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Building Community Climate Resilience in Coastal Bangladesh (CCRB)

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Executive Summary

The CCRB project is designed to strengthen local water organizations, local NGOs and local governments that are attempting to solve water problems in coastal Bangladesh. It will create a new Water Resources Center that will combine community organization training, training in evaluation research and a Water Data Center to provide technical assistance to partner organizations engaged in community water development efforts. The school for community organization will focus on ways to develop and invest community capital, methods of dispute resolution, and how to build multi-partner coalitions of local groups that are solving local water problems. The school for evaluation research will emphasize more effective ways of assessing and improving community water projects. The Water Data Center will assemble and distribute without cost to partner organizations a wide range of vital data about community access to water, such as estimates of regional surface and ground water volume, the location and level of river and soil salinization, the documentation of severe river erosion, monsoonal flood and storm early warning, and local estimates and projections of land subsidence. The Center will also operate a smart phone/internet based website for reporting of severe river erosion and flooding problems.

Problem Statement

Coastal Bangladesh is one of the most heavily populated, high vulnerability areas in the world under climate stress. With over 60 million residents, over a third of whom are below the poverty line, it is highly vulnerable to monsoonal flooding, salt water intrusion, drought, severe river erosion and sea-level rise and land subsidence. Annually over ten percent of all crops are lost due to flooding and 30,000 people are displaced due to severe river erosion and flooding. Climate change and human actions are aggravating these problems, e.g. the damming of the Ganges in India is reducing fresh water flow and thereby raising the salinity level in the rivers and the water table of the southwest coast. Land subsidence, which is largely unmeasured, is significant, perhaps as much as 2.5 cm per year, due primarily to water pumping and monsoonal flood sediment load and compaction. Accelerated sea-level rise driven by climate change will exacerbate these vulnerabilities. Government agencies and NGOs are working mightily to counter these challenges, rebuilding the polder (levee) system, constructing fresh water projects, creating early warning and disaster response systems, organizing char development projects, and providing technical information about crops, markets and technology. These efforts are undercut, however, by the lack of strong community organization in the rural villages and the weak integration of the coastal communities into the national water management system. Despite a mandate under the National Water Policy adopted in 1999 to create local participation in water management and major investments by the Dutch and Swedish development agencies the Bangladesh Water Development Board (BWDB), and the Local Government Engineering Department (LGED), local water organizations still do not exist in the majority of coastal Bangladesh polders and have highly uneven performance where they exist in terms of sustained membership, activities, ability to regulate local disputes (such as canal grabbing, the introduction of salt water shrimp farming, which destroys neighboring farmlands, and private irrigation works that endanger polder integrity). Most important of all, there is little effective voice for local communities and small/medium farmers in informing the water development planning process.

Critics argue that the implementation of participatory management has produced a consultation model in which local water organizations are limited to operations and maintenance, are tasked with mobilizing user fees to finance neglected operations and maintenance of polders and irrigation works, are unable to get local knowledge about problems with siltation, waterlogging, severe river erosion and more effective polder design to be incorporated into the decision-making system. Many local water organizations confront unresolved local conflicts over irrigation and land use, and experience elite capture and tokenistic representation of women, minorities and the landless in the local water committees.[1] Local water organizations are poorly coordinated with local government, especially *union parishads*, which are responsible for disaster preparation and relief from flooding disasters as well as sanitation and drinking water quality. NGOs often turn out to be solo actors in flooding disasters, bypassing a number of community institutions that could be mobilized to prepare for and respond to human need. Local

[1] Dewan, Camelia, Marie-Charlotte Buisson, and Aditi Mukherji. 2014. "The Imposition of Participation? The Case of Participatory Water Management in Coastal Bangladesh." *Water Alternatives* 7(2):342-366. See also Aditi Mukherji, B. Afuleki, T. Shah, D. Suhardiman, and M. Gioradano. 2009. *Irrigation Reforms in Asia: A Review of 108 Cases of Irrigation Management Transfer.* Colombo, Sri Lanka: International Water Management Institute. Diana Suhardiman, M. Giordano, E. Rap and K. Wegerich. 2014. "Bureaucratic Reform in Irrigation: A Review of Four Case Studies." *Water Alternatives* 7(3):4442-463.

water organizations and NGOs working with local communities lack technical information about the underground water tables that should inform their irrigation and freshwater development decisions, crop decisions, response to flood early warning, the implementation of relief efforts, and the resettlement process. These organizations often lack sufficient training in community organization, dispute resolution, and experience in building the multi-sector advocacy coalitions that are often necessary to coordinate efforts, create self-help solutions and influence governmental policy.

Despite these challenges, a number of joint projects between international donors and the BWDB/GLED (e.g. Blue Gold, IPSWAM, Char Development and Settlement Project [CDSP]) and NGOs working in local communities, often in partnership with other local NGOs (e.g. World Fish Center, BRAC Community Empowerment Program) have organized effective water organizations and other community organizations to promote better polder design, more flexible and responsive local government, organized landless contracting societies that employ significant female laborers to carry out polder repairs, organized local conservation campaigns (e.g. tree planting), promoted gender-sensitive agricultural information and technology, launched local drinking water projects (e.g. catchment and filtration systems), advocated for the construction of roads, drains and polders in the newly settled char areas as well as in established polders, assisted displaced farmers with gaining secure land titles for their newly colonized lands, and worked with local government and other agencies to promote disaster preparedness and relief efforts, including char resettlement. By national law, displaced households are to receive priority in the settlement of new char lands but this is often neglected in practice and displaced farmers who are attempting to resettle on char lands have major problems securing clear land title plus creating viable farms and homesteads on these new lands.

Despite significant successes, these efforts lack sufficient knowledge about community organizing methods and dispute resolution. We propose to address this by creating a community organization training school that provides a conceptual overview of the community capital approach to community development,[2] and training in dispute resolution methods. The first is important because it encourages organizers to think holistically and in terms of system interdependence about the multiple types of resources that a community controls and the ways in which these can be invested to create new resources in a long time horizon. Multiple forms of capital—cultural, natural, financial, political, social and human capital—can be invested to create built capital and thereby the environmental sustainability of the community. At the same time, this built capital can have negative feedbacks on the natural, financial and other forms of capital. Understanding the tradeoffs and interactions between these different forms of capital, as well as how to create positive growing returns on investments over time is critical. This provides an accounting framework for understanding the multiple resources in a community and the way in which these grow and prosper or, alternatively, decline. For community organizers, the most immediate issue is thinking about how to build social capital, i.e. new trust networks that bring together a community and providing bridging ties across the diverse and competing interests in the community. We cannot assume a false harmonious image of rural communities but recognize their competing and conflict groups and interests. Community organizers' second

[2] Emery, Mary and Cornelia Flora. 2006. "Spiraling-Up: Mapping Community Transformation with Community Capitals Framework." *Community Development* 37(1): 19-34. See also: http://www.soc.iastate.edu/staff/cflora/ncrcrd/capitals.html

priority is to understand how to build the political and financial capital of the community to solve local problems and advocate community interests in the larger political and economic arena. Promoting self-help groups, such as economic cooperatives and micro-credit, encouraging local water organization leaders to become more involved in local government and to engage in the assessment of alternative plans for polder design contributes to the community's long-term ability to create sustainable development. Understanding the translations and tradeoffs between these different forms of community capital is critical to planning an organizing strategy and to devising solutions when confronted with obstacles and failures.

Dispute resolution methods are an important way of building cultural and social capital by resolving tensions in the community over water and land use. Many coastal villages have lingering and active disputes over "grabbed canals," private sluice gates and pipes that penetrate polder walls or cross-cut other private irrigation canals. The introduction of saltwater shrimp farming typically destroys surrounding rice and vegetable farmland when the salt leeches out of the saltwater ponds. Given the financial incentives for saltwater shrimp farming (known locally as "white gold"), it has grown in the southwest area since the early 1980s and is encouraged by the growing saline content of river water in this region. These disputes over water and land use stymie the decision-making and activities of local water organizations and undermine the ability of an integrated irrigation system to function. There are inevitable conflicts between farmers in an integrated irrigation system, especially between early and end users. Resolving these plus the wide range of other disputes is important to create more integrated and sustainable communities. Some of these measures also expose the polder system to potential major flood damage. Cutting a polder to install a private sluice gate may leave the other 5,000 or more households inside a polder to flooding. Training the local water organizations and the local NGOs and local government officials involved in water management is an important step to creating better local water management.

These local water organizations and their governmental and NGO partners often lack clear information about the full impact of their programs. While these projects typically collect baseline and endpoint data about their projects, they often do not know how their customers evaluate their impact, especially several years after assistance or contact. Simple before and after designs or with/without assessment comparisons, often over a short period of time, are sufficient to evaluate short-term impact but this leaves open the longer term view. It also makes it impossible to draw inferences about confounding factors that may be responsible for outcomes. Below we outline a Water Resources Center that will include in its initiatives professional training in the use of small sample surveys to assess particular programs, the use of in-depth qualitative interviews with expert informants, and the design of field experiments with randomized trials. While more expensive and sometimes not feasible, these types of data collection and multivariate designs can be of great value in improving the quality of evaluation research.

These local water organizations and their governmental/NGO partners often lack access to technical information about water quantity and quality. Farmers making decisions about where to drill new tube wells or about the planting of crops that assume the future availability of future pumped irrigation water typically do not have access to accurate data on the size and stability of underground water tables. Nor do villagers have information about the over time expansion of

salt in these water tables, which may compromise future drinking and irrigation water. By integrating geospatially existing field observation data on river salinity and soil moisture/salinity with water level gauge measurements and with a suite of remote sensing and geodetic satellite measurements of total water storage, surface water height/extents, we are proposing an innovative near-real time monitoring system with various temporal and spatial resolutions, down scalable and quantifying both surface and ground water evolutions. The proposed novel satellite measurement system, some of them are low latency, includes GPM and TRMM (precipitation); MODIS onboard Terra/Aqua, Landsat, and Planet Labs optical imageries (crop classification, land erosion and land cover change, water and seasonal snow extent change), SMAP and SMOS (soil moisture), Gravity Recovery And Climate Experiment (GRACE) gravimetry (total water storage or surface and groundwater storage, mountain glacier and snow melt), satellite altimetry (classification of water and land, water level heights over rivers and within polders, coastal sea-level change), GPS and synthetic aperture radar interferometry (ALOS-1/-2, Sentinel-1, TerraSAR-X tandem) measuring 30-m resolution land and polder subsidence. For large river or large in-polder water salinity, it may be possible to use SMAP or Aquarius, originally designed to measure large-scale soil moisture and ocean surface salinity, to gauge surface salinity, which can be combined with existing field measurements of river and soil salinity, can provide a understanding of how river salinity is changing over time. We propose to build a robust physical science measurement system, which will be promptly disseminated to users and decision-makers, to help guide the decision-making process of local water organizations and farming groups.

Another major threat is severe river erosion which may threaten a polder and whole villages with monsoonal flooding. This is especially a risk since most of the polders have no internal protection walls, meaning that a single breech floods a large area which may house 5,000 or more households. Getting governmental evaluation and action is typically a lengthy process. It may take months before an examiner from the BWDB or LGED will respond to a report and arrive on the scene to document a potential polder breech and develop an engineering assessment. If local water organizations were provided with smart phone technology and an internet link for reporting pictures of severe erosion, this simple facility could cut months from possible interventions and mean the difference between a major polder breech and timely protection. We propose to use our low-latency satellite monitoring system, which measures evolution of bank erosion and land subsidence which threatens farmers. Drawing on training from the SES-Ohio State on the analysis and interpretation of satellite data for operational usage, the proposed new Water Resources Center can develop the ability to monitor at the appropriate temporal and spatial resolution severe river erosion, surface and ground water change, land/subsidence, flooding, drought and threats to polders. The suite of satellite remote sensing and geodetic measurement system will exploit the near-real time high-resolution (5 m), frequent sampling (daily), and free RBG imagery (with added infrared channels in 2016) from a constellation of cube-sats provided to this GRP initiative by Planet Labs (Dr. Joe Mascaro, http://planet.com).

Satellite data can also be used to improve other aspects of flood and drought warning. Flood early warning has greatly improved in coastal Bangladesh but remains problematic in that the current systems can provide at most 3-day warning of downstream water movement and does not provide near real-time information on severe river bank erosion. There are also problems with distribution in that illiterate users do not respond to text messages and phone-calling-trees are

often limited in signups. The NASA-USAID SERVIR project, led by the Univ. of Washington, Ohio State Univ., and IWM (http://www.nasa.gov/mission_pages/servir/index.html) has developed the operational satellite and *in situ* data assimilative, 8-day flood forecasting and early-warning system for the entire Hindu Kush Himalayas region, the majority of which drains ultimately through coastal Bangladesh. The flood early warning system is a low-latency, and down-scalable to a local resolution. The flood forecasting protocol is hosted at the International Center for Integrated Mountaintop Development (ICIMOD) in Nepal, with which this project is affiliated. To capture floods and droughts, especially those stemming from simultaneous glacial and snow melt, and monsoon rainfall that accumulates downstream and is compounded when downstream rivers merge, requires this type of region-wide forecasting system. Once fully operational, this system will provide locally relevant flood information scaled to specific locales which can be used by local water managers, *union parishad* officials and citizens to prepare. The warning signal, however, needs to be distributed through trusted networks where recipients will take information into account and respond. A key problem is that, although over 80 percent of the coastal population has cell phone access in the household, roughly half of the population is illiterate and responds best to "voice" signals. Current practice is to rely on text messages, which are often ignored, especially by illiterate villagers. This will need to be replaced with either robo-call voice systems, calling-trees organized among the villagers and/or simplified text that can be readily understood. Research will need to be conducted to evaluate the best format for distributing different types of warning information to different kinds of users.

Another place where satellite data can be harnessed is gauging land subsidence. Currently there is little known about land and polder subsidence with sufficient time coverage to construct valid projections. Currently the BAND-AID project (http://Belmont-bandaid.org), with which this project shares personnel, is developing over time satellite geodetic measurement of land subsidence in three coastal sites using CGPS (Continuing GPS) systems, one of which is located in polder #13. By integrating GPS measured vertical velocity with radar interferometric measured (InSAR) land subsidence, we can estimate projections of land motion and thereby land subsidence across multiple sites. If changes turn out to be as large as expected (perhaps as much as 2.5 cm per year = 25 cm per decade), this should be taken into account in polder redesign and other long-term infrastructural investment. During this Project, we will carry out geodetic surveys using GPS, absolute and relative gravimetry, to help establish robustness of the Bangladesh national vertical datum, which is non-existent at present. This GRP Project will consider implementing additional geodetic equipment (GPS and river gauges) to be permanently installed, and intended for streaming data in near-real time, and to the public. We anticipate that this set of equipment will be maintained, and operated by local entities, including the Survey of Bangladesh, and BWBD.

This proposal will create a Water Resources Center with three facilities: (1) a community organization school dedicated to local water management, (2) a training facility for evaluation research on local water initiatives, and (3) a Water Data Center which can be tapped by the partner organizations to gauge water quality and quantity, including surface and ground water table assessment, salinization, severe river erosion, flood early warning and land subsidence. The team members will develop relevant training and data for this facility, which will provide data to the external partners (Blue Gold, CDSP, World Fish, BRAC, and their local NGO partners) and the local water organizations without cost to guide their decisions and activities.

Eventually these could be sustained as self-supporting programs financed by user fees once their value is demonstrated. At that point, we will oversee in the form of competitive bids the operation of the Water Resource Center for an organization or organizations in Bangladesh, including government entities, after the GRP Project has ended.

The community organization school will provide training for the partner groups in community organizing methods. Evaluation research facility will provide training in methods for conducting evaluation studies, especially small scale surveys, in-depth qualitative interviews and field experiments. The water data facility will harness the existing public data held by the three water groups in the team—IWM, the School of Earth Sciences, Ohio State University (SES-OSU); and the Institute of Water and Flood Management, Bangladesh University of Engineering and Technology (IWFM-BUET), and the Survey of Bangladesh. All have non-proprietary data that can be made publicly available in a standard geo-coded format and made available on maps and/or formal data files online. The facility will also create a website based flood erosion reporting site and assist with the distribution of flood early warning information and other measures of water tables, salinization and land subsidence that can be developed and distributed. Some data will be available online only for members (i.e. external partners) and some will be also posted on an open public users' site to establish recognition and awareness of the facility. Under this GRP Project, the team will develop an unselfish data sharing procedure for operation in the future after this Project terminates. An important step will be to survey the external partners for their priorities on the various water data possibilities that the team is able to develop or has in hand and that is publicly available. This Water Resources Center will also as serve as an advocate for the local community water movement and the government agencies and NGOs that are working with local water management issues. It will build on the prior efforts of its major partners: the Blue Gold Project, CDSP, World Fish, the BRAC Community Empowerment Project, and the many local NGO partners of these groups that are active in specific communities throughout the southwest and central areas of coastal Bangladesh. The core focus will be on building better organized communities that have access to timely and relevant water information, are integrated into all aspects of the national water management system and are able to improve the livelihoods of the rural villagers.

Theory of Change and Impact Pathway

The assumption underlying this project is that there are viable and capable governmental, NGO and local community groups that already exist and have the ability to address these environmental and climate problems but have lacked the resources, knowledge and conceptual frameworks needed to maximize their effectiveness. In part this is a question of scale with significant community changes that have been initiated in specific localities where our partner groups have been active. But the problem is also deeper since some types of information, such as the changing sizes of water tables or the geographic distribution and rate of land subsidence have not been available before. While not all users have the same data needs, bringing these together into a single site has major benefits in terms of standardization, uniformity and quality control of data and data management. Some materials will be of interest to small farmers and local water organizations. Others will be more useful for NGOs with regional spread or local NGOs operating in a single locality. Others will be useful for community organizers while others will be more useful for agency and NGO managers. Some will be only possible if local

water organizations and communities take on data gathering tasks. The river erosion documentation facility will require that local water organizations use smart phones to take pictures of river erosion damage, post it to a website and work with a website manager to post a simple synopsis and establish geo-location. This documentation can assist BWDB district engineering offices and LGED offices to review in a timely fashion sites for investigation. This will not overcome the limited number of field investigators or the evaluation of cost-effective solutions but it will reduce the time required for field evaluation and create a publicly available record of river erosion problems that can be used by the mass media and evaluated by the public and parliamentary officials.

The proposed Water Resources Center to be established in this Project, which is intended to be at the receiving end of the technology transfer to build and operating the low-latency satellite water monitoring system. This project will install accountable, self-sustained, and open data policy procedures to operate this Center during the project time period and after Project terminates. Both metrics above can be evaluated as criteria of success under the proposed Project.

Social change also requires that new technologies are embedded in stronger conceptual frameworks for understanding the complexity of water problems and ways of organizing so as to address these problems. A major objective of this project is to develop strong community organizations, local and regional networks and problem-solving adaptation coalitions by creating a community organizing school that draws on veteran theorists and trainers of community development and dispute resolution. Partner organizations will be able to send their community organizing staff and other selected staff to training workshops held regularly in a central and accessible coastal location (such as the University of Khulna). This community organization training school will emphasize the development and application of the community capitals framework for understanding community development, the core of which is to emphasize the way in which the social and political capital of local communities interact with and enable the human, cultural, financial and natural capital of communities and thereby shape the built environment. This framework has been used effectively in forging adaptation coalitions in many rural communities throughout North and South America. It begins with a focus on what people envision to be a desired future, realizes that multiple group may have different mental models of the relationship between means and ends, and hence, to forge effective coalitions, will have to negotiate and bargain extensively over how their different discourses and causal understandings can be integrated into an effective adaptation coalition. A key focus of this effort will be to promote organizing projects that empower women, minorities and, where possible, landless groups. This empowerment priority operates both in terms of the content of the programming and the selection of participants for training activities. The evaluation research training facility provides another way in which to improve the professional skills and insights of the agency/NGO partners by providing methodology training and ways to improve the quality of evaluation data.

These three initiatives are complementary. Having better and more timely water data and knowing their quantity and quality provides an incentive for coastal residents to join and participate in local water organizations and to support their local partners. It also strengthens their decision-making and ability of these local water organizations and agency/NGO partners to organize and implement change. Better community organizing knowledge by the external

partners and the local water organizations increases the likelihood that community participation is sustained and effective in their programs. Improving the quality of evaluation research provides a better sense of what works and what doesn't, the marginal rate of return on alternative projects and what benefits the local communities in the long-run. This will rebound to strengthen community organizing efforts and improve the way in which community projects are designed and implemented. Properly primed, this three-pronged effort should create an accelerating upward spiral of local community mobilization and impact on sustainable development.

Logframe for Building Community Climate Resilience in Coastal Bangladesh (CCRB)

Goal	Organize stronger rural communities in coastal Bangladesh and better integrate them into the national water management system so that they can adapt positively to environmental challenges and climate change.
Purposes	1) Communities will be better organized in terms of participation and membership rates, gender balance, and the financial resources of local water organizations. 2) The local water organizations will have better bridging capital in terms of trust networks, coordinating meetings, and participation in adaptive coalition work with union parishads, farmers/fishers associations and other local cooperatives. 3) These groups and their governmental/NGO partners will have greater access to water information to make decisions, document problems, design solutions, and advocate for change.
Project Outputs	1) Greater membership, participation rates and financial resources of the local water organizations (including their micro-finance operations). 2) Greater gender balance in the water organizations and advisory committees 3) Better water information in the hands of local water organizations and allied local farmer/fisher groups, and union parishads. 4) More adaptive coalitional work among local community organizations, especially links between local water organizations and union parishad leaders.
Activities	The project will establish a multi-purpose Water Resources Center which will have three functions, each of which will service different parts of the overall water participation movement: 1) A community organization school will focus on providing training in the theory and practice of community development. It will provide training to the community organization staff of the partner NGOs and government agencies in the community capitals framework, including training in dispute resolution methods. 2) An evaluation research facility will provide training to the evaluation staff of the partner NGOs and government agencies in advanced methods of evaluation research, especially small scale social surveys, in-depth qualitative interviews and the use of field experiments. 3) A water data center will provide a range of water data as prioritized by our partner organizations from both publicly available data sets and newly developed information on water tables, salinization, flood and river erosion warning, and land

	subsidence. It will harness the skills of team groups (the IwM, SES-Ohio State & IWFM-BUET, Survey of Bangladesh) to build a world class Water Data Center. 4) By becoming a recognized source of information about local water issues, the center will in effect become an advocate for the larger local water movement and the various NGOs, community groups and agencies that are trying to build sustainable development in coastal Bangladesh. 5. This project will oversee bids from local entities to operate the Water Resources Center after this project terminates, and to establish operating guidelines, including accountability, check and balance, and unselfish data sharing.

Environmental and Social Safeguards

This project focuses on capacity development by providing professional training and the development of new water data that can be used by local groups, government agencies and NGOs. It does not have field data collection or experiments that have a local environmental impact. Hence it should receive an exclusion from the Initial Environmental Examination.

On a social level, the major safeguard needed for this project is protections on intellectual property with regards to proprietary data and the tools for developing such data that may be housed and distributed by the water data center. Such data will not be distributed without the express written permission of the owners or their legal agents. Since this project will generate new data, it will be distributed gratis during the life of the project to our initial external partners. This policy will be reviewed after the initial 2-year project period to consider the possibility of a user fee system for members that would limit data access. Data generated under U.S. federal governmental contracts will be distributed gratis to the general public unless the data center has to invest significantly in data development and management. During the project, data that requires this type of investment will be made available to partner members gratis.

A second safeguard issue is human subjects' protection for any field study conducted by the evaluation training school. We will follow standard U.S. protocol in terms of guaranteeing anonymity for all participants in such studies. Participants will be de-identified so that their identities are unknown in any data that is released publicly or to secondary data users. Individuals will only be known only as case numbers. Human subjects protection will be secured from the Bangladesh University or the Ohio State Institutional Review Board.

A financial safeguard will be negotiating in advance with all partner organizations an agreement that all professional staff who attend any of the training sessions are treated as in service, i.e. compensated for their time as normal in their organization. The project will cover their travel and per diem expenses to attend the workshop but will not cover any salary or compensation for training or travel days, which will be borne by the partner organization.

Risk Matrix and Mitigation

Each of our three initiatives has operational risk. In the risk matrix below, we discuss the likely risks and their severity as well as mitigation measures.

Program Area	Defined Risk	Likelihood	Severity	Mitigation
Community Organization School	Participants find the curriculum of little practical use	Low	High	Team teach with local instructors; revise curriculum with more local examples and success/failure case illustrations
Evaluation Research School	Participants find the curriculum of little practical use	Low	High	Revise curriculum with more examples of false conclusions from evaluation studies; bring in new instructor with team teaching
Water Data Center	Internet hacking of proprietary data	Medium	Medium	Hire stronger website protection
	Theft of smart phones	Medium	Low	Require financial deposit for smart phone checkout
	Failure of any new data development effort	Low	Low	Redeploy resources to new data development effort

Measuring Resilience Impact

Evaluating these three initiatives will require conducting baseline and annual qualitative interviews with the partner organizations and two surveys of the local water organizations (baseline and year 2). These will provide information on water data priorities and training needs, a before-and-after picture of the resources and activities of the water organizations, and feedback on specific programs. A key test of effectiveness is whether the training initiatives and water data center affect the resources and activities of local water organizations and their evaluations of the partner organizations. We look briefly at each monitoring tool.

Interviews with Partner Leaders:
A baseline qualitative interview will address how many community organizers will attend the schools, available data on local water organizations (participation rates, financial resources, gender balance), specific training priorities, and priorities for water data. A follow up interview at the end of each year will provide feedback on project effectiveness.

Survey of Workshop Trainees:
An exit survey will be used to identify the professional experience and prior training of organizers and evaluation researchers and their evaluations of the training workshops.

Survey of Local Water Organizations:
A baseline survey will be conducted with the chairperson of water organizations about their membership, finances, elections, member participation, gender representation (membership & board), attempts to influence *union parishads* (elections, appearances at meetings), relations with the BWDB and LGED, participation in construction planning, O&M operations, water disputes,

and coalitions with other local groups on local adaptation projects. A second wave in mid-year 2 will see if these have changed over the project period. (We will also collect available data from the Dept. of Cooperatives, Rural Development Board, on registered water organizations, resources and participation, and polders without registered local groups.)

Efficiency will be gauged from the trainee exit survey, good attendance at the workshops, hits on the water data site, the number of water data sets archived and displayed, and use of the river erosion site. Effectiveness will come from assessing the 2-year change in the water organizations in terms of their participation, resources, political and coalition work and gender balance, their perceptions of the partner organizations, and from the follow up interviews with partner leaders.