvu.

The team also visited International Water Management Institute, where they had a detailed discussion with Ms. Priyanka Dissanayake (Regional Coordinator of Global Water Partnership- South Asia) and K. Jinapala. The entire expense was privately borne by the delegates who visited the Mahaweli Authority of Sri Lanka.



Figure 12: Visit to Mahaweli Ganga Sub-basin, Sri Lanka

(Facing L-R Director General, MASL, Mr. More, Ms. Priyanka Dissanayake, Mrs. Kulkarni, Data Mgmt Expert, Mrs. More, Mrs. Shelke, Mr. Ratnayake, Dr. More and Prof. Paranjpye)

Points of Appreciation and Lessons to be learnt:

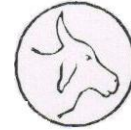


1. The Mahaweli Authority of Sri Lanka (MASL) established through an Act of Parliament has been given complete control over the development of all resources within the Mahaweli River Basin, and has the powers of coordinating the development and management activities of other key departments like forestry, agriculture, rehabilitation and resettlement of displaced persons, conservation, rehabilitation and integration of the ancient and traditional systems into the modern systems of hydro-engineering and the development/management of water resources. This has enabled them to bring about a considerable of a synergy between different development investments
2. Our team was greatly impressed and appreciative of the way in which the ancient system of tank cascades (developed between the 1st-10th century A.D.) and the terminal reservoir constructed by Parakrama Babu in the 11th century have been systematically integrated into the modern systems of dams and canals (the Victoria, Kotmale, Randanigale and others located in the upper catchments of Mahaweli).
3. The rehabilitation package offered by Sri Lankan Government to the project displaced households also appeared to be satisfactory. Although it's been 25 years since the time of their displacement the relationship between the project authorities and rehabilitated villages still appears to be well bonded and fruitful. We were also impressed by the fact that the average rice productivity in the command areas of Mahaweli (especially the System C, which we had the privilege to visit) is about 6 tonnes per hectare per year, which happens to be more than double of the per hectare productivity in India.
4. The MASL has managed to introduce simple management techniques of volumetric measurement and release of water through canals which has led to an increase in the water efficiency.
5. Our team was particularly impressed by the meticulous procedures of operation and management, the neatness and cleanliness and the disciplined way in which the entire staff from the Chief Engineer downwards to the Rest-house keepers (a matter which our team felt needs to be emulated by the Irrigation Department of India).
6. We noticed a sense of engagement and coordination between the MASL, the International Institute of Water Management (IWMI) and the Sri Lanka Water Partnership. Mr. Jinapala, a senior and experienced expert on Water Resource Management at the IWMI gave us an insight into the socio-political processes which have led to an admirable cleaning of all water bodies in the urban area of Sri Lanka.



We were amazed to see every single water body that we travelled along in the cities or in remote inter-lands were clean and unpolluted, devoid of plastic bags, paper or other garbage. We were informed that the Sri Lankan Army has been substantially responsible for this neat and clean status of Sri Lanka water bodies.

Considering the fact that our entire team was non-efficient, we greatly appreciated the time given and the efforts made by MASL to explain to us the functioning of the Mahaweli Authority. We would like to acknowledge our sense of deep appreciation to all officers of the MASL who extended their hospitality towards our team. Finally we would like to thank Ms. Priyanka Dissanayake, who in spite of a very short notice got us in touch with the authorities of the MASL and made arrangements for our trip. Without her involvement and advice and logistical support during our trip, it would not have been possible for us to conduct such a fruitful and enjoyable trip to Mahaweli Ganga River Basin. A detailed report of this trip is being prepared and will be sent to IWP later.



Annex 1: Agricultural Data received from various sources

Land Use Data:

Two tables are given below in order to demonstrate the variability in the data received from two of the five departments in the State Government,

1. District Statistical Abstracts

Geographical Area	Area under forest	Land not useful for agriculture and non cultivable land	Cultivable land
1687917	522876	192053	929817

2. Comprehensive District Agricultural Plan

Geographical Area	Forest	Land under Non-agricultural use	Cultivable land	Pastures	Barren Land
3122580	917246	197977.36	1656174	153255	44190



Agricultural Land under Various Crops:

	Crops	Area (Ha)	Percentage with total area	Percentage with gross cropped area
1	Traditionally Irrigated crops			
	Sugarcane	3265	0.41	0.33
	Horticulture	3428	0.43	0.342
	Wheat	23623	2.92	2.36
	Groundnut	352	0.044	0.035
	Sub total	30668	3.804	3.067
2	Crops recently brought under irrigation			
	Cotton	15385		1.53
	Tur	26842		2.68
	Gram	17802	2.2	1.78
	Rabbi Jowar	27470	3.4	2.74
	Rabbi Maize	1557	0.19	0.16
	Sub total	89056	5.79	8.89
3	Rainfed crops			
	Rice	450805	55.85	44.97
	Soyabean	87931	10.89	8.77
	Khariph Jowar and Bajara	8177	1.01	0.82
	Moong, Udad and sesame	24357	3.02	2.43
	Sunflower and Kardaie			
	sub total	571270	70.77	56.99
4	Crops			
	Cotton	15385		1.53
	Tur	26842		2.68
	Gram	17802	2.2	1.78
	Rabbi Jowar	27470	3.4	2.74
	Rabbi Maize	1557	0.19	0.16

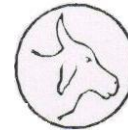


	Sub total	89056	5.79	8.89
5	perennial crops			
	Sugarcane	3265	0.41	0.33
	Horticulture	3428	0.43	0.342
	Sub total	6693	0.84	0.672
6	Two Seasonal crops			
	Cotton	15385		1.53
	Tur	26842		2.68
	Vegetables	13574	1.68	1.35
	Sub total	55801		

Crops grown in various seasons:

It is clear that the major crop in the region is paddy cultivation which is almost entirely dependent on the monsoon rainfall. It would be important to identify practices for making paddy cultivation practices climate resistant.

Crops	Total Area (Ha)	Percentage	Percentage (with gross cropped area)
Khariph crops			
Rice	450805	55.85	44.97
Khariph Jowar and Bajara	8177	1.01	0.82
Soyabean	87931	10.89	8.77
Maize	1557	0.19	0.16
Udad, Moong and Sesame	24357	3.02	2.43
Vegetables	13574	1.68	1.35
Rabi Crops			
Wheat	23623	2.92	2.36



Bengal gram	17802	2.2	1.78
Rabi Jowar	27470	3.4	2.74

Various Crops under Irrigation:

Ideally, the entire area under sugarcane cultivation should be under irrigation. However as per the available data only 78.37% of the total area under sugarcane is found to be irrigated. Ground-truthing of this information is necessary. Similarly, it is noted that 76.81% of the horticultural crops are under irrigation, however the fruits grown in the region include species like sapota, mango, guava, custard apple, etc. which normally do not require irrigation.

Sr. No.	Crops	Total Area (Ha)	Area under Irrigation	Percentage
1	Sugarcane	3265	2559	78.37
2	Horticulture crops	3428	2633	76.81
3	Vegetables	13574	12821	94.45
4	Wheat	23623	12501	52.92
5	Gram	17802	632	3.55
6	Cotton	15385	0	0
7	Tur	26842	0	0
8	Maize	1557	0	0
9	Groundnut	352	92	26.136

Area under Drip and Sprinkler Irrigation

The area under drip and sprinkler irrigation is approximately 0.06% of the total area under irrigation, and needs to be promoted to a large extent to increase the water use efficiency.

	Area under Drip and Sprinkler Irrigation (Ha)		
	Drip	Sprinkler	Total
Nagpur	186	326	512
Bhandara	27	205	232
Gondia	36	1	37



Chandrapur	21	301	322
Gadchiroli	0	26	26
TOTAL			1129



Annex 2: Organizations in the Proposed Middle Wainganga Water Partnership

1. Bhandara Nisarga Van Sanskruti Abhyas Mandal, Bhandara
2. Gondia Nisarga Abhyas Mandal, Gondia
3. Bhandara Jilha Machhimar Sangha (Bhandara District Fishermens Association)
4. Gondia Jilha Macchimar Sangha (Gondia District Fishermens Association)
5. Shrishti, Gadchiroli
6. SEARCH, Gadchiroli
7. Vrikshamitra, Chandrapur
8. Gav Vikas Niyojan Parishad, Mendha Lekha
9. Nutan Kanya Shala (New Girls School), Pauni
10. L.A.D. College, Nagpur
11. J. M. Patel College, Bhandara
12. Envocare Nature Club, Sakoli
13. Jhadi Boli Sahitya Mandal, Arjuni Morgaon
14. Swami Samarth Mandir Trust, Pauni
15. Gosekhurd Prakalpa Grasta Samiti