



Environment

Water Community



Solution Exchange for the Water Community Consolidated Reply

Query: Inputs for India Water Development Report - Experiences; Referrals

Compiled by [Nitya Jacob](#), Resource Person and [Sunetra Lala](#), Research Associate
Issue Date: 9 March 2011

From [Medhavi Sharma](#) and [Anjal Prakash](#), SaciWATERS, Hyderabad
Posted 10 February, 2011

The South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATERS), Hyderabad, is working on 'India Water Development Report – The right to water amidst increasing scarcity', a project funded by UNICEF and FAO.

This report proposes to work towards building a comprehensive and consolidated interdisciplinary publication on **Water Development in India** with available information as well by exploring it through consultations with various stakeholder groups. The major areas on which information will be collected are

1. Water availability & scarcity
2. Water demand
3. Water quality and contamination
4. Multiple use water resources
5. Pressures and drivers of change
6. Water conservation
7. Partnerships and stakeholder involvement
8. Workable solutions for the way forward.

The report aims to produce a holistic and dynamic document which looks at the strategic steps required for immediate actions to evolve an environment where water is available for all in a sustainable manner.

The first phase of the report consists of framing an overview of the present status of water resources in India on the broad themes of [a] Water Availability and Scarcity (with a section on climate change), [b] Water Demand, [c] Water Contamination and [d] Multiple Use Water Resources.

With respect to the above theme, we request the members to kindly give their valuable inputs on:

- How is climate change leading to water scarcity situation in different parts\regions of India?

- Do we have examples of gender disaggregated data that informs water decisions in India? Has it been integrated in any project which the report can highlight?
- What examples we have on Multiple Use Water Resources and how can this be integrated in the mainstream planning for water resources in India?

The inputs may be in the form of literature, case studies or research work on. Your response will be crucial in framing the report in a holistic manner.

Responses were received, with thanks, from

1. [Pratyush Das](#), World Vision, Jaipur
2. [Rahul Banerjee](#), Khedut Mazdoor Chetna Sangath, Indore ([Response 1](#)) ([Response 2](#))
3. [Ratnakar Gedam](#), Adviser (Retired), Planning Commission, New Delhi
4. [Ramakrishna Nallathiga](#), Centre for Good Governance, Hyderabad, ([Response 1](#)), ([Response 2](#))
5. [S. Parthiban](#), CENPAP, Hyderabad
6. [Padma S. Vankar](#), Indian Institute of Technology, Kanpur
7. [Satya Prakash Mehra](#), Rajputana Society of Natural History, Rajasthan
8. [Johnson Rhenius Jeyaseelan](#), WaterAid India, Lucknow
9. [Seema Kulkarni](#), Society for Promoting Participative Ecosystem Management (SOPPECOM), Pune
10. [Nripendra Kumar Sarma](#), PHED, Guwahati
11. [Janakarajan](#), SaciWATERS, Hyderabad
12. [Himanshu Thakkar](#), SANDRP, New Delhi
13. [Floriane Clement](#), International Water Management Institute, Hyderabad
14. [Suparna Katyaini](#), Indian Institute of Technology, Guwahati*

**Offline Contribution*

Further contributions are welcome!

[Summary of Responses](#)
[Comparative Experiences](#)
[Related Resources](#)
[Responses in Full](#)

Summary of Responses

The report on Water Development in India will be a new, path-breaking publication that will provide a comprehensive overview of the sector, much like other state of the sector reports. The scope of work shows it will take a wider look at the sector, bringing together the engineering and social streams of thought. A lot of thought has gone into drafting the initial framework of the report, that has been in the making for several years. It will be all the more relevant since it looks the relationship between climate change (or variability) and the hydrological cycle.

To assist in desk research for the initial part of the report, this discussion provided several ideas on where to find information. These are described in brief below and annotated in the Related Resource section.

There are few studies on climate change and water in India. One, [conducted by Climawater](#) (a joint project of Bioforsk – the Norwegian Institute for Agriculture and Environment – and the Indian Institute of Technology, Delhi) uses advanced modeling to predict the short, medium and long-term effects of climate change on the Godavari river basin. The hydrological model, called Soil and Water Assessment Tool or SWAT (Arnold et al., 1998, Neitsch et al., 2002) is a distributed parameter and continuous time simulation model. It helps predict the response to natural inputs as well as the manmade interventions on water and sediment yields in un-gauged catchments. SWAT is physically based, uses readily available inputs, computationally efficient to operate and continuous time and capable of simulating long periods for computing the effects of management changes. It does not require much calibration and therefore can be used on un-gauged watersheds.

Climawater has used SWAT to study the Godavari river basin and the Manjira river watershed for the effects of climate change. The studies cover precipitation, water yield, evapotranspiration, soil water recharge and sediment yield. Additionally, Climawater has conducted a literature review of mitigation and adaptation measures to climate change in tropical river basins, with a focus on India.

The Global Water for Sustainability programme promotes integrated management of water resources. In India, it works in the Wakal watershed in south Rajasthan to strengthen governance and strategic decision-making, supporting innovative and sustainable technical interventions and fostering global learning and local capacity building through integrated water resource management (IWRM). Its work has helped communities in this river basin deal with the effects of climate change.

In the north-eastern states, rainfall has become more erratic due to climate variability. The forest cover in the region is closely linked to this phenomenon on the one hand, and on the other, it is linked to the area's water retention capacity. In turn, this has affected traditional water sources for water supply, for example in the greater Guwahati area. This has forced people to pump more groundwater; in places of Assam, dug-wells have started going dry for many months as aquifer levels have fallen. The depletion of groundwater is faster in areas where there has been rapid construction activity.

In [Rajasthan's](#) Bharatpur region, the rise in temperatures and deficient rainfall has reduced water availability. The aquifer has fallen from 10 to 50 feet in the past few years. The Rajputana Society of Natural History, with local communities and support from donors, devised a plan to harvest rainwater for both immediate water needs and recharging the aquifer.

As with climate change and water, there are few sources of gender disaggregated data in the water sector. The Arghyam Survey of Household Water and Sanitation, conducted across Karnataka in 2008-09, is one such state-wide resource. It provides data by sex on who collects water and menstrual hygiene management. It also provides information on the status of village water and sanitation committees, but the number of women in these or the panchayats is not available. The study covered 17,200 households across 28 districts. WaterAid has several studies on drought and drinking water on its website. Navdanya works on climate change and its impact on the Himalayan ecosystems and agriculture and has several research publications on its website.

The Society for Promoting Participatory Ecosystem Management has several studies on women and water. One has examined the scope for women's empowerment through decentralized water governance in Gujarat and Maharashtra from the points of view of women's participation, social, economic, political and physical empowerment. The study states that "women in the domestic water sector felt euphoric about participating in public decision-making processes. They did not

see attending meetings as additional burdens and in fact said that they had to complete their domestic work to 'earn' a space in the public sphere. These are opportunity costs but not seen as an additional burden by women themselves. Often these have been borne by other women of the household who are lower in the familial hierarchy – daughters and daughter in laws.”

The study highlights the Ghoghe project in **Gujarat**, called the Ghoghe Rural Water Supply and Sanitation project. This was executed to increase women’s participation in water and sanitation through setting up self-help groups (SHGs). Even though women’s literacy was low, women participated in the project. The project demonstrated how being a member of a community based organization (such as a SHG) helped them play a more active role in water and sanitation.

In much of rural India, water from a single source serves multiple uses. A study of water structures build using funds from the Mahatma Gandhi National Rural Employment Guarantee Scheme in Madhya Pradesh shows that water from farm bunds and gully plugs is useful only for irrigation. Water from ponds is additionally used for domestic purposes and watering animals. Water from wells is truly multi-purpose, being used for the foregoing purposes as well as drinking. Thus, water use depends on the source, with wells being most versatile.

The resource team adds. Additional research shows several organizations have worked on augmenting water availability in rural India. To name a few, Dhan Foundation through its Vayalagam Tankfed Agriculture Development Programme organizes farmers around tanks and rehabilitates them. Arid Communities and Technologies works on natural resources management, especially water, in Bhuj, Gujarat. ACWADAM works on a holistic management of groundwater and is based in Pune. Tarun Bharat Sangh works on integrated water resources management based on traditional and indigenous skills and knowledge in several parts of Rajasthan, as does the Jal Bhagirathi Foundation. In Central India, Vigyan Shiksha Kendra and Samarthan work on NRM through people’s self-reliance. In the east, some of the organizations are Gram Vikas (Orissa) and the Centre for North East Studies and Policy Research (Assam). All their websites have extensive documentation of their work.

Comparative Experiences

Rajasthan, Augmenting Water Resources with Community Participation

Bharatpur (*from Satya Prakash Mehra, Rajputana Society of Natural History, Rajasthan*)

Several years of drought and water profligacy has caused a catastrophic decline in water tables in this area. The NGO conducted surveys to collect information on the decline, organized people to create awareness and work out ways to arrest the fall in water tables. With support from donors, it has executed demonstration projects that have had a ripple effect in the region. [Read more](#)

Related Resources

Recommended Documentation

From Rahul Banerjee, Khedut Mazdoor Chetna Sangath, Indore, [response 1](#)

Neither Water Nor Governance

Book; by Mr. Rahul Banerjee; Khedut Mazdoor Chetna Sangath; Published by the Society for the Promotion of Wastelands Development, Supported by the Sri Dorabji Tata Trust; Indore; April 2010; Permission Required: No

Available at <http://www.scribd.com/doc/47225699/Man-Final-Low-Resolution> (PDF 2 Mb)

Traces the struggle of the Bhils of western Madhya Pradesh for their right to water that successive governments have denied them, especially in the case of the Man river

Fighting the Commoditisation of Water and the Marginalisation of Bhil Indigenous People in Jhabua District of Madhya Pradesh in India - A Multi-Disciplinary Approach

Chapter of book, New and Enduring Themes in Development Economics; by Mr. Rahul Banerjee; Khedut Mazdoor Chetna Sangath; World Scientific Publishers; Singapore; 2009; Permission Required: No.

Available at <http://www.scribd.com/doc/47524153/Problems-of-Access-to-Water-and-Finance-for-Bhil-Tribals> (Word 100 Kb)

This paper details how mass organisations of the Bhils have used a mix of political action and economic analysis to bring balance to water resource management in Jhabua

Addressing Equity Issues in Watershed Development Projects in Bhil Adivasi areas of Western Madhya Pradesh

Paper; by Mr. Rahul Banerjee; Khedut Mazdoor Chetna Sangath; Permission Required: No

Available at <http://www.scribd.com/doc/48678947/Equity-in-Watersheds> (PDF 744 Kb)

The paper details the work of several organizations to address the inequalities faced by the Bhils in western Madhya Pradesh

From Ramakrishna Nallathiga, Centre for Good Governance, Hyderabad, [response 1](#))

Water Resource Management as a Tool for Urban Water Management: An Illustration in NCT_Delhi

Article in the Journal of Indian Water Works Association; by Mr. N. Ramakrishna; Centre for Good Governance; India Water Works Association; 2006; Permission Required: No.

Available at <ftp://ftp.solutionexchange.net.in/public/wes/cr/res-10011101.pdf> (PDF 205 Kb)

This paper argues for using water accounting as an appropriate tool for decision-making in water resource management through an illustrative case study of NCT-Delhi

River Water Conservation through Management interventions: A Case Study of Yamuna Action Plan in India

Paper; by Mr. Ramakrishna Nallathiga; Centre for Good Governance; Water Today; May 2008; Permission Required: No

Available at <ftp://ftp.solutionexchange.net.in/public/wes/cr/res-10011102.pdf> (PDF 131 Kb)

This paper discusses the critical state of the Yamuna river, the need for public intervention and the implementation of the Yamuna Action Plan

Reforming water sector governance and institutions for improving efficiency: the case of Mumbai

Paper; by Mr. Ramakrishna Nallathiga; Centre for Good Governance; International Journal of Regulation and Governance; Permission Required: No.

Available at http://www.cgg.gov.in/workingpapers/IJRG_6%5B1%5D.1_3-3.pdf (PDF 155 Kb)

This paper provides a quantitative and analytical overview of the water resource status in Mumbai and then outlines the need for reforms on several fronts

From [Satya Prakash Mehra](#), Rajputana Society of Natural History, Rajasthan

Community Participation in Resolving Water Problems of their village

Blog post; by Mr. Satya Prakash Mehra; Rajputana Society of Natural History; 2010; Permission Required: No

Available at <http://earthmatters.ning.com/profiles/blogs/community-participation-in>

Describes how the Society worked with people in Bharatpur to improve the quantity and quality of groundwater

Project Boond - V, a comprehensive mitigation initiative in the drought prone regions of Bharatpur

Blog post; by Sangeeta Deogawanka. India Water Portal; Bangalore; Permission Required: No.
Available at <http://www.indiawaterportal.org/post/11771>

Describes an initiative to help people in drought prone areas through a societal approach with a case study of the Chak Ramnagar village

From [Floriane Clement](#), International Water Management Institute, Hyderabad

Rural Water Security through Livelihood Security Programs Paper; by Mr. Ravinder P. S. Malik; International Water Management Institute; New Delhi; Permission Required: No

Available at <ftp://ftp.solutionexchange.net.in/public/wes/cr/res-10011103.doc> (DOC; Size: 43KB)

Study examines the multiple uses of water in India. This is a short synthesis of the main lessons learnt from a survey of 155 households in Madhya Pradesh

Climate Change Impact Assessment on Water Resources of Godavari River Basin

Paper; by Dr. A K Gosain; Professor and Head, Department of Civil Engineer, Indian Institute of Technology, Delhi, and Dr. Sandhya Rao, INRM Consultants Private Limited, New Delhi; Climawater; New Delhi; December 2010; Permission Required: No

Available at <http://webold.iitd.ac.in/~akgosain/CLIMAWATER/Report/Report%20No.5.pdf> (PDF 600 Kb)

The study quantifies the impact of climate change on the water resources of India using a distributed hydrological model and outputs of a regional climate change model

Literature review of mitigation and adaptation measures to climate change impacts in tropical river basins, with focus on India.

Paper; by Johannes Deelstra; Bioforsk; Norway; October 2009; Permission Required: No.

Available at http://webold.iitd.ac.in/~akgosain/CLIMAWATER/Report/Report_2.pdf (PDF 2.5 Mb)

The objective of this report is to look at possible ways to increase the Water use Efficiency in irrigated agriculture. WUE is closely linked to irrigation efficiencies.

From [Nitya Jacob](#), UNICEF, New Delhi

Water Rights as Women's Rights? Assessing the Scope for Women's Empowerment through Decentralised Water Governance in Maharashtra and Gujarat

Study; by Seema Kulkarni, Sara Ahmed, Chhaya Datar, Sneha Bhat, Yuthika Mathur and Dinesh Makwana; Society for Promoting Participatory Ecosystem Management, Utthan and Tata Institute of Social Sciences; October 2008; Permission Required: No.

Available at http://www.idrc.ca/uploads/user-S/12442185011Final_report_India_Water.pdf (PDF, 3 Mb)

The document presents a detailed analysis of the role of women in water governance and its relationship with their status at home and in the community

Recommended Contacts and Experts

Mr. Padma S. Vankar, Indian Institute of Technology, Kanpur (from [Padma S. Vankar](#), Indian Institute of Technology, Kanpur

Tel: 0512-2597844; <mailto:psv@iitk.ac.in>;

She has worked on water quality and contamination and partnerships and stakeholder involvement in workable solutions for the way forward

Recommended Organizations and Programmes

WaterAid (from [Johnson Rhenius Jeyaseelan](#), WaterAid India, Lucknow)

2/203 Vishal Khand, Lucknow, Uttar Pradesh; <http://www.wateraid.org/india/default.asp>

Has a rich resource of documents on drinking water and sanitation based on its projects and the work of its partners from around India

Society for Promoting Participatory Ecosystem Management, Pune (from Seema Kulkarni, Society for Promoting Participative Ecosystem Management, Pune)

16, Kale Park, Someshwarwadi Road, Pashan, Pune 411 008, Maharashtra, India; Tel: +91-020-25880786, 25886542; Fax: +91-020-25886542 <mailto:soppecom@gmail.com>;

<http://www.soppecom.org/projects.htm>; Contact Mr. K J Joy; Senior Fellow

SOPPECOM is a non-profit, non-governmental organisation working in the area of Natural Resource Management (NRM) primarily in the rural areas.

From [Nitya Jacob](#), UNICEF, New Delhi

Navdanya, New Delhi

A-60, Hauz Khas; Tel: +91 11 26532561, 26968077 ; Fax: +91 11 26856795
vandana.shiva@gmail.com; www.navdanya.org; Contact Dr. Vandana Shiva; Director

Navdanya works on climate change and its impact on Himalayan eco-systems and agriculture in different parts of India

Dhan Foundation, Madurai

18, Pillaiyar Koil Street, S.S.Colony, Madurai - 625 010, Tamil Nadu; Tel: +91-452-2610794,2610805 ; Fax: 91-452-2602247 dhan@md3.vsnl.net.in, dhanfoundation@dhan.org;

<http://dhan.org/themes/vtadp.php>; Contact Mr. A Gurunathan; Director

Vayalagam Tankfed Agriculture Development Programme (VTADP) was initiated in the year 1992 to work on small-scale water bodies with the participation of the farmers

Aid Communities and Technologies, Bhuj Gujarat

C - 279, Opp. Gunatit Chowk, Mundra Road Relocation Site, Bhuj - 370 001. Kutch. Gujarat; Tel: +91 2832 651531, 645152; act.bhuj@gmail.com; <http://www.act-india.org/>; Contact Dr.. Yogesh Jadeja; Director

The organisation focuses on research program and training program for capacity building mainly in water resource and agriculture field

Advanced Center for Water Resources Development and Management, Pune

Plot No. 4, Lenyadri Society, Sus Road, Pashan, Pune - 411021 Maharashtra; Tel: +91 020 25871539; acwadam@vsnl.net; <http://www.acwadam.org/>

ACWADAM is a not-for-profit organization that aims to develop solutions to groundwater problems of today and tomorrow

Tarun Bharat Sangh, Bhikampura, Rajasthan

Tarun Ashram, Bheekampura- Kishori, Thanagazi, Alwar- 22, Rajasthan,; Tel: +91 1465 225043;

Fax: Fax No. info@tarunbharatsangh.org; <http://www.tarunbharatsangh.org>; Contact Mr. Rajendra Singh; Chairman; rajendra@tarunbharatsangh.org

TBS builds institutional mechanisms for IWRM based on traditional and indigenous skills, knowledge, cultural values

Jal Bhagirathi Foundation, Jodhpur

D-66 (B), Sawai Madho Singh Road, Jaipur 302 016, India ; Tel: +91 141 2280964, 4025119 ;

Fax: +91 141 4025119 Email; <http://www.jalbhagirathi.org/publication.php>; Contact Ms. Ankita Vijay, Programme Assistant ; jal@jalbhagirathi.org

The Foundation organises communities to manage their local water resources through Jal Sabhas and takes a holistic view to water management

Vigyan Shiksha Kendra, Banda, Uttar Pradesh

Civil Lines, Banda 210 001, Uttar Pradesh; Tel: +91 5192 24587; Contact Dr. Bhartendu Prakash; Secretary

VSK promotes people's self-reliance and development, natural resource management and environmental planning, empowerment of women and people's technologies

Samarthan, Bhopal

36, Green Avenue Chuna Bhatti, Kolar Road, Bhopal, Madhya Pradesh; Tel: +91 755 2467625, 9893563713; Fax: +91 755 2468663; info@samarthan.org; <http://www.samarthan.org/health-2/>

Samarthan promotes participatory development and participatory governance through capacity building, direct field action, model building, research and advocacy

Gram Vikas, Mohuda, Orissa

Mohuda Village, Berhampur 760 002. Ganjam, Orissa; Tel: +91 680 2261866 to 2261869; Fax: +91 680 2261862; gramvikas@gmail.com ; <http://www.gramvikas.org/>; Contact Mr. Joe Madiath

Gram Vikas has been working since 1979 to bring about sustainable improvement in the quality of life of poor and marginalised rural communities - mostly in Orissa.

Centre for North East Studies and Policy Research, Guwahati

Ilashree, House no. 9, 2nd Bylane, Rajgarh Road, Guwahati 781003, Assam; Tel: 91 361 2463962; Email: sanjoy@c-nes.org, sanjaysharma@c-nes.org; Website: <http://www.c-nes.org/>

C-NES aims to impact policies and perceptions all levels to build a more equitable society

Recommended Portals and Information Bases

Global Water For Sustainability Program, USAID, (from [Pratyush Das](#), World Vision, Jaipur) <http://glows.fiu.edu/glows/Default.aspx>; Contact Ms; Mario Donoso; Director; Tel: +1-305-348-5287; glows@fiu.edu

GLOWS is a consortium financed by USAID working to increase social, economic, and environmental benefits to people of the developing world

Climawater, Indian Institute of Technology, New Delhi (from [Floriane Clement](#), International Water Management Institute, Hyderabad)

http://webold.iitd.ac.in/~akgosain/CLIMAWATER/pub_Reports.html; Contact Dr; A.K. Gosain; Project Coordinator ; Tel: +91-11-26591186 ; mailto:gosain@civil.iitd.ac.in

Climawater is a joint project by Bioforsk (The Norwegian Institute for Agriculture and Environment) and IIT Delhi to study the impact of climate change on hydrology regimes

India Water Portal, Arghyam, Bangalore (From Nitya Jacob, UNICEF, New Delhi)

<http://www.indiawaterportal.org>; Contact Mr. Deepak Menon; Tel: +91 80 41698941

This portal is an online repository of information on water, sanitation and water resources management from across India

Related Consolidated Replies

Community Participation in Ground Water Management (Comparative Experience), from A J James, Pragmatix, Gurgaon . Water Community,

Issued 8 November 2005 . Available at <ftp://ftp.solutionexchange.net.in/public/wes/cr/cr-se-wes-08110501.htm> (PDF,210 KB)

Identifies documented cases of local community level water management practices in the context of ground water management

Integrated watershed approaches (Comparative Experiences), from M. V. Rama Chandrudu, WASSAN, Hyderabad. Water Community,

Issued 29 December 2005. Available at <ftp://ftp.solutionexchange.net.in/public/wes/cr/cr-se-wes-15010601.htm> (PDF,160 Kb)

Provides information and experiences regarding watershed projects attempting to address or develop a large area in an integrated manner

Water Budgeting by Communities (Experiences), from Ravi Niwash, United Nations Volunteers, Jharkhand,

Issued 7 November 2006. Available at <ftp://ftp.solutionexchange.net.in/public/wes/cr/cr-se-wes-07110601.htm> (PDF, 155 KB)

Presents advice on processes that could prepare communities to take up water budgeting for better management of water resources, covering issues, suggestions and experiences

Climate Change Adaptation in Water, Agriculture and Coastal Areas - Experiences . Preeti Soni, Energy and Environment Division, UNDP, New Delhi,

Issued 31 December 2007 . Available at <ftp://ftp.solutionexchange.net.in/public/wes/cr/cr-se-wes-food-27110701.pdf> (PDF,155 Kb)

Discusses the larger context of climate change, shares environmental impact findings and mentions experiences with climate-resilient water and agriculture management practices

Gendered Adaptations to Climate Change, from Meenakshi Kathel, United Nations Development Program, New Delhi. Gender and Water Communities, New Delhi,

Issued 26 March 2008. Available at <ftp://ftp.solutionexchange.net.in/public/wes/cr/cr-se-gen-wes-global-15120701.pdf> (PDF,202 Kb)

Shares experiences and examples for developing gender sensitive adaptation strategies for combating the effects of climate change, diminishing livelihoods and water shortages

Developing an Indian Water Footprint, Advice, From Sudhirendar Sharma, Ecological Foundation New Delhi. Water and Food and Nutrition Communities, New Delhi,

Issued 11 November 2008. Available at <ftp://ftp.solutionexchange.net.in/public/wes/cr/cr-se-wes-food-11110801.pdf> (PDF,339 Kb)

A mechanism on developing an Indian Water Footprint that reflects our climate, geography, culture and needs, rather than importing something from the West

Inputs for Water Mission of National Action Plan on Climate Change, Advice, Examples. Water Community, New Delhi,

Issued 30 January 2009. Available at <http://www.solutionexchange-un.net.in/environment/cr/cr-se-wes-29120801.pdf> (PDF,140 KB)

Suggestions on the specific initiatives that should be included in the National Water Mission under the National Action Plan on Climate Change

Responses in Full

[Pratyush Das](#), World Vision, Jaipur

This is keep you informed that you as you prepare for this report, you may like to have a look at the resources produced from a research study conducted by a USAID funded project GLOWS at Udaipur. The web link is <http://www.globalwaters.net/>. Hope it provides various insights.

Rahul Banerjee, Khedut Mazdoor Chetna Sangath, Indore (response 1)

It is indeed commendable that SaciWATERS is bringing out an India Water Development Report at this critical stage in this country. I hope the report will adequately give space to the alternative schools of thought regarding decentralized conservation and use of water which are in opposition to the ideas and practices of water resource management establishments both nationally and globally. I am giving the links to some reports of studies that we have conducted in western Madhya Pradesh that may be of interest to you -

<http://www.scribd.com/doc/47225699/Man-Final-Low-Resolution>

<http://www.scribd.com/doc/47524153/Problems-of-Access-to-Water-and-Finance-for-Bhil-Tribals>

<http://www.scribd.com/doc/48678947/Equity-in-Watersheds>

Ratnakar Gedam, Adviser (Retired), Planning Commission, New Delhi

The outline of proposed report seems to be fine. I agree with such efforts. However, my concern is beyond such traditional approach - fresh water versus accumulated sea water. Fresh water is a minuscule part of all water found in nature. Mankind has spoiled rivers, sea and other water bodies. But mankind too has intellect to devise technologies. Therefore, my views are as follows:

In fact the solution to water problem does not remain in devising strategies and deliberating on right or wrong choices or in the name of integrated water resources management pondering over how best to supply water to meet demand or use available water resources for growing demand for water with growing population, but solution need to be found in new technologies which would assure water supply from abundant water found in sea which is not usable due to contamination, pollution etc. The fresh water is less than 3% and sea water is large so find solution in sea water usage. That is, efforts need to concentrate on how to develop technologies which will purify to 100% safe for drinking and other usage. Inventions / technologies are response for needs. Malthus theory stated long back that "mean of productions are growing at arithmetic progression while population is growing at geometric progression thereby world is heading to face hunger and starvation" must be reminded and also why it failed was technologies have made feasible to outstrip productions of rice, wheat etc. than population could consume. Similarly, King Henry declaring a prize of GBP 2000 for a person who could make spoon of aluminum and aluminum industry came into being. None might have thought of computers / mobile phone about 50 years back as popular as they are today but technologies have made it feasible. In fact efficient and low cost, low energy solution for converting sea water or any other water is solution. Similarly, detergents, soaps, fertilizers, pesticides, etc. need to have some chemicals properties which should enable re-use of waste water by purifying through ordinary technological means.

The available technologies of desalination or RO etc. have not become popular for various reasons. Indeed all coastal states must exploit the RE technologies but they too rely on traditional water supply and distribution mechanism. Perhaps, time has come to think radically different and act accordingly. Reducing Carbon foot print / Eco-foot print or Water Foot Print, Chartering or Water Future, calculations of virtual water in each of the commodity grown, Cost of Adapting to Climate Change etc. are good concepts but they hardly lead to solutions for mass population. "Necessity is the mother of inventions".

Ramakrishna Nallathiga, Centre for Good Governance, Hyderabad *(response 1)*

The project appears to be very ambitious when several institutions/agencies would have taken few years to complete one or few aspects mentioned in it. Also, the focus - sectoral or spatial, rural or urban or regional, services or resource - is not clear, depending upon which the literature and case studies will also vary.

Water Aid came out with a sector review report in 2005, a review of the resources was also done in a paper by Maheswari and Pillai in 2001 (International Journal of Regulation and Governance). Ministry of Water Resources, GoI has a plenty of data and narrative. From my experience, I enclose herewith a couple of papers for perusal that deal with:

- The need for water resource accounting at regional (NCT) level (multiple uses). Please visit <ftp://ftp.solutionexchange.net.in/public/wes/cr/res-10011101.pdf> (PDF; Size: 205KB)
- The need for basin-wide approach to river water management (multiple uses). Please visit <ftp://ftp.solutionexchange.net.in/public/wes/cr/res-10011102.pdf> (PDF; Size: 131KB)

Ramakrishna Nallathiga, Centre for Good Governance, Hyderabad *(response 2)*

As far as water resource status is concerned, the macro picture may not always reflect the actual underlying issues of the sector issues - especially of service delivery. The attached paper shows how that is the case with respect to Mumbai. It also provides a detailed review of existing literature relevant to water sector status as on date. 'Reforming water sector for improving efficiency: the case for Mumbai' Please visit [http://www.cgg.gov.in/workingpapers/IJRG_6\[1\].1_3-3.pdf](http://www.cgg.gov.in/workingpapers/IJRG_6[1].1_3-3.pdf)

S. Parthiban, CENPAP, Hyderabad

We need to look at how climate change is going to affect the incidence, the intensity (the proportion of land, duration) and spatial dimensions (geographic areas) of drought in order to identify and estimate water scarcity. How climate change is going to affect rainfall patterns as the hydrological cycle becomes more intense. In some places this means that rain will be more likely to fall in deluges (washing away top-soil and causing flooding). So it is not only scarcity but also abundance/devastation in some places due to climate change. Impact of climate change on low rainfall areas and consequent impact on rain fed agriculture is another critical aspect when we design water development strategies.

Rahul Banerjee, Khedut Mazdoor Chetna Sangath, Indore *(response 2)*

Nature is the best desalinator of sea water through the water cycle. All we have to do is ensure that the naturally desalinated water that is made available to us through rain is properly stored in a decentralised manner for which simple and cheap technologies are available which are being neglected by the powers that be, precisely because they are simple and cheap and involve empowering common people rather than water resource technologists and bureaucrats.

Padma S. Vankar, Indian Institute of Technology, Kanpur

I have worked extensively in the tannery area of Kanpur-Unnao, on survey and identification of sites which are severely affected and have even done remediation work, in case you want some material for the following issues, you can let me know: (a) Water quality and contamination (b) Partnerships and stakeholder involvement Workable solutions for the way forward.

Satya Prakash Mehra, Rajputana Society of Natural History, Rajasthan

I would like to state the situation in north-eastern Rajasthan. Although we could not find any scientific reference of the direct relationship between water scarcity and climate change but indirectly it is one of the reasons. The uneven rainfall combined with over-consumption of water (both surface and underground) is worsening the situation in the region. Further, anthropogenic activities have altered the water flow patterns.

Overall, based on the questionnaire surveys carried out in the region (Braj-Mewat), I would like to state that the rise in temperature and low rainfall have major impacts on the water resources of the region. Rajputana Society of Natural History (RSNH) is carrying out the Project Boond supported by Oil Industry Development Board (OIDB) and Bharat Petroleum Corporation Limited (BPCL) for the improvement of water resources in the rural areas of Bharatpur through natural solution. Some of the impacts can be seen on the following links <http://earthmatters.ning.com/profiles/blogs/community-participation-in> and <http://www.indiawaterportal.org/post/11771>.

Further, a report on the issue of Gender and Water in the region can be found in the Resource Guide of GWA [*Resource Guide - Jal Prabandhan mein Gender Samanta* (in Hindi), Gender and Water Alliance and Center for Environment Education, Pp. 189-191. (ISBN: 978-90-8806-006-9)]. Women's had a higher participation in such work than men's.

Photographic records and details of the survey can be shared if required on these issues.

Johnson Rhenius Jeyaseelan, WaterAid India, Lucknow

We are working in Ballia on an arsenic mitigation programme. During a training programme to volunteers on Arsenic filters on operation and maintenance, the participants from the affected village shared that earlier when they were using the open wells there was no problems of Arsenic but after bore-well technology came into being people rapidly shifted to ground water. Each HH has a shallow bore-well and all the open wells have become non-functional or dumped with solid waste. In Ballia and other districts arsenic is still a problem and WAI have promoted filters, sanitary well and through NREGA did open well cleaning but government and sector institutions are still not planning to shift to surface water sources or use of open wells. Even the mini water supply schemes are dependent on ground water and agriculture. All these will manifest with increase in arsenic problem.

In Bundelkhand, only recently the government's relief package talks of IWRM and water conservation but the work on the ground is less. NREGS has more scope for IWRM but the focus is more on link roads and drainage because of contractor nexus and here we influenced to increase IWRM works. We were able to showcase examples of water conservation works in Bundelkhand but government and politicians do not see IWRM as a sustainable solution because it does not fetch them votes while a borehole fetches. Government, Sector institutions, NGOs, Donors and communities need to work together more in promoting workable solutions.

A right based approach towards water will ensure that excluded communities have access to water, schemes like NREGS integrates IWRM and sustainability. Report cards, water audits and the golden opportunity of village water security plans are workable solutions which all stakeholders should work together.

Seema Kulkarni, Society for Promoting Participative Ecosystem Management (SOPPECOM), Pune

This is indeed an ambitious task and I do hope that you are able to put together the report in the short time at hand. Since one of the queries you mentioned was around gender disaggregated data I thought I should share our recent experience of a study to look at how gender, caste class issues are addressed in domestic and irrigation water. The study mainly tried to look at water access and decision making.

The rationale for the study was mainly the non-availability of disaggregated data to understand the structural inequities in access to water.

Our study clearly showed a class and caste bias in access to domestic and irrigation water. The gender differentials were seen in terms of the cost of accessing water which was unduly borne by women not only in terms of work around water collection and its utilization but also in some instances the violence meted out to women. In other instances this cost meant extending assured labour to large landholders in exchange for drinking water which is drawn from there private wells (invariably the public sources on which the poor, Dalits depend are non-functional either because of lack of electricity or low water tables or leaking pipelines or non-maintenance, etc) during scarcity.

None of this is usually reflected except in small box items of a larger report. The severity and the extent of these changing social relations due to water inequities needs to be reflected in the water status reports.

We in partnership with groups in Nepal and GWA have tried to do some ground work in this direction in India and Nepal with a sample of about 500 households across 20 villages. We would be happy to share our methodology and the detailed findings for the preparation of this report.

Nripendra Kumar Sarma, PHED, Guwahati

The proposed project for working on 'India Water Development Report – The right to water amidst increasing scarcity' is indeed a great effort. But the efforts should be made to capture the region / basin / watershed wise information to encompass the water resources all over India. Moreover the scope of the areas should perhaps study the use of water for drinking, irrigation and other conjunctive uses along with their extensiveness and impacts.

I would like to put forward some inputs on the aspect of Water Scarcity and Multiple Use of Water Resources (as sought for) as best as possible with regard to the situation in different parts of Assam. (But this may only be a reflection in part, because this is not based on a documented study / exploration but on information collected from different field oriented stakeholders).

(a) Water Scarcity:-

In general, North Eastern States are blessed with heavy rainfall, which eventually results in adequate and high groundwater table in most of the plain districts of Assam. Hence extraction of groundwater is easier and therefore, Drinking Water Supply in Assam is highly dependent on groundwater.

In urban areas, the poor coverage and unreliability of public water supply to meet the increasing demand arising out of extraordinary pace of urbanization and growing population has led the dependency on groundwater to increase manifold. Every new construction in Guwahati begins with sinking a bore-well due to absence / erratic nature of public water supply. Such indiscriminate digging of bore-wells has resulted in depletion of ground water levels. The depletion of ground water levels is significant in areas which have been witnessing rapid construction activity for the last few years.

Moreover, in certain locations, groundwater sources such bore-wells / ring-wells (dug well) etc. dry up during winter, leading to water scarcity. Every year there is a seasonal water crisis in the greater Guwahati area because of depletion of ground water table, leading to a situation where deep tube wells and ring wells dry up and the residents are compelled to procure water from private vendors at a premium.

The problems of depletion of groundwater level aggravate also due to the recent phenomenon of Climate Change leading to erratic rainfall pattern in this region. In the recent past, the rainfall pattern seems to have changed creating an impact on groundwater level and sometimes some of the small perennial rivers also need to strive for water.

Another notable factor responsible for Climate Change as well as water scarcity is the dwindling forest cover as proclaimed by different schools of thought. One school of thought describes that there is a substantial reduction in water retaining capacity in the areas along the Indo-Bhutan border. Those areas were well known for their thick forest cover, predominantly with Sal trees, which contributed to enhance the water retaining capacity in the areas. But during last few years, there was large scale deforestation and the Sal Wood trees have vanished from the localities. So the groundwater reserve in those areas gets exhausted more easily, as it flows down to lower terrain areas in the downstream.

Multiple Use of Water Resources

Considering the availability of water resources (both groundwater and surface sources) in Assam with normal rainfall, the multiple uses of water resources is not yet practiced due to lacking in proper convergence among the stakeholders. Each and every implementation stakeholders draw their own plan of action for utilization of water resources. Few years back the agricultural department wanted to go ahead to install one lakh shallow tube well for irrigating the agricultural field, without considering the probable future effects of over withdrawal leading to chemical contamination / leaching etc. However such attempt could have easily be avoided by a system of water sharing through discussion with other stakeholders. In case of utilization of ground water for different purposes such irrigation, water supply etc. a common source (Deep Tube Well) may perhaps be a feasible option and this can happen only through proper convergence to involve suitable water sharing formula.

There is ample scope for water sharing from large irrigation projects, which involve barrages, weirs or dykes. In Assam, there are two irrigation projects, 'Champawati' and 'Bardikrai' Irrigation Projects, where the water is being used for power generation and irrigation. Likewise, water can easily be shared for rural water supply scheme also, considering the nominal water requirement for the water supply scheme as compared to that for irrigation purpose. In the absence of such water sharing, extra arrangements for the raw water required for rural water supply schemes are necessary leading to high cost involvement as well as wastage / over withdrawal, etc.

However, the success of such water sharing depends largely on the community. Rural water supply schemes are normally implemented by targeting the nearby habitations. In such cases, other habitations raise objection on a common source (river / spring etc.) being used for water supply scheme meant for a particular habitation. There is a very good practice of water sharing mainly for irrigation purpose. Different village communities in the water scarce Indo-Bhutan areas in Assam, have constructed and maintained diversified canal systems known as 'Dong', carved out from natural sources like rivers called 'Pagla', 'Diya', etc. They are maintained by an Anchalik (Regional) Dong Committee, which is the conglomeration of 9 (nine) committees constituted in different habitations.

Recently one rural water supply scheme named as 'Suwankhata Water Supply Scheme' was commissioned in the areas along the Indo-Bhutan border areas by utilizing the raw water from an intake point situated at 'Manas Chowki' at the confluence of river 'Pagla' & 'Diya' and the scheme was meant for some of the habitations of that locality striving for drinking water. However, the site of that intake point is far away from the scheme and it becomes inaccessible during rainy season due the thick forest cover and a potential threat from wild elephant. Meanwhile, there is another canal known as 'Japadong', which is curved out from 'Pagla' & 'Diya' river, flowing behind the water supply scheme. The 'Japadong' canal was originally constructed for the purpose of irrigation by the Community themselves (without any government funding) from the greater Suwankhata area. It was running quite successfully for irrigating the agricultural fields in a greater area.

So, due to the unavailability of alternative water sources in the areas, Public Health Engineering Department initiated discussions with some of the above-mentioned committees for sharing the water from the 'Japadong' canal for the rural water supply scheme **as an alternative during the rainy season only**. Because during the rainy season water flows in large quantities through the 'Jaladong' canal and considering the fact that diversion of a nominal quantity of water is required for the water supply scheme in that period, this will not affect irrigation requirements.

In that backdrop, the management committees agreed on such sharing of water for the water supply scheme. However, after sometime, under the influence of village politics, few of the Dong committees from the habitations, who have not benefited from these water supply schemes, want to change the formula for water sharing. They asked the Public Health Engineering Department to shift the intake point from their 'Japadong' canal to another point. But such shifting is perhaps not feasible due to the high cost involved.

Inter-basin water-related conflicts are also particularly evident in this region. Plans are in place to develop over 100 hydroelectric power plants along the river Brahmaputra and its tributaries in Arunachal Pradesh. The dams would bring a valuable income to Arunachal Pradesh, but at the same time would put at risk many traditional water-related livelihoods and other riparian regions downstream.

So day by day, it has become inevitable to have a **Regional Task Force on Water Resources** with the involvement of all stakeholders to act as Regulatory Authority on scientific source finding using hydrological survey and to ensure proper utilization of Water Resources and also to avoid the situation that arises out of Climate Change leading to water scarcity and other regional problems.

Janakaraian, SaciWATERS, Hyderabad

This is in continuation of Anjal Prakash's request for information with regard to the SaciWATERS' current project on *India Water Development Report* funded by UNICEF and FAO. This is an important project which aims to consolidate not just the data and data analysis on water situation in India but also attempts to enrich the documentation through active consultation with various stakeholders across country - cutting across disciplinary boundaries of people engaged in the water sector. The mandate of the study is to bring out a comprehensive volume on India's water sector by taking into account the current challenges and to spell out ways forward strategies. It focuses more on various key issues such as mismatch between water supply and demand, increasing competing claims on water, measures of water conservation / saving and building partnerships for sustainable use. Particularly the project attempts to pinpoint the key challenges that India is confronting today in the water sector (which includes issues relating to climate change impacts) – and contextualizing them in a broader socio-economic and political framework and the impacts of globalization that the country is currently going through.

I would like to join Anjal Prakash in requesting the members of the water community to share with the information / experiences on various issues of the water sector. We will be grateful if members could share with workable solutions / ideal strategies to overcome water problems / challenges supported by analytical documentary material. I assure you our collective proactive engagement in this endeavour of SaciWATERS will go a long way in influencing the water policy of India for achieving sustainable use of water.

I appreciate Nripendra Kumar Sarma for sharing valuable views / information.

Himanshu Thakkar, SANDRP, New Delhi

I think this is indeed a welcome step and such an effort is required. Actually such work is required on regular basis.

However, the canvas of the work is indeed huge. And it would be difficult for anyone to respond to this in a significant way. For example each of the eight "major areas on which information will be collected" as listed below would require a lot of work/ discussion in any one specific state/ district/ tehsil/ village/ river basin/ watershed. As we all know, water is an essentially local issue with global linkages. Moreover all these major areas are actually affected by how the state and its various arms/ institutions deal with them as also how the society and other arms of the democracy deal with them.

On four broad themes listed for the phase I, the issue of water demand at macro level seems to me like a black box. In the sense that we do not have clear picture as to what is the total water consumption in India for different sectors and what are the trend lines for each of them. Such macro picture would come from micro constituents like the sectoral demands at state level, etc. Credible figures seem to be lacking. It is same about sources of water use, where the picture is possibly less hazy.

About the three specific questions, I find them very different kind of questions and each of them possibly deserves a discussion through separate queries. The first and third of the questions again are mega questions that would require to be broken down into sub queries.

The last time such a mega effort was under taken was the report of the National Commission for integrated water resources development (1999), if I remember correctly. The Planning Commission did take an effort at a report on integrated water use, that that seemed less useful.

Apologies for less-than-focused response.

Floriane Clement, International Water Management Institute, Hyderabad

IWMI has led one project which has examined multiple water uses in India, the project is still on-going so formal publications have not been released yet, but my colleague, Ravinder Malik, who conducted the research in India wrote a short synthesis of the main lessons learnt from a survey led among 155 households in Madhya Pradesh. Please visit <ftp://ftp.solutionexchange.net.in/public/wes/cr/res-10011103.doc> (DOC; Size: 43KB)

IWMI is also currently involved in a research project on climate change in the Godavari River Basin and various studies on the impact of climate change on water scarcity in the basin have been posted by IWMI/their project partners (IIT-Delhi) on http://webold.iitd.ac.in/~akgosain/CLIMAWATER/pub_Reports.html (see technical reports)

I did not find any gender disaggregated data in India from our recent projects in India.

I hope it is useful for your report, feel free to contact me or my colleagues if you would like to know more about the two projects.

Suparna Katyaini, Indian Institute of Technology, Guwahati*

I would like to add inclusion of Water Users' Association (WUAs) to the India's Water Development Report would be crucial as it indicates decentralized water management in agriculture, focus on the composition of WUAs would also aid in analyzing gender and equality aspect of the resource.

Many thanks to all who contributed to this query!

If you have further information to share on this topic, please send it to Solution Exchange for the Water Community in India at se-wes@solutionexchange-un.net.in with the subject heading "Re: [se-watr] Query: Inputs for India Water Development Report – Experiences, Referrals . Additional Reply."

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