

Strengthening the Institutional Framework for Flood and Water Resources Management in Bihar

Developing a Strategy for Reform



In brief

- Bihar is prone to flooding every year, affecting 73% of the state. The Water Resources Department (WRD) of the Government of Bihar is responsible for flood management, and thus, its' institutional strength directly affects the success of Bihar against flooding.
- This IGC report attempts to improve the institutional framework for flood and water management through identifying areas of reform in the Water Resources Department.
- Focus groups and one-on-one interviews were undertaken with key stakeholders, including WRD senior management, local community members and supporting agencies.
- Only 1 in 6 households in a flood prone village knew any staff from the WRD and more than half of households did not know that the WRD is responsible for flood protection.
- There is currently no flood warning issued by WRD officials directly to the community.
- WRD field officers identified major issues as a lack of adequate hardware and software, as well as little decision-making power delegated to on-the-ground staff.
- Senior WRD staff highlighted the lack of functional breadth, limited training facilities and time-consuming process overheads as significant obstacles.
- A future vision for the WRD should: engage with local communities, provide early flood warnings, utilise modern technology, develop better information portals, establish an active research and development unit, create a more robust and decentralized FMISC, ensure all equipment needs are met and develop a robust, timely decentralised decision-making processes.

Scope of Study

Floods ravage the state of Bihar every year. With 73% of the state flood prone, management of floods is central to the development and sustenance of the state and its 108 million people. The enormous responsibility of flood management is entrusted to the Water Resources Department (WRD) under the Government of Bihar. The institutional strength of WRD determines the success and survival of Bihar against incessant floods that occur with unpredictable intensity. Therefore, the IGC study, *Strengthening the Institutional Framework for Flood and Water Resources Management in Bihar: Developing a Strategy for Reform*, focused on understanding the institutional setup of WRD and highlighting the potential for strengthening the institution with respect to flood management. While several studies in the past have focused on floods in Bihar, an institutional analysis of the WRD remains an unexplored domain.

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The study seeks to address this gap by investigating the institutional challenges hindering optimal performance and identifies priority areas of reform for improving the management of floods in Bihar. This project aims to shape policies related to the institutional framework of flood and water resources in the state of Bihar thereby reducing the adverse impacts of these events on the population, businesses and industries located in flood-prone areas within the state, thus potentially making a significant contribution to the overall sustainability and growth of the state’s economy.

The following synopsis provides a brief executive summary of the study, the methodology utilized and the overall findings made. The detailed study report has been shared with the Government of Bihar Water Resources Department and is now part of the discussions for Phase II of this study which will look at ways to implement the findings and proposed actions.

Data Collection and Analysis

The first step of the study was exploratory and involved open ended and detailed interactions with the Minister and Principal Secretary of the WRD, WRD officers in Patna and at the Flood Management Information Systems Cell (FMISC). Prior to beginning the primary data collection activities, the team undertook a scoping visit to a heavy erosion site in the Gandak River basin where interactions with local community members and WRD staff assisted the team in designing robust survey questionnaires. The second step of the study was to conduct a representative survey, consisting of a mix of focus group discussions and one-on-one interviews with key stakeholders involved in flood management. This included senior management and flood division field officers of WRD, supporting agencies such as FMISC, and the communities affected by floods including men, women, and local government representatives. Finally, the team developed a holistic analytical model to integrate all the information and develop a complete understanding of the Department.

The study focused on an approach that was representative and participative. During the design phase for the survey, the study team held detailed discussions with the

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WRD, especially the head of the Flood Monitoring Cell in Patna, who worked with the study team to select the appropriate river basins based on the needs of the surveys. Due to the time limitations for conducting the field surveys, the team agreed to target a total of three basins in the state. The three basins that were selected to conduct all surveys were:

1. The Bagmati-Adhwara basin in central north Bihar
2. The Mahananda basin in north Bihar
3. The Kosi basin in northeast Bihar.

This ensured that a wide cross-section of flood-prone river basins were covered. Once the target basins were selected by the study team, a set of surveys were designed to assess the capabilities of the key staff engaged in flood management for the WRD.

The surveys aimed to target officers of the WRD who are actively engaged in flood management activities at all levels from junior-level engineers to senior officers such as the Engineer-in-Chief. In order to accurately assess all officers, the study team designed two types of surveys for WRD staff; one set of questions that were addressed specifically for field level officers (e.g. Junior Engineers to Executive Engineers) within the three target basins and another set of questions prepared in an online survey format for senior officers of the rank of Superintending Engineer (SE) and above (e.g. Chief Engineer, Engineer-in-Chief, Director, etc.) for officers located in Patna at the headquarters of the WRD as well as senior field level officers who work on floods throughout the state. Both sets of surveys sought to:

1. Identify the level of knowledge held about the flood risk
2. Identify the level and quality of interactions within the WRD on flooding issues
3. Identify the extent and timeliness of flood warnings
4. Identify the quality of embankment maintenance and management
5. Identify quality of staff skills, training, and technical knowledge
6. Identify and map processes and quality of decision making
7. Identify types of technology, hardware and software available for flood management.

The WRD field level officers survey included questions that obtained information from field level officers on the background data of each Division and/or Sub-Division such as availability of technology, staffing, resources available to staff, trainings given and/or received on flood activities. Specific questions were also raised around

- The topic of flood location and flood risk within the area of responsibility for the interviewees within the basin
- Questions pertaining to flood forecasting and flood early warnings within the target areas
- Others on flood preparedness and mitigation measures particularly questions focusing on the procedures, processes and quality of embankment maintenance activities as well as annual flood anti-erosion works
- Questions on financial resources and availability of funds to perform regular

“One in three community members believe floods can be prevented while the rest consider floods to be part of their life”

maintenance activities.

Questions around specific flood events and how officers coped with past floods were also raised in the survey as well as open-ended questions that asked officers specifically if they faced challenges in performing their duties adequately as well as opportunities for them to provide feedback and give suggestions as to how they think these challenges can be overcome.

In conjunction to surveys of WRD staff, the study also focused on interviews, surveys, and focus group discussions with communities, businesses, and Panchayat Raj members in the three target basins. The household qualitative surveys were conducted in selected villages that were directly and indirectly affected by floods within each of the target basins. Surveys of households, local businesses, and local PRI officials were conducted to gauge the response of community members to the WRD, the level of awareness among citizens of flood issues, quality of early warning mechanisms in place, and perspectives on the role and functions of the WRD. The purpose of the village level surveys was mainly to assess the experience and knowledge held by flood-affected communities. The survey sought to:

1. Understand the impact on flood affected households, businesses and industries in flood affected districts in Bihar
2. Identify the level of knowledge held about the flood risk
3. Identify the level and quality of interactions with the WRD on flooding issues
4. Identify the extent and timeliness of flood warnings
5. Identify the level of knowledge held about embankment maintenance and management.

Apart from field surveys, the team also covered supporting agencies of the WRD namely WALMI (Water and Land Management Institute) and FMISC and the key decision makers at the head office in Patna. As a result of these primary data collection exercises, the team was able to holistically outline the institutional gaps of WRD and make a case for a stronger institutional setup with respect to flood management.

Survey Results

“Only one in 6 households in the flood prone village knew of any staff from the WRD”

The community survey gave three levels of insights. One, at an aggregate level, it educated the team about the level of information, interaction, and engagement that community in flood affected villages have around the subject of flood management. Two, it also highlighted the commonality and variations that exist depending on the basin. Finally, we gained similar insights dependent on whether a village is inside or outside the embankment. Overall, the results indicated that one in three community members believe that floods can be prevented while the rest consider floods to be part of their life in flood prone areas. However, a much higher percentage thinks that flood protection can be done better and several noted that flood information is seriously lacking. More than half of the households surveyed did not know that WRD is responsible for flood protection. Only one in 6 households in the flood prone village knew of any staff from the WRD. More than half the people surveyed

said that the community doesn't work together during flood and a much higher percentage said that there is no collaborative behavior at the time of reconstruction. This indicates that community engagement and ownership on flood management is a mixed bag. Lastly, survey focus group discussions highlighted that there is currently no flood warning issued by WRD officials at the moment directly to the community. Villagers reported that earlier they used to receive signals before release of water from Kosi, but now even this practice has been mostly abandoned. The community survey clearly establishes that people living around the embankment are neither inclined nor encouraged to collaborate. The flow of information about flood warning and flood management is either non-existent or dependent on the individual initiative of the field officers.

“WRD faces significant organizational gaps that limit its capability to manage floods and continuously evolve as a strong institution of flood management”

The analysis of the WRD surveys began by considering seven features of an institution to present and analyze the leadership survey. We categorized these issues within the framework of seven structural gaps namely people, process, technology, resources / funding, support system, ecosystem and coordination. Not only is this gap analysis framework simple and comprehensive but also it seamlessly integrates into the theoretical framework of the 7-S model that was utilized to integrate the overall findings of the entire study. The WRD senior and field level officer surveys showed that the WRD faces significant organizational gaps that limit its capability to manage floods and continuously evolve as a strong institution of flood management. Within WRD, the field officers at the lowest level identified the major issues as a lack of adequate hardware and software facilities to monitor the embankments, overly hierarchical nature of decision-making with little to no empowerment of junior staff on-the-ground, process overheads and limited trainings. The senior manager survey highlighted a lack of functional breadth in the department, limited training facilities and time-consuming process overheads. Across the board, there is significant dissatisfaction with the lack of performance and merit based promotion systems. At the organizational level, WRD does not get adequate technology and training support from FMISC and the Water and Land Management Institute (WALMI). Finally, the coordination between WRD and other departments such as Disaster Management needs to be better synchronized.

Conclusion & Next Steps

The WRD has the unenviable task of managing one of the most complex and volatile river systems in the world. They have the highly perilous responsibility of protecting millions of lives from the constant onslaught of floods. The study team met a plethora of dedicated engineers at all levels that work tirelessly despite difficult conditions and limited resources to aid them in managing the enormity of their tasks. One of the most remarkable aspects of the fieldwork was that all officers that participated in the survey were open and honest about the inherent issues that need to be addressed in the Department, although junior level officers expressed concerns related more to the daily operational activities of the Department whereas the senior officers identified strategic challenges. This knowledge and acceptance was seen at all levels from senior level officers to field staff within the Department. Lastly, the study team witnessed firsthand a deep desire to reform and improve performance standards of the WRD for future years. In the table below, we provide

an overall summary of the findings.

Summary of WRD Challenges and Opportunities

Skills	Style of Leadership
Technical know-how of staff needs to be improved	Too much emphasis on top-down decision-making
Need for research & development unit within the WRD that focuses on training and dissemination of latest flood management techniques to WRD staff	Failure in strategic thinking of leadership to transition from construction agency to management agency
Need to make professional human resources development and management a core objective of the WRD	Need to set mandate for a more professional agency
	Leadership from top needs to help WRD evolve to a “predict and prevent” organization
	Provide strategic leadership to transform Department
	Need to identify root causes of problems in WRD (e.g. why are junior staff demotivated?)
Staff	Systems
Staff shortages and promotion processes need to be urgently addressed and revised.	Ensuring robust systems is important
Need a specialist HRM cell, staffed with experienced HRM people (sociologists, social scientists or similar, not only civil engineers).	WRD systems appear to be weak and are functioning at sub-optimal levels
Need to identify each individual’s skills and post them to positions to match their skills.	The communications systems are poor (passing information down through the organisation to communities)
Need to identify younger, capable staff and fast track them through the system so that they get to positions at an early age where they still have the energy and enthusiasm to make changes.	The human resources management (HRM) system appears to be very weak and outdated in its practices
	Liaison/communication with communities appears very poor/ almost non-existent.
	Mobile technology and modern communication systems can offer WRD significant opportunity to address systems gaps and leap frog
Strategy	
WRD needs to define a vision for flood management for the future	
Need to focus more on management rather than on construction	
Must make strategic shift away from viewing embankment as the client	
Need to shift away from “wait and watch” and then react to the crisis mode	
The key elements the WRD should focus on for a future vision are:	
<ul style="list-style-type: none"> • Engagement with local communities • Providing early flood warnings • Utilizing modern technology • Developing better information portals (e.g. flood risk maps) • Establishing an active research and development unit • Creating a more robust and decentralized FMISC that is funded by WRD • Ensure all hardware and equipment needs are met • Developing robust, timely decentralized decision-making processes 	

“[There is a] need to shift away from “wait and watch” and then react to the crisis mode”

Summing up, there is strong survey based evidence supported by individual and group interactions with key stakeholders within and outside WRD that points to

“Flood management needs to continuously integrate more intelligence, research, coordination, and collaboration”

a need and opportunity for better institutional setup to manage floods. Floods in Bihar occur under a complex environment created by constantly changing river courses, high sedimentation, dense and expanding human settlements, climate change, and unpredictable monsoons. Consequently, flood management needs to continuously integrate more intelligence (use of technology and knowledgeable workforce), research (hydrology, river morphology, remote sensing expertise at local institutes), expertise (incorporating best practices from within and outside), coordination (integrated planning with other departments) and collaboration (involvement with community).

The major gaps highlighted in this report represent an initial step towards understanding some of the complex and challenging issues facing institutions such as the Government of Bihar’s Water Resources Department today in managing state-wide flood events. Further detailed studies are required to build a more thorough and comprehensive understanding, focusing on all of the basins of Bihar and on all of the various actors engaged in water resources and disaster management in order to develop a more comprehensive understanding of the institutional challenges. Further analysis can deepen the high level understanding that has been developed from Phase I of this study.

In July of 2012, the IGC has approved the next phase of this study that will focus on developing concrete solutions and road maps of how to implement reform in the areas identified under Phase I. This project has now commenced with close interactions with the leadership of the WRD and will aim to complete by December 2012.

About the authors

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