

**CPWF-IWMI Basin Focal Project for Indo- Gangetic Basin:
*Ground Covered and the Road Ahead***

2nd Phase Planning and Review Workshop

WORKSHOP REPORT



Hotel Rajhans, Surajkund (Haryana), India
24-25 February, 2009



Workshop background

The Second phase Planning and Review Workshop of CPWF-IWMI Basin Focal Project for Indo-Gangetic basin (BFP-IGB) was held on 24-25th February 2009 at Hotel Rajhans, Surajkund (Haryana), India. The workshop was intended to

- Review what has been done in the first phase of the project (in 2008)
- Discuss on whether we are on the track and creating the desired impact, and
- Develop research, knowledge management and impact plan for the second phase of the project (2009/ March 2010)

23 researchers, water policy planners and stakeholders from IWMI and partner organizations participated in the workshop (Annexure 1). The workshop was structured under seven introductory and thematic sessions, of in-house presentations as well as presentations from resource persons, for each work package followed by comprehensive open discussions. The workshop was concluded with a roundtable discussion on intended and potential impact pathways of the project.

Session 1: Familiarization with the Project and the Participants

Bharat R Sharma chaired the session. He welcomed the participants to the workshop and gave an overview of the project, how it was initiated and its six Work-Package (WP) components.

The session included three presentations from Bharat Sharma (Project Leader), M A Khan (IG Basin Coordinator) and A K Singh (DDG (NRM), ICAR). First presentation outlined the purpose of the meeting, logic and structure of BFPs, a brief tour of Indo-Gangetic basin realities and brief review of each of the work package accomplishments. He described the questions, which each work package was trying to answer. M A Khan presented the basin's potential and challenges for improving water productivity and poverty alleviation. He identified the challenges in Ganga basin as integrating agriculture and aquaculture, integrated groundwater management, climate change and vulnerability of food system in IGB and adaptation strategies and integrated catchment management and its impacts on livelihood. Anil K Singh remarked that in Indo Gangetic plains, rice-wheat is the major part of national food security program in the basin countries. Its sustainability requires immediate attention due to its over-dependence on depleting groundwater resources and continually degrading soil resources besides the inevitable impacts of climate change in the form of floods and coastal inundations.

Ashok Gulati (Director-Asia, IFPRI) advised that the project needs to pay further attention to three main issues:

- i. How food security policies like minimum support price, food procurement policies of the Government, as well as the political environments in which these are made, are affecting the overall food security and water productivity of the region?
- ii. Crop diversification- cropping pattern will change dramatically in near future and presently water productivity is higher in regions of water scarcity as food security policy dominates all other policies.
- iii. Salvation of eastern regions (eastern Gangetic basin, Nepal terai, Bangladesh) from flooding, the solution of which requires regional cooperation. Is there political capital available in these areas to have big storage structures and what are the potential interventions?

Also, investment on infrastructure, eg., roads are required in eastern IGB which is a sure investment for poverty alleviation.

Madar Samad (Regional Director-SA, IWMI) appreciated that the Project was well on track in achieving the intended outputs. It may be good to have a detailed characterisation of the agrarian system and production environment in the basin- which may include farming systems, land tenure systems, agrarian system, livestock systems, gaps in achieving yield potential and mapping the ongoing transformations in the basin.

Tushaar Shah (IWMI Fellow) suggested that for creating a good impact during the life of the project the team must be careful in choosing the appropriate levers. Rather than addition of new topics to the project, there should be a focus on questions to be answered. Working on issues, which are at the top of the list in Government agenda shall create the needed impact.

Alok Sikka (Rainfed Area Authority, GoI) suggested that interventions and productivity components should focus more on the impacts. Target small holders and landless also for poverty analysis. Project should focus on rainfed areas of IGB as well.

Other suggestions from the house included the following;

- i. Arsenic contamination of groundwater is spreading from east to west in the basin and needs to be factored in while developing the strategies.
- ii. Lack of labour availability in rice-wheat cropping areas demand mechanization of farming sector. How the change in land-use policies are impacting water sources. Environmental services of rice are equally important, as the impounded water helps in regulating temperature and groundwater recharge.

Can we have some reasonably good models to show how to manage water resources in climate change scenarios? Climate change should be kept as a base and recommendations to be given on adaptation.

Integrated farming approach can help improve livelihood options of farmers. Accommodate a farming systems specialist in the team.

- v. Changing energy policies in the basin need to be studied more comprehensively for better understanding the water-energy nexus.

Session 2: Poverty and water poverty analysis in the Indo-Gangetic basin
(Chair: Madar Samad)

Poverty and Water Poverty Analysis (Upali, Stefanos , Srinivasulu)

While setting the context, Upali linked the rural poverty to access to water and land. Literature synthesis for water poverty analysis is completed. Poverty mapping using small-area method and non-parametric density estimation method is in progress. Also, an analysis of water-poverty-land nexus and coping mechanisms in IGB is in progress. Srinivasulu presented the methodology for poverty mapping. Poverty mapping using small area estimation method by pooling data from Census and NSS and a regional analysis of poverty will be done. Stefanos, in his presentation on rural and water poverty at household level, outlined the plans for determining the drivers of water-poverty nexus through household and sub-basin level survey and to know how to use these drivers for improving water productivity and alleviating rural poverty.

Comments from the house:

- i. Agricultural productivity may be included as a determinant of poverty. Analysis may be based on classification of districts as 'water poor but income rich', 'income poor but water rich' and both water and income poor. Doubts were raised on model specification. Whether simultaneous equation model would describe the nexus in a better way? Concerns were also raised on whether NSS data would be reliable for a district level analysis. Presenter answered it could be done by merging the Census and NSSO data. The research may try to understand the question of what the farmers in western and eastern areas are trying to maximize, whether it is land productivity or water productivity. More discussion needed on construction of the model. Agricultural productivity to be included as a determinant of poverty. Analysis based on classification of districts as water poor but income rich, income poor but water rich and both water and income poor.
- ii. Lagged values need to be considered. Income is taken at the district level, and poverty at the household level, how it could be linked?
- iii. There should be clarity on the enabling environments, which are contributing to high water productivity. Changing rural employment scenario and off-farm incomes also should be taken

- into account. Land-leasing practices also should be considered while analysing poverty.
- iv. WP should consider how different types of interventions can impact water-poverty-land nexus. Further, water-poverty –land nexus could be a first cut, as a second cut, cause-effect relationship matrix should be established and it should be built into the intervention analysis.
 - v. Taking consumptive use of water may not lead to practical outcome. For practical purposes, irrigation deliveries should be considered.
 - vi. Livestock and fisheries need to be included in water-poverty nexus analysis.
 - vii. In cluster level analysis, externalities might be excluded. From that angle, analysis could be based on the natural boundary of the drainage basin. Including environmental flows will add value to the exercise.
 - viii. Will the data capture non-farm incomes? Investment needed in areas, which are already irrigated, and areas, which are non-irrigated, may be worked out.
 - ix. Statistical probability of agricultural household depending on water would be very high. In such households, the water-land-poverty nexus would be strong. Further, pure statistical approach may not suffice; a qualitative analysis to understand the nature of poverty at household and intra-household level is also needed.

Session 3. Analysis of water availability and access (Bharat, Luna, Upali, Ambili, Asad, Gosain) (Session Chair: Ashwini K Gosain, IIT- Delhi)

Bharat set the context of the session by highlighting that the objective of this workpackage was to make an assessment of the surface and groundwater resources, water quality and possibly the impact of climate change on water resources and their access by different sectors. Data constraints are a major challenge in the basin. The project shall strive to have a macro-scale basin-wide resource assessment (based on secondary sources) and more detailed analysis at the sub-basin level. The suggested sub-basins were: Rechna-Doab (Indus, Pakistan); upper Ganges basin (India), Koshi sub-basin (Ganges, Nepal/ India) and Madhumati-Ghorai (Ganges, Bangladesh). Ambili presented the general hydrology and water resources of the basin. Upali made a presentation on the PODIUM-based comparative analysis of water resources in the Indian part of the Indus and Gangetic basins- this analysis shall be enlarged to cover the remaining areas in other three basin countries. Luna has completed the SWAT-based analysis for the Ghorai sub-basin including the impact of land use changes. Similar analysis for Upper Ganga basin has been initiated. Asad shall undertake a SWAP-based analysis for a part of the Rechna-doab basin. Ashwini Gosain made a presentation on the potential impact of climate change on water resources for the Ganges basin, which received a good appreciation and the need to

take it further by including the impact of reservoirs, land use changes and other human interventions.

Comments from the House:

- i. The project may undertake WEAP analysis for basin scale analysis including the scenario generation for different impacts of land use, climate change, glacier melt etc. It shall provide good inputs for intervention analysis as well.
- ii. House raised doubts on how *utilizable water resources* can be defined while doing water accounting under the PODIUM-Sim analysis. This was then explained by Upali.
- iii. Return flows from irrigation are normally taken as 10-20% of total water applied. But an IIT-Delhi study found it to be as high as 45%.
- iv. SWAP model might not be highly reliable in rice-based cropping system and may be adapted as per the sub-basin conditions.
- v. The adaptation strategies to be taken in climate change scenarios should also be stressed.

Session 4. Analysis of Agricultural Water Productivity (Bharat, Cai, Upali, Dinesh)
(Session Chair: Alok Sikka, NRAA, GoI)

Bharat gave a brief explanation of the levels of analysis that were/would be done for assessing and identifying the factors affecting water productivity and scope for water productivity improvement. Crop dominance maps and crop productivity as well as rice water productivity maps are already developed for the basin, through remote sensing, GIS, ground truthing and modelling. He also outlined the plans of this work package for 2009. The important methodological innovations are being made to convert the census data into a pixel-level water productivity mapping. Using SEBAL approach, water productivity analysis for Rechna-Doab has already been completed and published. Upali presented a district level analysis of potential water productivity improvements in India. He explained the spatial variation of water productivity and the potential for water productivity improvements through bridging the gap between actual and maximum attainable yield, through supplementary irrigation in rain-fed areas and through deficit irrigation. Dinesh Sharma shared the experiences of CSSRI in improving productivity of the waterlogged-saline soils along the canals through well designed multiple water use systems. This intervention under the Sharda Sahayak command has the potential of improving productivity under similar agro-ecologies of water logged sodic soils.

Comments from the house:

- i. Rice water productivity may also take into account different varieties of rice, such as basmati, for which GVP may be higher.

- ii. Using SEBAL (Surface Energy Balance) model for estimation of actual ET in *kharif* may not be correct, as the estimates tend to be lower than the actual due to high surface moisture content.
- iii. The study should be able to give some concrete recommendations based on the differences in actual ET in rainfed and irrigated areas.
- iv. In high water productive areas, productivity is influenced not only by water, but also by other factors such as nutrient application, infrastructure etc. hence using water productivity as a measure for improved water efficiency might be misleading. Presenter clarified that exercise gives an indication of variation of water productivity and where water savings need to be done or other suitable measures taken for improving the productivity.
- v. Low water productivity may not always be that bad. Is there really a need to improve water productivity in low water productive areas, if they are growing high valued crops?

Session 5. Analysis of interventions (Bharat, Rajendera, Das, Susana, Khan, Stefanos)

Session Chair: Anil K Singh, DDG (NRM), ICAR

Setting the stage, Bharat provided an overview of the purpose of the exercise and the analysis that would be done to identify potential interventions. He also pointed out the necessity of identifying the enabling environment for potential interventions.

Rajendra explained prioritisation of interventions using the Analytical Hierarchy Process (AHP). In the first phase, a detailed literature survey and stakeholder interactions were undertaken to identify the important interventions for land/ water productivity improvement, an intervention matrix was developed, water productivity of different interventions were estimated and potential interventions were identified using AHP. Appropriate irrigation scheduling and maintenance of an optimum water regime along with several others were identified to be the prominent interventions for major crops.

Comments from the house:

- i. It would be better to have an appraisal with farmers to know what they perceive as potential and possible interventions. Initial rapid appraisal methods could be carried out.
- ii. Information on environmental impacts of interventions is available which could also be incorporated.
- iii. The study may also identify the thresholds of interventions. Further, interventions are not always independent. Interventions with different rankings may be inter-dependent.
- iv. Expert groups are likely to be biased towards their subject matter.
- v. How technology interventions could be linked to the water management component?

- vi. Does the matrix allow differentiating interventions based on the need and potential across the region?
- vii. Addition of cost and benefit components to potential interventions shall be very helpful.
- viii. Decoding of identified potential interventions is required for better and shared understanding and proper recommendations.
- ix. The impact of mega-program on watercourse lining in Punjab-Pakistan on water savings and productivity improvement shall be studied under a Project-sponsored M.Sc. research. (Waqas Jehangir)
- x. CISS components: Comparativeness, Inclusiveness, Sustainability and Scalability of interventions need to be considered in analysis.

Susana (WorldFish) presented the analysis of fish water productivity for Gorai-Madhupati sub-basin. Causes for variation in fisheries productivity across the basin were identified as proximity to Padma, salinity, soil water retention, pollution, water diversion and institutional aspects such as access, ownership, policies, extension services and past project interventions. She also mentioned role of institutions in improving fish productivity.

Stefanos presented the methodology for evaluating aquatic ecosystem from production as well as demand side.

Khan presented a proposal for assessment of the potential of multiple water use systems for improving productivity in eastern Gangetic basin.

Comments from the house:

- i. Integration of canal and aquaculture in the multiple uses of water can also be looked into.
- ii. Institutional analysis should also include land-less and poor.
- iii. Degradation of land, in case of commercialisation of ponds as in Bangladesh, needs attention from an environmental point of view.
- iv. Institution dynamics of common property water bodies leased out for fisheries, need to be addressed, and also their productivity as well as distribution impacts.
- v. In Contract of water bodies, mechanisms existent for keeping poaching at acceptable limits and the welfare mechanism with co-operative members in case of common property water bodies may be studied.
- vi. Does the community participation deliver outputs? It would be better to document community participation and what makes it work.
- vii. Linkages of legal policies and real conditions, how does it match/mismatch?
- viii. The study may consider cultured and capture fisheries separately.

Session 6. Analysis of institutions (Tushaar, Aditi, Dhruba, Joshi)

Session chair: P K Joshi, NCAP, India

Tushaar, in his presentation talked about the classes of irrigators in IGB and the responses of different irrigators to rise in diesel prices. He also discussed about the change in land-tenancy scene in South Asia and the drivers for such a change in land-lease markets. Talking on governance, he added that Governments influence the working of sectoral economies through direct action, regulation and economic instruments. Dhruva spoke of the leasehold practices in the hill, inner terai and terai regions of Nepal. The change has been attributed to feudal characteristics of landholding and landlessness.

P K Joshi presented the proposal to identify the water management constraints and suggest potential policy interventions for improving productivity in the eastern Indo Gangetic plains of India.

Aditi presented the water sector policy and legal framework in IGB, their trends, drivers and implications. She presented the temporal trends of legal documents on water, evolution of legal instruments on water in IGB and their focus.

Comments from the house:

- i. Absentee owners may be a major driver in land-lease markets- needs verification.
- ii. Marginal farmers lease out land to get freedom from farming and engage in non-farm labour- needs verification.
- iii. In Nepal, select two or more sites in east and west terai for analysis.
- iv. International funding, for eg. World Bank, can also trigger policy making.
- v. Water governance should include informal institutions working in the sector also. The proposal on governance on informal water economies is good and may be undertaken for proper understanding of the water economies.
- vi. Synergy between intervention and institution analysis may be capitalised.

Session 7. Knowledge management and impact pathways (Matin, Bharat, Samad, Simon- presentation only) Session Chair: K Palanisami (Director-ITP)

Matin presented the data and knowledge management strategy for the Project. All the data procured/ developed under the project is retrievably stored under the IDIS for the benefit of all the project partners and stakeholders. However, this needs further strengthening through active support of all the project partners and associates. Knowledge dissemination was achieved through several of the project publications, hosting these on Pbwiki. The project has also designed and test launched its project website. It shall become fully operational in the very near future.

Brainstorming on potential pathways for impacts (moderated by Samad)

The house was of the view that the need-based research had the highest potential of direct uptake and impact generation. Alternatively, the project may list out its important recommendations, find out the relevant government/ donors/ stakeholders programs and superimpose the recommendations where these may have the highest impact and policy prescription. PK Joshi informed about the NCAP experiences of undertaking high impact research-, which definitely required stepping out of the comfort zone, and face the realities on the ground. The other impact pathways may be through deliverables which help in informed decision making, prioritisation and cost/ benefits of the proposed interventions, improvement of the livelihoods and capacity building of the stakeholders.

The mechanistic of creating the logframes, networks and other such tools are good in better and shared understanding of the project outputs, chalking out a strategy, map the process followed and envisaged and develop an implementation- but all this will be useful when the research and outputs are need based, and recommendations can be mainstreamed into the ongoing and future development programs of the governments and other important stakeholders.

Bharat proposed a sincere vote of thanks to all the participants and project collaborators for very meaningful and interesting suggestions which shall help in improved implementation and impact creation of the project in the IG basin.

The Road Ahead

A brief summary of the important work- package wise decisions and the persons responsible for implementations is given below:

Work Package (WP)	Plan for 2009 and beyond
WP-1: Poverty Analysis	<ol style="list-style-type: none"> 1. Poverty mapping using small area estimation method and non-parametric density estimation method. 2. Analysis of Poverty mapping using small area estimation method and non-parametric density estimation method 3. Analysis of water-land-environment poverty nexus and coping mechanisms in the IGB at district level and household level in the basin/ selected sub-basins <p>(Upali, Stefanos, Srinivasulu)</p>
WP-2: Water Availability and Access	<ol style="list-style-type: none"> 1. Water availability analysis and scenarios scenarios generation for land use, infrastructure development, other major factors for the sub-catchments of Gorai- Madhumati, 2. Upper Ganga and Koshi (Luna and associates) Water availability analysis in Gorai river catchment thorough PODIUM-Sim analysis for the Indus and Gangetic basins – Macro-scale (Upali) 3. <i>Assessment of water resources, allocation priorities and future scenarios (WEAP modelling) for the Ganges and Indus basins (Devraj/SIWI, new to be commissioned).</i> 4. <i>Impact of climate change on water resources and adaptive mechanisms for the Ganges basin (A K Gosain, IIT Delhi)- new to be commissioned</i>

<p>WP-3: Water Productivity</p>	<ol style="list-style-type: none"> 1. ET, yield and productivity mapping using higher resolution Landsat images to study water consumption pattern and yield distribution at basin and sub-basin levels and identify factors influencing it (Cai/ Bharat) 4. SWAP Modeling for analyzing field scale water assessment and productivity for Rechna- Doab (Asad) 3. Rice-water productivity trend analysis and the factors responsible for Bangladesh (Mohammed / Upali/ Bharat) 4. Fisheries water productivity, poverty, factors responsible and policy/ institutions for improvement in Bangladesh and Madhumati-ghorai sub-basin (WorldFish team) 5. Analysis of water productivity in the IG basin and potential options for improvement- based on district level census data (Upali)-<i>to be extended to other basin countries</i>
<p>WP-4: Institutional Analysis</p>	<ol style="list-style-type: none"> 1. Impact of irrigation on land-leasing policies in IG basin countries (Tushaar/ Dhruva) 2. Analysis of water policy and legal institutions in the IG basin countries (Aditi/ Sanjiv) 3. <i>Impact of changing energy policies on access and use of groundwater in West Bengal/ other locations (Aditi)- new</i> 4. <i>Analysis of groundwater governance in Indus basin- Pakistan (Asad)- new</i> 5. <i>Governance of informal water economies in the IG basin (Tushaar/ RPS Malik)- new</i> 6. <i>Analysis of water management constraints in the Eastern Gangetic Basin (KK Datta, PK Joshi, Bharat)- new to be commissioned</i>

<p>WP-5: Intervention Analysis</p>	<ol style="list-style-type: none"> 1. Identification, agro-ecoregional mapping and benefit assessment of the potential interventions for the IG basin (Indian part); enlarging and strengthening of the analysis (Rajender, Bharat, Das) 2. Impact of project level canal lining program on water savings and productivity improvement in Pakistan Punjab (Waqas, Asad)- 3. Potential of multiple use systems to meet the productive and consumptive water needs and livelihood improvement in Nepal hills (Dhruba)- <i>new</i> 4. <i>Assessment of the productive multiple water use systems for improving productivity and livelihoods in the Eastern IG basin (Khan)- new to be commissioned</i> 5. <i>Assessment of salt-affected soils and waterlogging, impact on productivity and options for improvement in IG basin (SK Gupta/ Dinesh- new to be commissioned)</i> 6. Impact of floods and flood management policies in the eastern IG basin (Matin/ Bharat)
<p>WP-6: Knowledge Management & Impact Pathways</p>	<ol style="list-style-type: none"> 1. Launching of project website by 15 March, 2009 (Matin) 2. Management of project database and process mapping for knowledge/ data management (Matin/ Bharat)- <i>new</i> 3. Ensuring regular flow of project publications 4. Thematic brainstorming sessions/ roundtable discussions and policy briefs – 2 sessions during 2009 5. End-of-project result dissemination and impact creation workshop 9 early 2010 6. Steps for regular impact creation at different levels

Annexure 1. List of participants

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