

REPORT

WORKSHOP ON
***Water and Livelihood Security in the Eastern and North-Eastern
Zones of India***
Organized by KINSPARC: Sponsored by: IWP (New Delhi)
December 14-15, 2009

I. Introduction and Background

The **KINSPARC**, a Partner and East Zone Coordinator of **India Water Partnership (IWP)**, **New Delhi** organized a Two-Day Workshop on "***Water and Livelihood Security in the Eastern and North-Eastern Zones of India***" on December 14-15 at Kalyani. The workshop was sponsored and supported by the India Water Partnership (IWP). A Brief report on the workshop is presented here.

The Workshop was held following a year long programme of research and study of low cost water saving technology to solve the problem of water in the eastern zone. It was preceded by a round table conference of South Asian countries organized by India Water Partnership and Global Water Partnership held in New Delhi on November 5-6, 2009.

The South Asian round table conference in New Delhi highlighted the serious threat to the earth and livelihood caused by climate changes affecting entire eco-systems, natural resource base and human social and economic systems at global and regional levels. The New Delhi conference stressed the importance of designing and implementing policies on water resource management for ensuring food security, reducing poverty, creating opportunities for livelihood diversification, conserving eco-system integrity and creating resilience to climate change. The Eastern and North-Eastern Zonal Workshop in Kalyani explored these issues through research and field level experiences.

The Eastern and North-Eastern India is characterized by wide variations in natural, soil-climatic, social, economic and overall ecosystems. A major characteristic of the water-climate scenario of the region is the virtual co-existence of excesses and scarcity of water in

the region, frequent occurrence of droughts and floods following each other in succession. Principal objective of the workshop was to organize a dialogue among members from different states and institutions for the purpose of disseminating the nature and effectiveness of low cost water saving technologies found suitable for adoption by farmers and other water users mainly for agriculture and sanitation. Papers and discussions highlighted available technologies designed to deal with the growing incidence of natural calamities in the region, which technologies were adopted by farmers and water users, and what had been their benefits and costs.

About sixty participants attended and twelve papers were presented at the workshop. Participants included Water Resource Management Experts, Water Scientists and Technologists, Sanitation and Livelihood Professionals, Agronomists and Agricultural Scientists, Economists and other Social Scientists, Policy makers and Administrators. They came from different states in the eastern and north-eastern region. Most of them attended from beginning till end of the workshop and showed keen interest. To name some of the distinguished participants: *Professor S.R. Hashim*, Chair, and *Dr. Veena Khandoori*, Adviser, IWP, New Delhi, *Shri Gourishankar Chattopadhyay*, IAS, Director, State Institute of Panchayat & Rural Development (SIPRD), West Bengal, Additional Director *Shri Tapas Ray*, and other faculty from the SIPRD, *Dr. Rangan Dutta*, Scientific Consultant to the PSA, Government of India, *Professor Alok Banerjee*, Vice-Chancellor of the University of Kalyani, *Professor Shantanu Jha*, Chair, Kalyani Municipality and several other faculty members and students from Universities and Colleges attended. Overall, the Workshop was well attended and created warm response and interest.

At the **inaugural session**, *Professor Sudhin K. Mukhopadhyay*, President of KINSPARC welcomed the distinguished participants and gave a brief introduction to the Workshop. *Shri Gourishankar Chattopadhyay*, IAS, Director of SIPRD inaugurated the Workshop and chaired the session. In a brief and incisive address Shri Chattopadhyay identified some key issues in water resources and stressed the need to address them. He appreciated the efforts of the workshop organizers and participants for highlighting this most critical problem. *Dr. Rangan Dutta*, Scientific Consultant to the Government of India in an illuminating address indicated the parameters of water and livelihood in the East and North-East. This was followed by a Key Note Presentation by *Professor S.R. Hashim*.

The **key note address** highlighted the problems of water wastage, sluggishness and inefficiency of governance, absence or inadequacy of

appropriate technology for saving and economically using water, especially in agriculture. Professor Hashim pointed out that water saving also implies saving energy and protecting ecology. He advised the workshop participants to explore these critical issues and encouraged them to conserve, harvest, store, reduce waste and economize water use. He particularly emphasized the need to create awareness among farmers and water users and change their mindset. Professor Hashim concluded his address by expressing satisfaction at the wide participation and interest shown in the workshop.

II. Climate Change and Water Security

(Professor Asis Mazumdar, Director, School of Water Resource Engineering, Jadavpur University, Kolkata)

Professor Mazumdar, in his paper on *Climate Change and Water Security* elaborated the nature of climate change in recent times and its effects on Global Water Resources. The following effects were identified:

- ***Increase in atmospheric temperature*** leading to reduction in availability of water in basins.
- ***Increase in surface water temperature*** reducing dissolved oxygen content, mixing patterns and self purification capacity. It also increases algal bloom.
- ***Rise in Sea level*** causing salinization of coastal aquifers.
- ***Shifts in precipitation patterns***: Changes in water availability due to changes in precipitation and other related phenomena (e.g., evapotranspiration, ground-water recharge).
- ***Increase variability in annual precipitation***: It Increases the difficulty of flood control and reservoir utilization during flooding season.
- ***More frequent and intense natural calamities***: Climate changes are causing frequent and unpredictable occurrence of floods, droughts, cyclones, heat waves causing widespread destruction of life, property, infrastructures, water and atmospheric quality threatening overall water and life security.

A glaring case of the effects of climate change on nature and life for is provided by the rapid rate of melting of the Himalayan Glaciers. Gangotri, the mother source of the Ganges river systems, is now retreating at a rapid rate.

It is estimated that at this rate the entire Himalayan snowfield will disappear by 2035, that is only a quarter of a

century from now. This is a grim prospect for a large proportion of the world population!

In order to prevent this, the author concluded with the following steps to be taken immediately:

Supply side measures:

- **Prospecting and extraction** of groundwater.
- **Increasing storage capacity** by building reservoir and dams.
- Expansion of **rainwater storage**.
- **Removal of invasive non-native vegetation** from riparian areas.
- **Water transfer**.

Demand side measures:

- Improvement of demand side efficiency by **recycling water**.
- Reduction in water demand for irrigation by **changing the cropping calendar, crop mix, irrigation method and area planted**.
- Reduction in water demand for irrigation by **importing agricultural products**.
- **Promotion of indigenous practices** for sustainable water use.
- Expanded **use of water markets** to reallocate water to highly valued uses.
- Expanded use of **economic incentives** including metering and pricing to encourage **water conservation**.

III. Rainwater Harvesting and Livelihood Security

III.(a) Rainwater Harvesting and Integrated Natural Resource Management: (Dinabandhu Karmakar, PRADAN, Purulia, West Bengal)

In view of the virtual co-existence of excess and erratic rainfall and droughts, depletion of forest and water bodies and limited water retention capacity of the undulating upland soil, small land holdings and low livelihood security of people in the districts of Purulia and Bankura in West Bengal as well as parts of Jharkhand and Chhattisgarh, the area offers scope for rainwater harvesting and integrated natural resource management. PRADAN, a well known NGO, has developed and implemented the INRM approach. The basic components of this model are: (a) rain water harvesting----in situ water harvesting described as 5% model in paddy fields and seepage tanks in valley lands; (b) building strong community organizations;

(c) capacity building for planning natural resources and (d) diversified farming, including agro- horticulture and timber plantation.

The following results have been obtained from implementing this model on farmers' fields of 0.4 ha. :

- Minimum 10 kg of green biomass is produced every three months;
- A family with 0.4ha. land can access 0.4ha-m water to produce minimum 4 tons of grain & 4 tons of recyclable biomass per year.
- Soil is rejuvenated with recycling of surplus biomass.

III. (b): Land Shaping Technology:

**(Dr. Nilendu Jyoti Maitra, Dr. K. Sengupta, Shri Utpal Maity
Krishi Vigyan Kendra &
Rural Development Wing
Ramkrishna Ashram, Nimpith, West Bengal)**

In contrast with the upland undulating land situation presented above (in districts of Purulia, Bankura in West Bengal), the land scenario of eastern India is characterized by low, saline coastal areas where water logging and soil erosion pose problems for agriculture and livelihood of the mostly poor people struggling for livelihood there. The 'land shaping technology' designed and implemented by the Ramakrishna Ashram Krishi Vigyan Kendra at Nimpith on the Sundarban coastal district in West Bengal has addressed this problem effectively.

The land shaping technology for harvesting rain water involves excavation of ponds covering one fifth of the farm land area of low land up to a depth of 9ft. Using the excavated soil the remaining area is raised up to 1' -1.5'. The embankments of the ponds dug are made 4' wide and raised up to a height of 5'. Embankment, 2' wide and 3' high, is constructed on the raised land. This construction makes it possible to harvest water ranging from 6.8 acre inch to 11.9 acre inch in volume depending upon the size of pond.

The technology has helped farmers to switch to multiple cropping (three crops on the same land) against the earlier mono crop of low yielding paddy only, because earlier coastal saline water prevented more than one crop season. Now due to rainwater harvesting this problem could be overcome. Farmers can now grow paddy on land and

vegetables on embankments, bitter gourd, bottle gourds, pumpkin, cucumber, etc. in the air on bamboo structures constructed over the land and pond, and duck rearing, fish farming, and aqua culture in the harvested rain water. The technology has helped conservation of ground water, irrigation, and energy saving. Enhancing people's livelihood security, their income has increased more than fourfold, their work days and employment has increased, their out migration in search of jobs had virtually been eliminated. Women's income and empowerment has increased significantly.

IV. Water, Agriculture and Livelihood Security

IV(a) Water saving and management practices in field crops ***(Professor A. Zaman, Bidhan Chandra Krishi Viswavidyalaya)***

The paper briefly states the water scenario in India and in the state of West Bengal and suggests that per capita availability of water in the country has been declining and by 2025 it will reach a state of water stress. Since agriculture is the largest water using sector, it is imperative to explore technologies to economize and save water in agriculture. The paper presents results of a set of experiments for water saving in agriculture conducted by the agricultural university (BCKV) in West Bengal. Experiments used different technology practices for field crops in different locations for different crops at different points in time.

Water management practices such as Tillage operation, Mulching scheduling of irrigation – number & frequency of irrigation, application of appropriate doses of fertilizers, drip irrigation, etc. have been tried to standardize the best practices regime.

Using the information generated, an irrigation calendar for various crops has been developed to aid farmers in saving irrigation water and in improving water productivity.

The participatory approach for improvement of the status of irrigation water utilization in DVC Canal Command was developed to demonstrate proper irrigation scheduling and management to check loss of water. Results show that 36% potato growers, 25% mustard growers & 50% of summer rice growers adopted the proven water management technologies and achieved higher water use efficiency within a period of 2 years since experiment.

IV(b) Irrigation-Agriculture-Livelihood Links:

A Secondary Data-Based Analysis: Orissa

(Dr. Souvik Ghosh , WaterTechnologyCentre, Orissa)

A common hypothesis is that irrigation augments agriculture and thereby promotes poverty alleviation and livelihood security. This paper makes a detailed analysis of district-wise data to examine the hypothesis. The paper observes that while there are wide variations among districts in levels of irrigation, agricultural development and income and livelihood security, it cannot establish any uniform relationship for the state as a whole for the hypothesized relationship among the three parameters. Further studies are therefore needed to explore the relationship and guide policies.

V. Safe Drinking Water and Livelihood Security

(Shri A. Kundu, State Institute of Panchayat & Rural Development, Kalyani)

Water and livelihood security involves quality as much as availability and access to water resources. Presenting quantitative information the paper suggested that in India lack of access to water , sanitation and hygiene causes 106 million death per year due to diarrhea, especially among children. Diseases due to polluted water and unhygienic conditions threatens livelihood security, causes loss of man days, depresses wages and imposes the burden of costs for treatment.

To address this problem, as reported in this presentation by the SIPRD, technologies for purification of water, eliminating bacteria and harmful chemicals (e.g., Arsenic, Fluoride, Chlorine, Iron, etc) have been developed and disseminated. Permissible ranges of each harmful element and its mitigation options have been standardized. For purification of arsenic contamination in water, which is of serious concern in West Bengal, various technologies, e.g., activated alumina filtration, absorption through GFH media, ion exchange, reverse osmosis, etc have been propagated. For fluoride contaminated water, activated alumina Nalgonda technique, reverse osmosis, etc have been found suitable technologies.

For purification of flood water to get safe drinking water, mixture of alum, lime, bleaching powder/calcium hypo chloride/sodium hypo chloride (zeoline) in a definite proportion may be used during flood and other natural calamities as indicated in the presentation.

VI. Community Mobilization and Community Participation in Management, Restoration, Maintenance and Putification of Water Resources for Livelihood Security

Four presentations were made focusing on the role of community mobilization and community participation in restoring and maintaining water resources. These were: (i) One on reporting results of a project on use of a common source of water, the river Ramial, a tributary of Brahmini river in Orissa. (ii) Another was on a similar project of development of an integrated river basin in the state of Manipur. (iii) The third presentation was on restoration and management of a derelict source of drinking water in Ajmere through community mobilization and participation. (iv) The fourth presentation was on a project of community mobilization for community led health initiative, with special emphasis on water and sanitation in West Bengal.

VI(a). Community Management of common water source in Orissa (Shri Antaryami Rath, Arun Institute of Rural Affairs, Orissa)

An interesting case study in community management of common water source is provided by Ramial, a tributary of river Brahmini in Dhenkanal district of Orissa. Ramial is the common water source to farmers of 37 villages for irrigating seasonal crops. A project was launched there in order to promote equitable access to each village in using water resources from the river ensuring maximum water usage efficiency while keeping the river water clean and pollution free. The project was community driven through awareness generation, mobilization, capacity building of farmers and domestic water users to achieve the objectives. Various publicity tools such as posters, pamphlets, wall paintings, booklets, electronic media, folk drama and mass oath taking on water management principle and practices were used at various locations. Students of local schools, youth groups and teaching community also were involved to create awareness regarding clean household latrines, tube-well bases, bathing ghats, etc.

New community groups were organized and existing groups were activated for holding village wise meetings with water users. Capacity building trainings on irrigation management systems were organized for office bearers of the community groups.

In the above process 15 water users committees with 20- 25 members in each committee have been formed so far. All these committees hold monthly meetings to decide crop-wise water requirement, redress intra group disputes related to water use, water use efficiency, etc. The impact of community driven implementation of the project became visible in the form of keen interest in working together to seek right solutions to problems of management of the river water.

VI.(b) The Wangjing Project of Conflict Resolution among users of water from an Integrated River Basin: Manipur.

(Shri Jelshyam Singh, Manipur)

The Wangjing river basin has serious water related problems creating hardship to local people. This has led to conflicts among the local users as the river is the single most important water source in the entire basin. People are deeply concerned with the water use conflicts that have become a serious social problem. In the above situation WWAGS has taken initiatives to educate the communities in integrated water resource management and sanitation in the river basin of Wangjing River. In their drive , village level water users committee(VLWUC) have been formed to discuss and take actions on the issues of water allocation for irrigation and drinking, water sharing among the villagers for various purposes, sanitation through construction ECOSAN, networking with other local and national institutions to share information and technologies.

In this process five water users committees have been formed so far along the Wangjing River basin. Meetings of the regional coordinating committees are held regularly. People are showing enthusiasm and cooperation to this community participatory approach and are coming forward for voluntary action in conserving water resources and management.

VI.(c) Community Mobilization and Participation To Restore and Manage a Derelict Source of Drinking Water in Ajmere Sharif

(Dr. Veena Khandoori, IWP, New Delhi)

Dr. Khandoori presented a documentary film on a success story on Ground Water Conservation in Dargah of Ajmere Shariff, Rajasthan. The case showed the role of public institutions and community participation in ensuring water supply in the holy Dargah of Ajmere Shariff. The Dargah is visited by more than 35 lakhs of pilgrims every year and requires more than 17 crore litres of water annually. Only

about 2 per cent of this is supplied by the Public Health Department of the Government, and a huge deficit is thus left unmet. This gap was being met by a deep tube well located nearby. In 2007 this well dried up. After this the Dargah Committee took up a project to reclaim the dried up Jhalra with people's participation. By the end of 2008 water level in the Jhalra was restored up to a depth of 40 feet. From this source about the entire water requirement of the Dargah could be satisfied.

This is an experimental evidence of how community participation can rejuvenate traditional water harvesting systems.

***VI. (d): Community Mobilization for Water and Sanitation :
Kalyani, West Bengal***

(Professor Shantanu Jha, Chair, Kalyani Municipality)

Kalyani Municipality Chairman presented a case study of a project on mobilizing the community to improve sanitation and water in fifty two slums around Kalyani town. The project consisted of creating awareness among slum population that poor sanitation reduces economic benefits, aggravates poverty and is a hazard for human health. It is an infringement upon human dignity, privacy and safety, especially of women. It weakens the foundation of social development and pollutes the environment. Improving sanitation alone can reduce the disease burden of the country by 50%.

Government policies commonly addresses this issue by providing free or subsidized toilets which have often proved unsuccessful, because

- This causes a sense of dependence on government, and
- This does not address the issue of behavior change, and sustainability of the policy measure.

Moreover, there is the problem of feasibility of construction of toilets for more than 600million people by the Government.

Through a participatory approach, the CLTS focused upon the concept of people's own participation in making sanitary toilets for themselves, eliminate open defecation, improve sanitation, and prevent water and environmental pollution.

This unique approach has empowered the poor slum dwellers to make their slums open defecation free without any external financial aid.

This approach has not simply increased the number of toilets but has ensured usage and behavior change. *For this programme Kalyani Municipality received an award from the Hon'ble President of India.*

VII. SPECIAL Session on WATER IN THE NORTH-EASTERN REGION
(Dr. Rangan Dutta, Scientific Consultant to PSA, Government of India)

The North-Eastern Region of India is among the most diverse and administratively fragmented regions of India from geophysical, ethnic, biodiversity and natural resources angles. From the "water resources" point of view, the NE seems to suffer from "Resources curse" as its utilization entails complex issues---- benefits are often less than social and environmental costs, and "uneven" in the sense that while projects may benefit 'upstream people, while 'down stream' communities are to bear the burden of floods or erosion as seen recently in Hydel development projects. Geography also warrants international cooperation in hydel and flood control measures. Against this broad background, the following points are worth mentioning in discussing the North-Eastern water scenario:

- One-third of India's total run flows through the Brahmaputra-Barak system.
- The hydel potential of the region is about 60,000 MW of which 2004MW is under construction.
- On an average, every year about 3.85 mha out of 7.58 mha of Assam is visited by flood affecting 2000 villages, damaging assets worth 163 million Dollars, and eroding 8000 ha of land.
- Wet lands covering 4 lakh ha could potentially make the region surplus in fish production. At present fish production in the region is 1.70 lakh MT against consumption of 2.80 lakh MT necessitating huge imports.
- Most of the potential of inland water transport is yet untapped.
- The problem of water quality --excessive fluoride, arsenic, nitrogen, etc.---is severe in the region.
- The overall crisis confronting the region is not just water, degradation of natural resources as a whole caused by the adverse relationships between forests, water and land. *It has been argued that the region needs a new definition of 'development' specific to region's location resources endowments.*

During the twentieth century, there occurred a ten times growth in population, while deforestation continued unabated. This highlights the need for an integrated approach to Forest, Water and Hydel development with accent on 'conservation'. One must strongly emphasize the special role of forest in mitigation of climate change in the Ganga, Brahmaputra, Meghna region for protecting the livelihood and ecological security of this vital region in south Asia..

The way forward

- The imperative need is to balance the interest of 'storage states' where hydel dams are located and the down stream communities limiting hydel exploitation.
 - The need for a shift to Rabi Season for cultivation of seasonal crops in plains of Assam based on ground water development, by adopting suitable green revolution technologies.
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- A Biodiversity Conservation Strategy and a new landscape/forest management system based on networks of village communities. (Incidentally, the IFAD experience in Meghalaya in community management of natural resources have shown that raising land capability is best done with community participation).
 - This may lead to widening the Jhum cycles raising productivity of soils and crops.
 - In the forest sector, tree felling for profits must stop and unscientific mining detrimental to forest water conservation must be prevented.
 - Promotion of cooperation with neighboring Bangladesh for developing a sub-regional approach to natural resources is essential to meet common goals of controlling floods & erosion.
 - Cooperation among the north-eastern states should be promoted. Inland water-cum-road transport system can optimize benefits to the region. However, this calls for coordinated efforts of scientists, state policy makers, administrators, and others concerned with extension and adoptive research.
 - "Water" is intimately connected with the lives of millions of people throughout the region. Hence, their widespread involvement and participation in decision-making regarding choice of technology, water pricing and other aspects of the critical role of water in their life are crucial. For these to happen, Science and Technology capable NGOs should have an important role to play. Such NGOs are also to help the farmers to develop innovative responses to land use issues. Examples are: the case of farmers of Shphir village in Mizoram who took to cultivation of Squash as an alternative to jhum, or floriculture and strawberry plantation in Meghalaya to move from subsistence to commercial cultivation.

To conclude, water related issues of NE are complex in a highly complex region moving now along a moderate growth path which requires a cautious approach. It is critically important that unbiased science and technology inputs are delivered without the influence of short term gains. The states and the central government must work together to develop and operate a NE specific sustainable livelihood approach where water plays a central role. Such a strategy would enable the region to achieve progress with conservation of ecological and economic security.

VIII. Valedictory Session

(Professor Alok Banerjee, Vice-Chancellor, University Kalyani

In a valedictory address, Vice-Chancellor of the University of Kalyani presented how the growing population in the context of limited and dwindling water supply is hastening an impending water crisis facing India. He urged immediate measures to be taken at all levels, from individual through the national, to harvest, save and augment the supply of water. He appreciated the work of the IWP, KINSPARC and other organizations in this regard.

Vote of Thanks

The Workshop sessions concluded with a vote of thanks by Dr. Kasturi Bakshi, Executive Secretary, KINSPARC. Thanks were due to the IWP, especially Professor Hashim, Chair, and Dr. Veena Khandoori, Adviser, IWP, for their unstinted support, collaboration and participation. Shri Gourishankar Chattopadhyay, IAS, Director, Shri Tapas Ray, Additional Director, and all officials, and members of faculty of the State Institute of Panchayat & Rural Development, Kalyani extended their gracious support and cooperation in holding the Workshop. Organisers were grateful to Dr. Rangan Dutta, for a special paper on the North-Eastern water scenario. Distinguished participants from different Universities, Government departments, NGO's and concerned citizens also contributed to the success of the workshop. Dr. Bakshi expressed special thanks to participants from out of state.

In the evening KINSPARC organized a street play by slum children on the theme of water scarcity and its solution through community involvement and participation. The play was innovative and the performance was beautiful. Guests, particularly those from outside including Professor Hashim, were highly pleased. It was proposed that a video recording would be made of the play for showing at different places.
