



## *Final Stakeholder Workshop Shifting Grounds Project Bangladesh*

**Khulna, Bangladesh**



## **Final Stakeholder Workshop Shifting Grounds Project Bangladesh**

*Report of workshop held at the CSS Ava Centre, Khulna, Bangladesh*

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## 1. Introduction

The project “Shifting Grounds: Institutional transformation, enhancing knowledge and capacity to manage groundwater security in peri-urban Ganges delta systems” (hereafter: “Shifting Grounds”) is a four year project that combines research, sustainable development and capacity development. The focus is on groundwater security in peri-urban areas in India and Bangladesh. Here, rapid urbanization has resulted in an increasing pressure on groundwater resources in peri-urban areas. Increased climatic variability, degrading surface water sources, land use change, coupled with unequal caste-class-power structures, rules, norms and practices, create pressure on already strenuous groundwater tables and lead to uncoordinated overexploitation of aquifers. The resulting lack of access to groundwater during critical periods affects the livelihood securities of the vulnerable and contributes to the incidence of poverty.

In the Shifting Grounds project, researchers and civil society organizations from Bangladesh, India and the Netherlands cooperated to enhance understanding and build capacity with local stakeholders to support sustainable groundwater management in peri-urban areas. Research and capacity building activities were undertaken in peri-urban villages near Khulna and Kolkata. Researchers conducted local assessments in four villages on groundwater systems, livelihoods and institutions and analysed their interplay. Results were linked to capacity building activities through an intensive process based on the “Negotiated Approach” for two of the four project sites.

Final stakeholder workshops were organized in Kolkata and Khulna towards the end of the project period in September 2018, to report and discuss project results with local stakeholders and international guests, and to obtain stakeholder feedback about project activities and impacts, as well as possibilities and commitment to continuation of initiated processes by local stakeholders. The workshops were chaired by Wil Thissen from TU Delft, former project leader and chair of the Project Advisory Group. During the workshop, translations from Bengali to English and vice versa were provided by the local project team members.

This report covers the workshop proceedings from the Khulna workshop. A separate report for Kolkata is also available.

## 2. The Theory of Change of Shifting Grounds

The Theory of change of the Shifting Grounds project helps to understand the ambitions and logic of the activities in the project, and subsequently the reason for the structure of activities in this final workshop. A Theory of Change is often used in project planning to articulate how a project is expected to have impacts and can make a difference. Project leader Leon Hermans from TU Delft explained the Theory of Change for the Shifting Grounds project (Figure 1).

Being funded by the Netherlands Organization for Scientific Research (NWO) under its Urbanizing Deltas of the World (UDW) programme, Shifting Grounds is primarily a research project. However, research is combined with a focus on sustainable development and stakeholder capacity development. The research activities in Shifting Grounds look into three interlinked components affecting groundwater management in the four-studied peri-urban areas: modelling the groundwater resources in the physical system, investigating the institutions (formal and informal rules) that condition the shared management of these groundwater resources, and the actual uses of groundwater by local stakeholders for livelihoods and domestic use.

The three systems (groundwater, institutional and socio-economic systems) also have important interlinkages, which are studies using more specific approaches such as scenarios, game theory, integrative narrative analysis, and a multi-dimensional groundwater poverty index. The aim is to get a better understanding of these three dimensions and how they influence each other.

The ambition for this project is not just for research but also for the benefit of society. Therefore, interactions with community stakeholders have also been an equally important pillar. Close stakeholder involvement was expected to improve research results, by obtaining a better image on the local situation, based on community knowledge and perceptions. Also, it was considered key to ensure that research insights could be used by local stakeholders to address their problems and improve the sustainability of local groundwater resources management.

The stakeholder participation and capacity development activities in Shifting Grounds were done using the “Negotiated Approach”, a stakeholder empowerment and policy influencing approach developed by the Dutch NGO Both ENDS and its different local partners in various parts of the world. The process used for Shifting Grounds identified several steps, based on expected interlinkages with research activities – a novel way of using the Negotiated Approach, tailored to this project. Shared understanding is an important base to build capacity and to increase the willingness among stakeholders within village communities to discuss groundwater problems among each other, to prepare for dialogue between government and village communities, and to subsequently take action and, possibly, influence government policies.

After the project, the project team hopes to leave the villages with an improved basis for further dialogue, an improved understanding of groundwater resources as well as capacity to address other local issues in the village in a similar way.

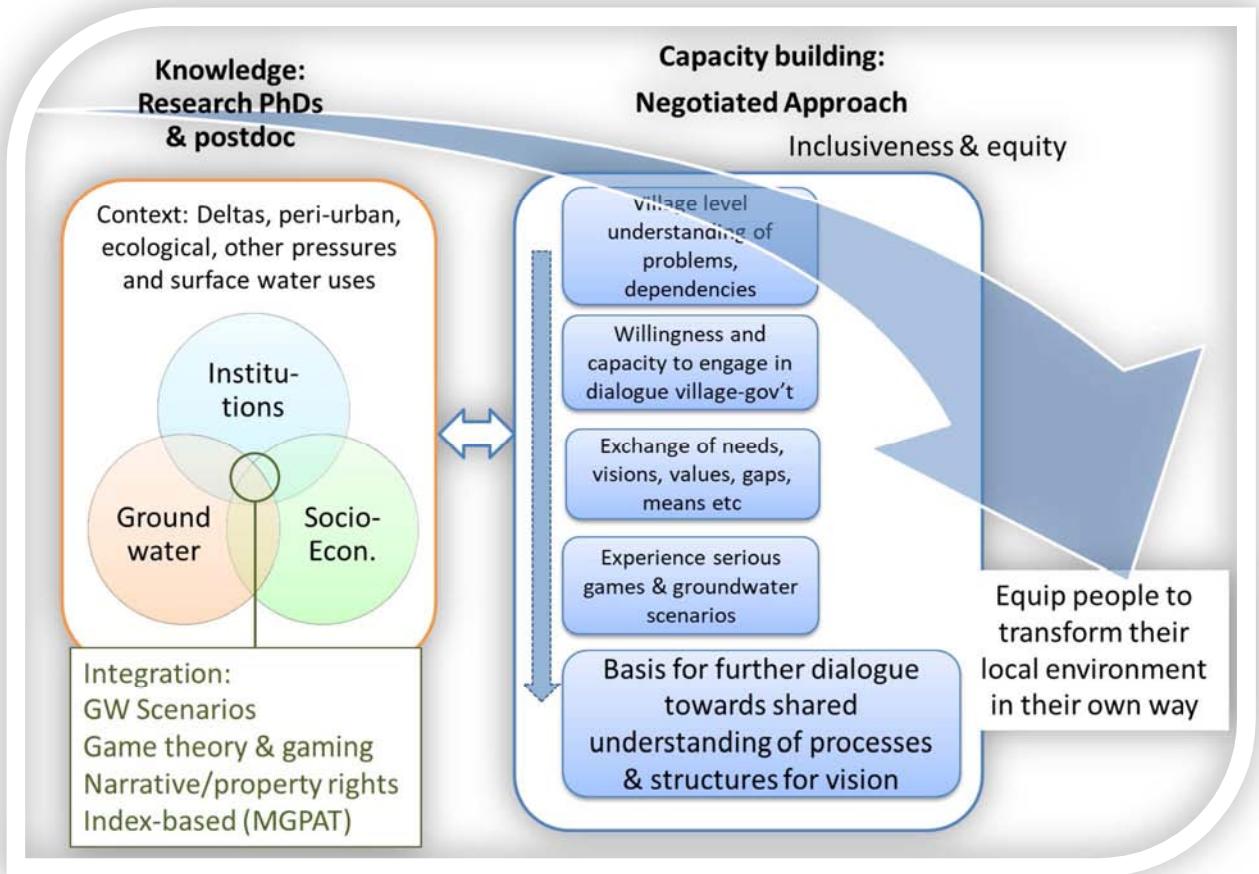


Figure 1 Theory of Change *Shifting Grounds* Project

### 3. Research results

#### 3.1 Groundwater system mapping

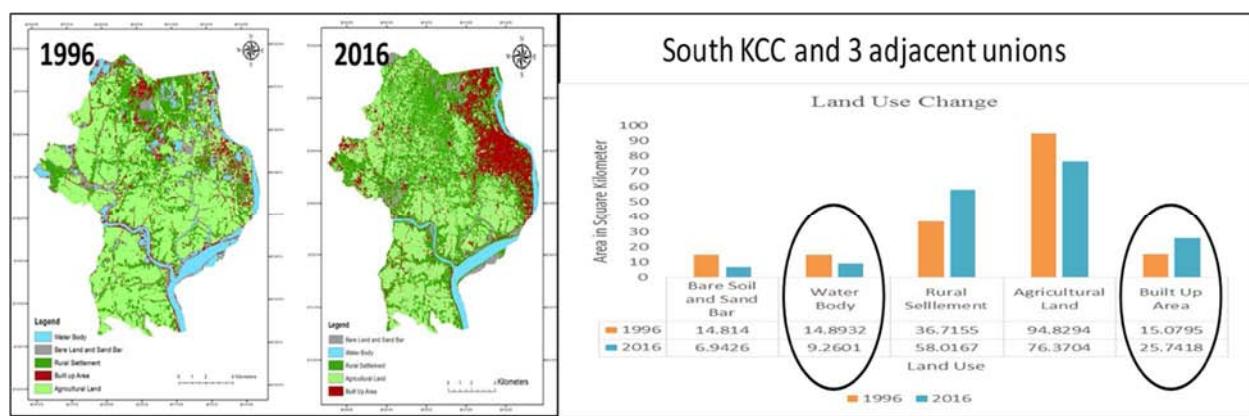
Groundwater systems research were presented by Rezaul Hasan, a PhD student at BUET in Dhaka who executed the groundwater research within the project. Limitations with data availability, combined with limitations in project resources, have limited the work on the groundwater sites in Kolkata. In Kolkata, groundwater quality research was done in the initial stages, providing some general insights in regional groundwater conditions. The further research in Kolkata was mainly done following the Negotiated Approach process, using additional funds for Arsenic testing, discussed later in the workshop. The presentation by Rezaul Hasan focused on his PhD work, which focused primarily on the sites near Khulna.

The groundwater research aims are to understand:

1. Evolution of peri-urbanization – around Khulna
2. Relation between peri-urbanization and groundwater security
3. Relative role of this relationship in different peri-urban settings

Groundwater security in the research has been conceptualized as: "The availability of water throughout the year with acceptable level of quality, accessible to people of different stakes, with tolerable levels of risks resulting from climatic and socio-economic processes". Six peri-urban sites around Khulna, in-depth investigation for Hogladanga. A larger area was taken to better look into the groundwater system, beyond the two village sites for Khulna in Shifting Grounds.

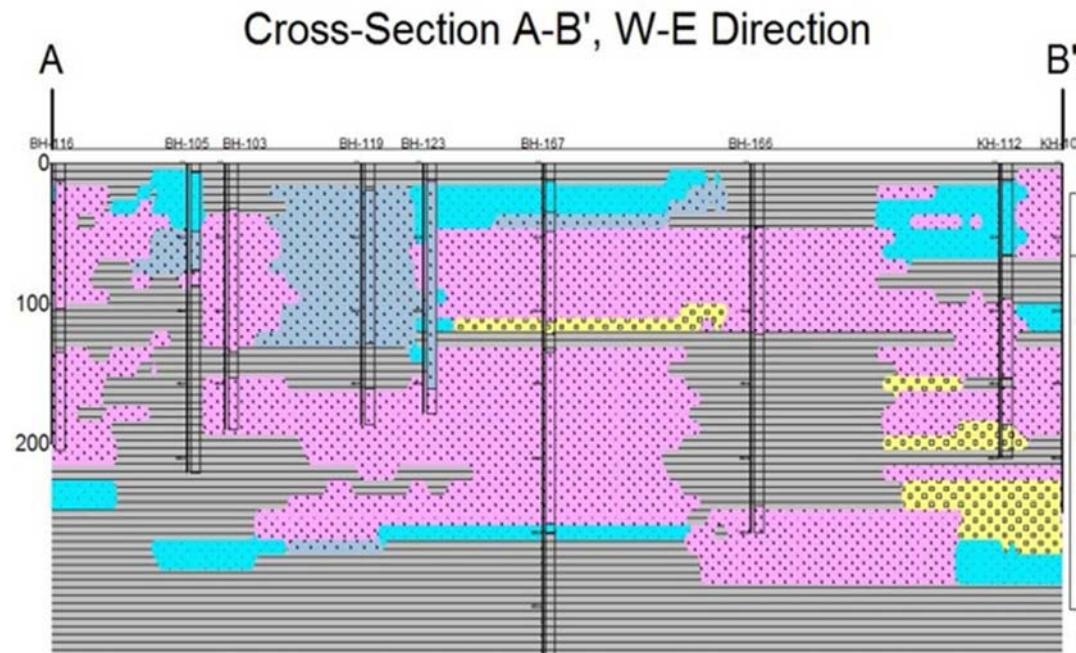
The research looked into different characteristics across these six sites near Khulna, important for groundwater security in villages, and illustrating the diversity in peri-urban areas. These include demographic changes, livelihood heterogeneity, distance to city centre, multiplicity of claimants (real estate, industry, agriculture/aquaculture) and land use changes (Figure 2). For instance: 56.6% of Hogladanga population is local and 43.4% are in-migrants from more recent years; build-up areas increase from 15.1% to 25.7% from 1996 to 2016; Real estate and industrial growth visible mainly along the roads; and more recent pollution impacts from Khulna city in Hogladanga due to city waste dumping station nearby and two wastewater canals, carrying city and medical wastes.



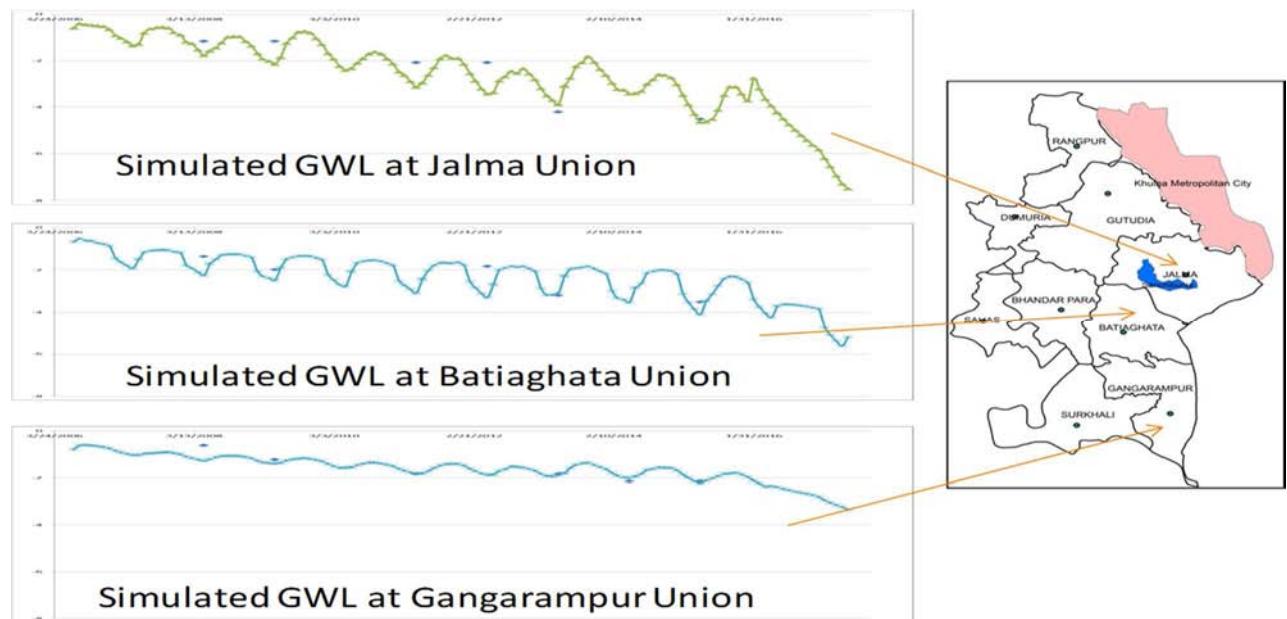
**Figure 2 Land use changes Khulna**

Groundwater coastal aquifers have a high degree of spatial variability (Figure 3). Furthermore, the unavailability of suitable aquifers (thickness and quality) limits the number of tube-wells. This also causes differences among the villages around Khulna: In the village of Chak Ahsankhali they suffer a lack of groundwater access, while in Sanchibunia there is no real issue in access.

Shallow aquifers are used in some villages for drinking water or domestic water (such as in Hogladanga). Shallow aquifers nearby rivers or canals suffer increased salinity levels. If quality (salinity mainly for studied Khulna villages) is insufficient in the shallow aquifer, the deep aquifer is tapped (600 – 900 ft), leading to increased pumping costs (for instance in Hogladanga).



*Figure 3 Cross-section showing the complexity of the hydrogeology in the study sites near Khulna*



*Figure 4 Groundwater model results, showing declining trends in groundwater levels*

Survey results obtained from a joint survey show that in Hogladanga, the village in which also the Negotiated Approach were undertaken, households continue to depend on surface water for many domestic uses, but shift to groundwater during the dry season when there are surface water shortages. Dependence on groundwater tube-wells for drinking water increased from less than 6.3% to more than 96.8% in past ten years. While the newly constructed households/buildings have installed tube-wells

to meet their demands in villages Sanchibunia, Nijkhamar, S. Labonchara, in the village Chak Ahsnkhale there is only one deep tube well that services about 50-60 households, often with conflicts.

Many of the households covered in the survey and water audits reported perceived water insufficiency, with groundwater table depletion being reported by them as the major cause of perceived water insufficiency by households. Possible causes of groundwater table decline, inferred from groundwater modelling results (Figure 4), are mainly located outside the peri-urban villages. These are different for the deep and shallow aquifers:

- Deep aquifer: extraction from city well fields. KWASA supplies 199 million liters every day to the households in Khulna city, mainly from groundwater. These wells are only 5-7 km away from Sanchibunia.
- Shallow aquifer: irrigation in neighbouring rural areas is expected to have an impact here. Less significant impacts from land use change *within* the peri-urban areas. In addition, the shallow aquifer salinity in the model results is influenced by proximity to rivers and canals that are increasingly carrying saline water.

Finally, some differences between the Kolkata and Khulna sites were highlighted: Impacts of city pollutants higher near Kolkata. Boro rice cultivation still popular in Hogladanga, declined near Kolkata.

### 3.2 Socio-economic research

Poulomi Banerjee, postdoc researcher at SaciWATERs, presented findings on socio-economic research. The research focused on groundwater management in relation to livelihood choices periurban villages.

#### Village profiles

The qualitative in-depth research focused more on the two sites near Kolkata: Bodai and Tihuria (5 and 6). Bodai, located north of Kolkata, has a predominantly Muslim population. For agriculture, groundwater irrigation plays an important role. In recent years, this entirely depends on the use of one deep tubewell. Shallow wells, in the layer of 150-180 ft, have become obsolete due to over-extraction. Furthermore, groundwater quality has been affected by pollution. Tihuria, south of Kolkata, has a more homogeneous social status than would be expected for a heterogeneous peri-urban community. However, the homogeneity in terms of caste does not affect the presence of significant economic heterogeneity. This is roughly organized in different geographic clusters, each with own economic activities and their own political representation. The presence of a wastewater irrigation system has influenced livelihoods since 1920, due to the proximity of the East Kolkata Wetland, used for treatment of Kolkata city wastewater (this wetland is now an internationally recognized Ramsar site). Recently, several more drinking water bottling plants have come up also in these areas. Survey results and Negotiated Approach activities have shown that water quality is affected by Arsenic, posing health threats for drinking water.

Also, a short overview of Hogladanga and Matumdanga villages socio-economic situations was presented. In these villages near Khulna, the process of periurbanization and city expansion is also manifest, but on a lesser scale than near Kolkata – also due to the relative size of these cities. The involvement or real estate agents and land development for urban usage is visible in these villages. In Matumdanga, the pressure on land is more coming from government actors. In Hogladanga, private entities are the main agents capturing the land.

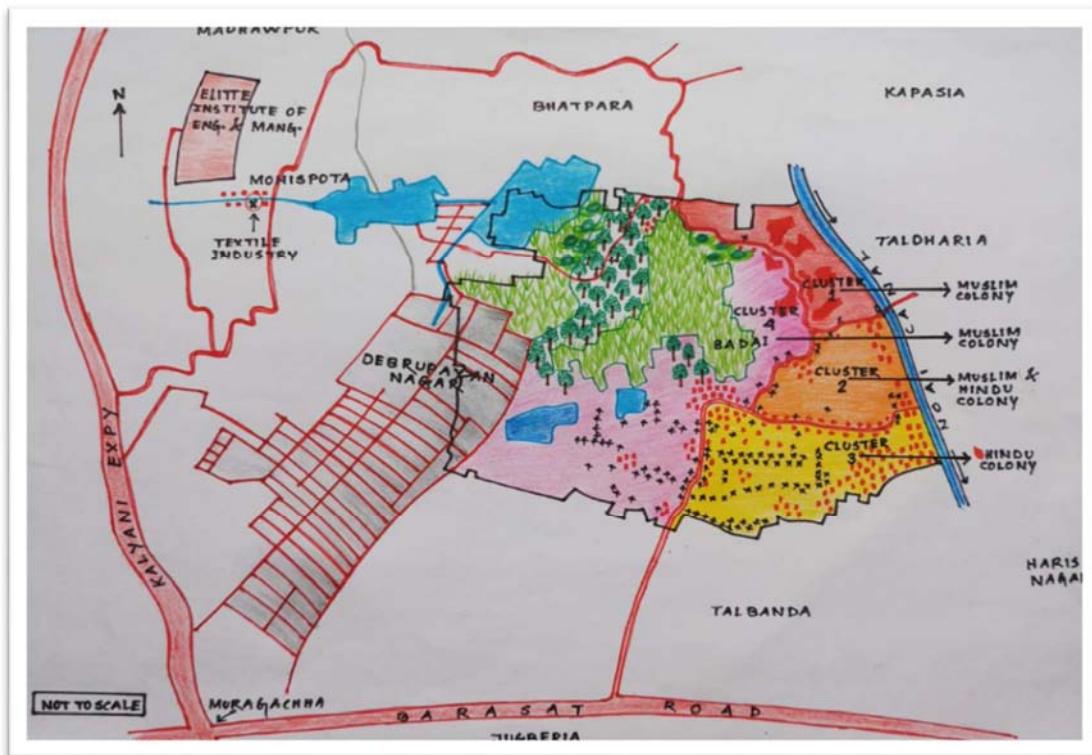


Figure 5 Social map of Bodai village, Kolkata

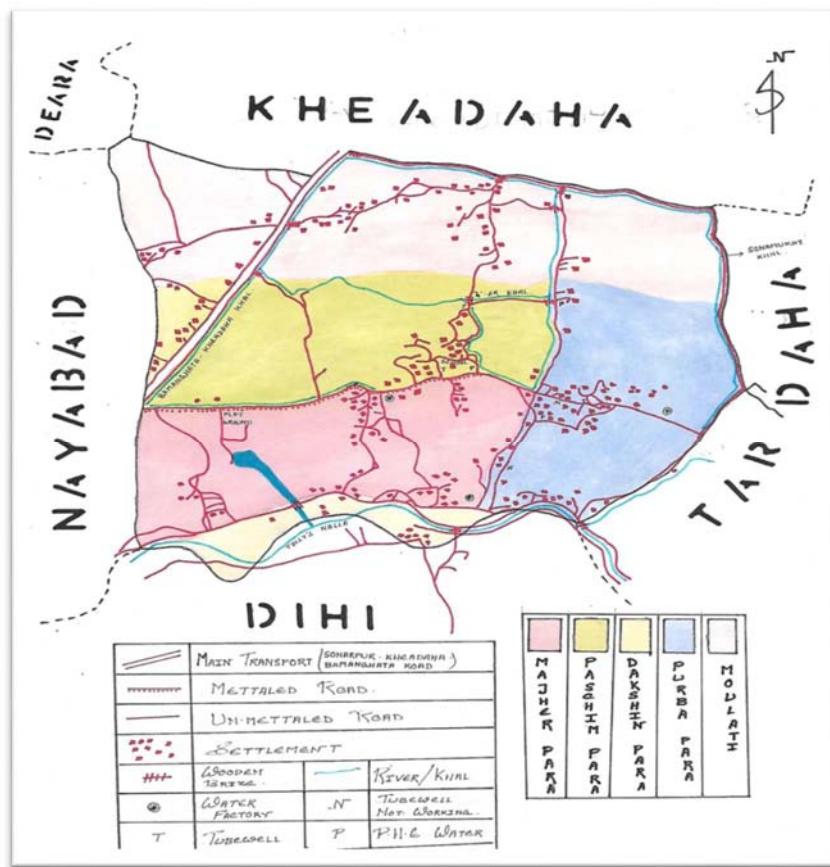


Figure 6 Social map of Tihuria village, Kolkata

## Comparative analysis

### Domestic water

The dependence on groundwater for domestic water is high across all four villages. Villages near Khulna depend more on private wells or shared public wells that are informally managed, lacking a connection to the publicly managed piped public water system and lacking established markets for bottled water (see figure 7).

Reasons for domestic water insufficiency differ among the villages: Depletion of groundwater table due to agriculture practices is reported as main reason for insufficiency in the water sources for the households around Khulna; Around Kolkata, different reasons are cited: pipe leakages in the public system operated by the PHE Department in Tihuria, and extraction by industries in Bodai.

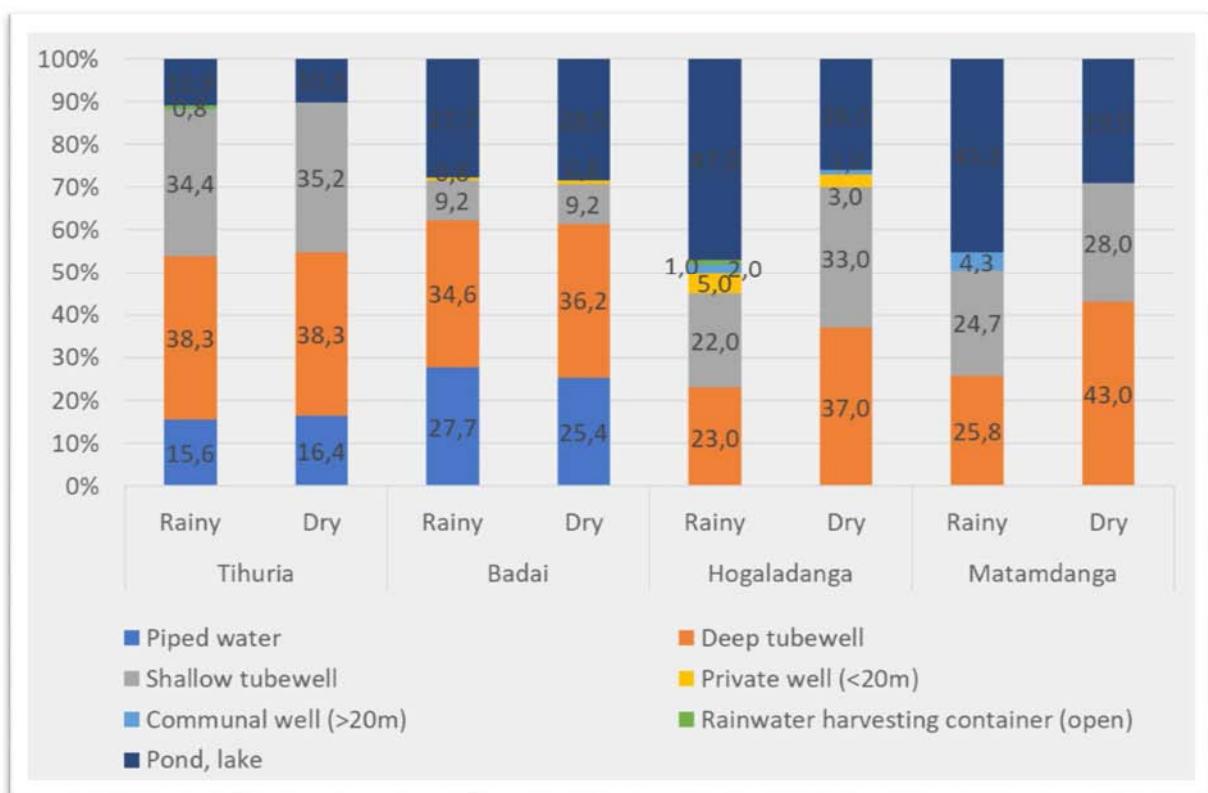


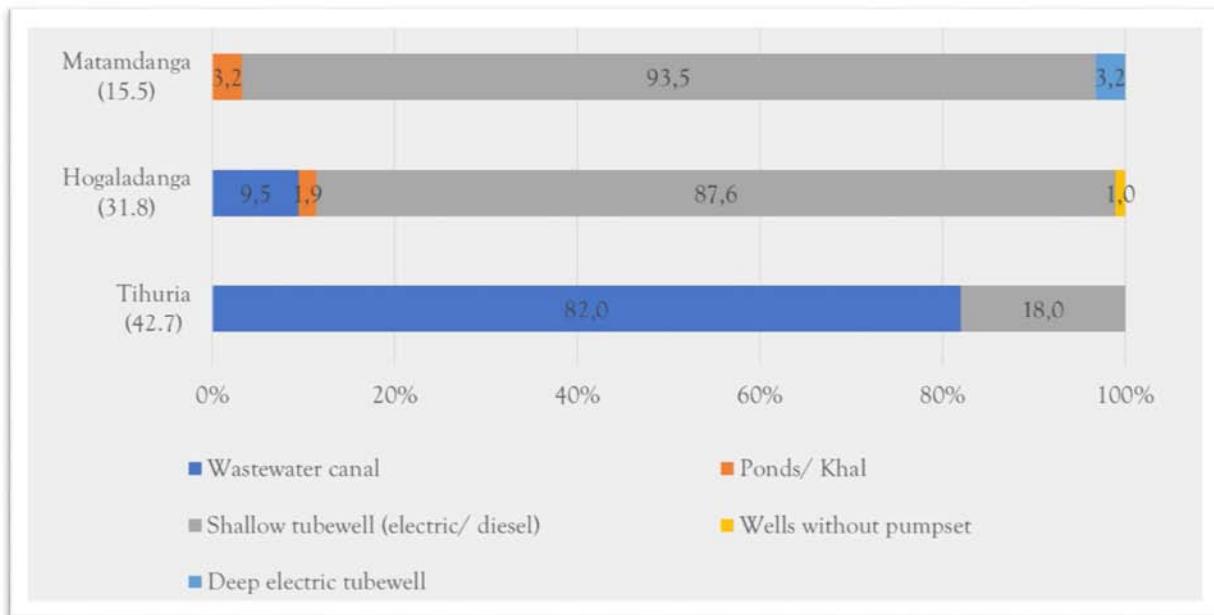
Figure 7 Domestic water sources across the four villages

### Livelihoods

Near Bodai, there is mainly textile dyeing and bleaching industry; 350 small industries were reportedly active, according to interviewed key informants. The unregistered industries are mostly owned by outside owners, and managed by other migrants from other areas. Farmers, around 100, suffer from this and now have court case against industrial dumping. Officially, industries are required to have an Emission Treatment Plant (ETP), but many will lack such facilities.

In Tihuria the usage of shallow tubewells in wastewater aquaculture fields is perceived by key informants to increase the water stress. The effect of this is also visible in a decline in gross irrigated area and increasing pumping hours for boro rice, as practiced by one of the five village community groups.

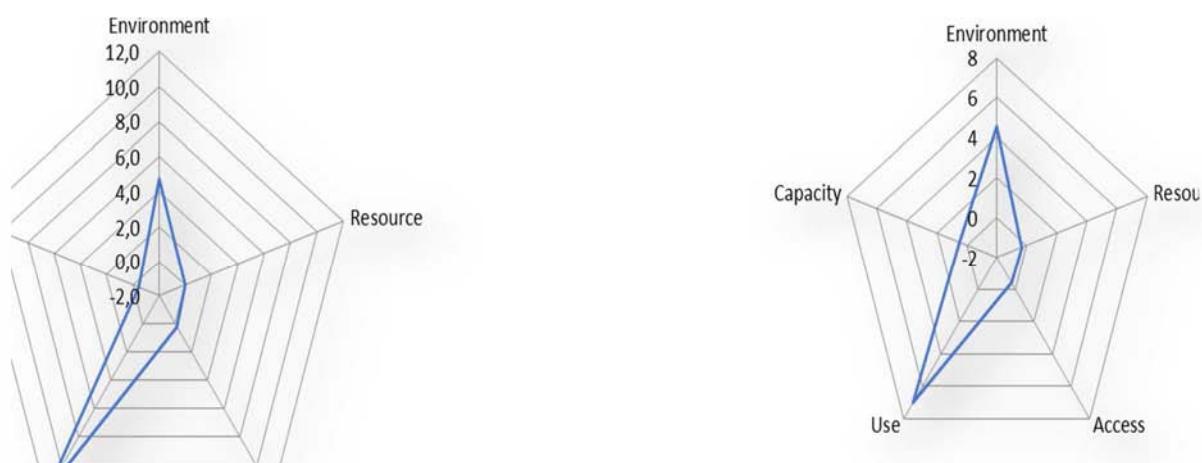
Groundwater dependence for aquaculture differs between the three villages where it is practiced (Figure 8). Shallow tube wells are used in Hogladanga and Matumdanga, while in Tihuria, this depends mainly on surface water from a nearby wastewater canal connected to the Kolkata Wetland area. For Matumdanga and Hogladanga, also changes in water sources for boro irrigation in the past five years were presented.



**Figure 8 Percentage distribution of irrigated area under aquaculture by primary source of irrigation**

### Groundwater poverty index

As last research activity, groundwater poverty scores index were presented, based on the results of a household survey combined with additional data. The groundwater poverty index scores were lowest for Tihuria, highest for Bodai. A decline in groundwater status across the four villages is visible though. The groundwater poverty profiles, among the different dimensions, were shown to be similar for Tihuria and Hogladanga villages (Figure 9). Both had a high score on the dimension of "Use", meaning relatively high criticality of groundwater as a water resource, and low scores on "Resource" and "Access", meaning that the groundwater resources themselves and access to them are limited in these villages. This indicates that indeed groundwater management is difficult.



**Figure 9 Groundwater poverty dimensions in Hogladanga and Tihuria**

In conclusion, inequity and exclusion in groundwater use are not only shaped by an incapacitated institutional framework for peri-urban areas, but also by livelihood choices, household's perceived preferences and the physical characteristics of the environment. Scarcity is created also along the axis of class, also within a single caste. Ideas and suggestions for a way forward across the four villages were made to conclude the presentation. Among others, regulation of deep private tube wells and increase coverage of public drinking water sources were suggested.

### 3.3 Institutional context of peri-urban water problems

#### Background of the research

Sharlene Gomes, PhD researcher from TU Delft, presented the results of her research on the institutional component of peri-urban water problems. The focus of the presentation was on research conducted on the developments in peri-urban communities near Khulna city, Hogladanga village especially, and its drinking water supply.

This issue is addressed from an institutional perspective. *Institutions are seen as rules*. Formal and informal. Often arranged along rural and urban boundaries, which for peri-urban areas creates problems, exacerbating the effects of overlapping and fragmented institutions. Institutions provide rules for joint decision-making, often through negotiations among multiple actors. This decision making and negotiation takes place in so-called *decision arenas*. Peri-urban communities are often isolated from the formal policy arenas. Peri-urban communities have limited access to information about institutions and experience in negotiation.

Aim of this participatory research was then to support problem solving in Hogladanga by working to improve their understanding of the institutional context and build capacity to navigate the decision-making arenas. A four-step approach was designed for this.

#### Step 1: Problem identification.

Several problems were identified, with access to safe drinking water supply being the most pressing concern for residents.

#### Step 2: Institutional analysis.

The drinking water situation was analysed. The formal arena and institutions are formed by a local WATSAN committee which distributes licenses for tube-wells among villages, which are then to be installed by DPHEs and constructed by private contractors. This is regulated under the National Policy for Safe Water Supply & Sanitation (1998), the Bangladesh Water Act (2013) and formal contract with mechanics to construct wells. The problem, for Hogladanga village, is that, despite an urgent need and annual requests, no licenses were issued to the village in the past years.

The informal arena as a result has become more important. There are two options in this informal arena. One is to invest in private tube-wells – however, often tube-well installation fails due to difficult local aquifer conditions. A second option is to share existing public or private tube-wells based on informal agreements. This results in an inconvenient, unreliable system of drinking water access, and with unknown quality of drinking water.

In the future, this situation will again change. Hogladanga is likely to eventually come under urban jurisdiction, and within the KWASA drinking water supply systems. Then community households can apply for piped water supply from KWASA, or for stand-alone shared public tube-wells from KWASA, purchase bottled water, or they can invest in a private tube-well of their own that will need to be licensed by KWASA. The outcome of these options is uncertain, given current problems that KWASA has to cater to the needs of the urban population already within their current jurisdiction.

These insights were shared with community stakeholders in the Negotiated Approach process through community briefs and a de-briefing workshop, a few years into the project. At this time, it was also clear that not just drinking water access from declining water tables was an issue, but also access to drinking water of good quality.

#### Step 3: Analyze actor behaviour and interactions in arenas

Use game theory models, three situations were analysed: existing drinking water supply, future drinking water supply, groundwater monitoring to improve groundwater quality. These models help to understand why preferred strategies of communities are not likely to lead to desired outcomes, and to compare different future strategies. However, these models are not so easy to interpret for a community.

#### Step 4: Explore strategies through a role-playing game

Therefore, a role-playing game was developed, with roles that community members would eventually play. These were based on the game theory models developed, were the key elements in the model were translated into different elements of a role-playing games: Role descriptions, action choices for players, and resources of players. Evaluation sheets were then used, for different players to evaluate the outcomes of their combined actions, as outcomes of the game.

The role-playing game was played in March 2018, facilitated by JJS. One workshop was held with community stakeholders, and another one with local government representatives. In each of these workshops, three sessions were played, on different situations for drinking water: Existing situation, future situation, and cooperation and challenges of negotiating joint groundwater monitoring options. A short video showed the play of the game with community residents from Hogladanga.

### 3.4 Discussion of presented research results

Following the presentations by researchers, a discussion was held, kicked off by statement of local experts from a research panel and the Project Advisory Group.

Eng Kamal Udin Ahmed, deputy director of KWASA commented on the drinking water dimension of the problems discussed. He explained that the use of a surface water treatment plant and connected pipeline system is the default option for future urban water supply. They have constructed huge pipelines to take water from Madhumati river. The treatment plant is to be finished end of this year. Seven reservoirs and 650 km of pipelines have been constructed. Extending this capacity further is very difficult. For more remote areas, such as some peri-urban villages, tubewells should be installed. However, this shows a high level of complexity, which varies over short distances. With the construction of the Phada bridge, the rapid urbanization will increase and will require a huge expansion of their activities and water supply system, to be expected. Especially with the increased use of a piped distribution system, there should be an effort to reduce the system loss.

Professor Mustafa Saroor, head of the Urban and Regional Planning discipline at Khulna University of Engineering and Technology, commented on the three research presentations. On the groundwater research: it was a thorough presentation with some alarming elements. Khulna City is taking too much water from the groundwater. Gardens, car, and other urban lifestyle characteristics result in much larger water demands. In the hinterland, dry season boro rice cultivation puts huge pressure. So peri-urban areas are basically squeezed. What is missing: urban area is expanding, and mostly to the southwest part. The land conversion and land business process, but also, water drains out into this southwest corner, if you look at Khulna topography. What does this mean for the recharge of the underground aquifer? How much recharge is taking place?

Socio-economic research: nice presentation on comparison across four sites in a single framework. Water poverty index has a lot of variables on each of the 5-6 dimensions. More clarity on the statistical procedure to bring down these variable under umbrella factors would be appreciated. Institutional work had involved KUET department students in a test session in the development of the workshop. Certain natural uncertainty was not there, for instance, variability in rainfall levels.

Engineer Sabirul Alam, chief engineer of the Khulna Development Authority commented on the role of the villagers, the objects of the presentations. He observed that at the beginning of the project, they were not so confident, now today, at end of the project they are much more confident, knowing who and how to approach. Often original inhabitants pushed out of peri-urban areas if migrants with more money come there. With this project, you have established your right.

Mr. Jayanta Basu, project advisor from India, commented on the importance of the institutional dimension. Peri-urban areas are todays villages in tomorrow's cities. They are often bound to take the negatives of both the urban and the rural areas. If peri-urban areas are known to be going toward urban, there are no rules anymore. What is happening there in this situation, is that many people are tainted to make a quick grab, and do all the things that should not be done. So, when it ultimately turns into an urban zone, the game has been lost. This is known as the political rent-seeking model, also in socio-economic research. Institutions are failing. People are less depending on it, credibility declining. For instance, Ramsar East Kolkata Wetland site: why are norms being flouted? Political rent-seeking. Furthermore, historic examples from groundwater usage and arsenic health issues in Punjab were shared to underscore the need for the advocacy component in policy making, to talk about what is happening around the world.

The audience raised some further questions. One was if the knowledge generated by the institutional research, had led to better understanding, or ongoing negotiation? It was replied that the evaluation of the role-playing game and its effects has been very extensive, with comparing before and after. The gaming workshop helped participating villagers identify more details and made them aware of certain aspects of problem, such as the role of nature. They also expressed a desire to use it within the village and in a workshop with also government people, to structure the dialogue there. After the workshop, they also were able to describe and explain why certain people would not collaborate in the negotiation session. But how it would be applied to affect future negotiations is difficult to foresee.



#### **Khulna workshop: Research Panel**

**From left:** Mr. Jayanta Basu, Mr. Sabirul Alam (KDA), Professor Wil Thissen (TUD), Mr. Md. Kamal Uddin Ahmed (KWASA) and Professor Md. Mustafa Saroor (KUET )

## 4. Experiences with the Negotiated Approach

### 4.1 The Negotiated Approach (NA) within the Shifting Grounds project

Remi Kempers from Both ENDS gave a general introduction of the Negotiated Approach (NA) and the results achieved in the project period. The approach has been developed by Both ENDS with several partner organizations, and has been used in various parts of the world. In the Shifting Grounds project, the NA is implemented by partner organizations JJS and The Researcher. Remi reviewed how far have we come with the NA in the Shifting Grounds project, based on our ambitions formulated in our initial Theory of Change (see Figure 1 above):

Villagers now really have built knowledge and capacities to understand their problems. On the willingness and capacity for dialogue, a start has been made between government and village communities. Also, part of this was capacity for dialogue supported by the three researchers, and to share their insights with the villagers and respond to need for inputs from village people. This was not easy for the researchers: you need to transfer this scientific knowledge in the most simple text and words. To a certain extent this has been reached, but more might be needed to discuss the available data. So, this capacity level may still need further work.

Village communities have done a needs assessment and identified their priorities, clearly. For engagement with government and knowledge institutions, further work may be needed.

The serious game, in form of simple role-playing game, was the first time such a game was played within the context of the Negotiated Approach. Both ENDS consider that as an important new tool that can be used in the toolbox of the NA, a very important addition. It was played now with local villagers, but can also be played with government representatives and with both parties together combined in one play. More experience is needed to see if this kind of role-playing really works. So far results are very positive and we are very glad with that.

What we know is that Negotiated Approach takes quite a lot of time. 3 or 4 years is too short to come to a major stage in the process. Therefore, we need to continue the process, and therefore it will be very interesting to hear the group discussions later today about this aspect.

### 4.2 Experiences in Khulna

ATM Zakir Hossain, executive director of JJS in Khulna shared the process of the Negotiated Approach in Khulna. In application in Khulna, ten steps emerged as a way to use NA for solving water related problems:

1. Engaging Community in Situation Analysis Process
2. Social Mapping
3. Prioritization of Issues
4. Stakeholder Mapping
5. Issue Based Negotiation Plan
6. Small Scale Participatory Water Management Plan
7. Community Negotiation Group Development
8. Negotiation and Advocacy Skill Development
9. Finalization of Water Management Plan with Stakeholders Suggestions
10. Individual Meeting with authorities

On 2016 JJS conducted socio-economic survey in Hogladanga village and develop a village profile . JJS also develop a Negotiated Approach Guideline in Bengali and share it with villagers. The community was organized through Water rights farmers and Fishermen group, and different knowledge

development activities were undertaken related to groundwater and institutions. Early on in the process, the village negotiation groups worked on prioritization of issues. Three issues were eventually identified as priority issues: accessible safe drinking water, canal encroachment and water logging, and city corporation waste dumping. Although not all were directly related to groundwater, the NA further continued work on these priority issues. Small scale participatory water management plan was developed by villagers for identifying problems and expected solutions, including identifying target organizations based on stakeholder mapping. A six member community negotiation group was formed by the villagers for negotiation and advocacy with authorities for their water related problems. After this, the Community Negotiation Group met with government representatives and agreed on a joint plan. This was followed by individual meetings of community representatives with individual departments: BWDB and DPHE. These meetings were also facilitated by JSS. Officials there showed the villagers a way to solve their problems by suggesting them the appropriate procedures.

Through this NA process, some very specific results have been reached for Hogladanga village. The Upazilla administration (local level government) took the initiative to remove canal barriers. Peri-urban issues are now being discussed at different levels, at universities and in the local media. DPHE is planning to install a test tube well over 1000 ft deep in Hogladanga village, in recognition of the declining water tables and the need for sufficient safe public drinking water supply points. A linkage between community and government stakeholders is developed. Finally, connecting across different projects in the area, a peri-urban water forum is now functional with involvement of several communities, representatives of all related government authorities and civil society. They will stay on issue, also after the project.



Figure 10 Presentation of Hogladanga map by village representatives at NA workshop in Khulna



*Figure 11 Meeting of community group with DPHE and BWDB officials on water logging and drinking water issues*

#### **4.3 Experiences in Kolkata**

**Partha Sarathi Banerjee**

Partha Sarathi Banerjee from The Researcher explained the history of the Negotiated Approach as applied in the Shifting Grounds project. It started with a quite elaborate procedure for village selection and first meetings, followed by the first larger project NA workshop in October 2015. At this first workshop, water-related priority problems were identified and discussed: irregular PHE drinking water supply, insufficient deep tube wells installed by panchayat, and concerns about the groundwater quality and the waste water intrusion from the city canal, and finally, the lack of testing the quality of the packaged drinking water bought by many villagers.

Subsequent smaller mango-tree meetings were conducted to increase community involvement and get more information on the local groundwater management situation, such as health problems presumably resulting from hand-pump groundwater use by households. A second NA workshop, with institutional brief prepared by researcher Sharlene Gomes was done with the presence of the Gram Panchayat (GP) leadership, who came to know the villagers' problems. This workshop helped to resolve misunderstandings that had arisen between the GP leaders and project works.



*Figure 12 Small scale village meeting in Tihuria*

During the project mid-term workshop, villagers expressed their needs for more specific actions from the project, now that a platform for discussion had been initiated. Afterwards, a linkage with the Arsenic Network was established and arsenic awareness and detection programmes were started. 40 samples were collected from domestic tube wells and the ones with higher levels were sent to the PHE accredited testing lab at the Ram Krishna Mission. 17 of these samples had higher than safe levels, 9 samples were above the permissible limit (as per WHO). With this, an arsenic map of the village was prepared (Figure 13). Results were discussed in a larger workshop with panchayat members, the local PHE official and NGO arsenic experts, as well as the members of the Village Water and Sanitation Committee. Arsenic testing, at request of GP, was extended to 7 villages, not only Tihuria. 55% of the domestic tubewells tested were found to be contaminated by arsenic. This was followed by a health camp in Tihuria with a Community Medicine Doctor to check possible arsenic affected members. 10 of the 26-tested people showed arsenicosis symptoms. The arsenic campaign was closed by final arsenic workshop.

As a result of the activities initiated through Shifting Grounds, groundwater security has been brought into the public discourse and is recognized by GP leadership and block officials as an important issue. Also, the Village Water & Sanitation Committee, which appeared to exist only on paper, has been activated, although this is still at an initial stage and will need to be continued in the future. The Researcher, as the local implementing and facilitating partner for the Negotiated Approach in Kolkata, has learned how to apply a structured community engagement and empowerment process through their experience in this project. And the impact of community empowerment will be visible through the successful experience of organizing themselves that was gained in this project. This was achieved without bypassing the official government structures. They have learned to work within official structures and still solve some of their problems.

তিলুরিয়া প্রামের মে সকল নলকুপ ও অন্যান্য জল সংগ্রহের স্থান থেকে আসেনির পরীক্ষার জন্য নমুনা সংগ্রহ করা হয়েছিল।

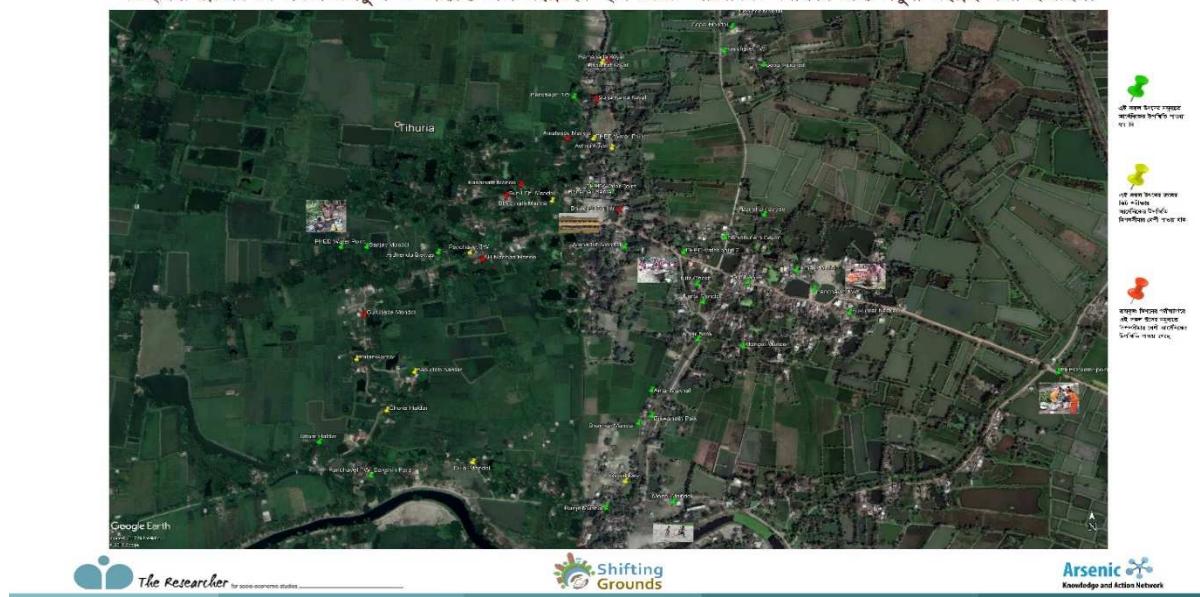


Figure 13 Arsenic map Tihuria

The villagers in Tihuria were initially reluctant to engage with this project. Slowly they understood that the project team was not here to supply new water wells or pipes, but to inform them more about the situation and the groundwater quality problem and other problems. People already had the idea that the water quality was not good, but could not be certain about their problems. Now that arsenic mapping has been done, it has helped the local people to build up their knowledge. This also came to the panchayat authorities, who are now discussing that something has to be done; They are now approaching Block level and District level government officials to take actions. Block level panchayat members are also present here today. Also, the village community representatives have been talking to District level panchayat members. They assured the village that if the arsenic testing reports are shared with them, they will look after it and take proper actions.

Panchayat leaders at final workshop on 14 September in Kolkata promised to take forward the project findings to the upper administrative bodies and seek their interventions. Thus, the 3-year long NA activities seem to have been able to finally create the necessary atmosphere to connect the project findings with the community and panchayat leadership that might go a long way to resolve the perpetual groundwater issues.

#### 4.4 Group discussions: lessons, outcomes, and continuity

After the plenary presentations and discussions, smaller group discussion were held on three key topics related to the use of the Negotiated Approach in this project.

##### Group 1: Lessons learned on the implementation of the NA

This group discussed the practical challenges faced and lessons learned in the implementation of the Negotiated Approach in the project. This group reported on the following issues and solutions:

- Lack of coordination: regular meeting suggested as solution.
- Political influence: make a non-political leadership
- Urban – rural conflicts: coordination and non-political leadership.

- Weakening social relations, lack of information, policy, knowledge and strategies they would need to know.
- Funding and financial crisis after project leaves, so need for a longer time presence. Maybe not four years but ten years.

A member of the audience observed that these were good points, but many of them did not seem to represent challenges that had to be overcome in the implementation of the Negotiated Approach. Rather, it was more a list of future challenges to be tackled in a next phase of activities.

#### [Group 2: Outcomes of the NA process.](#)

This group discussed what results were achieved and what results we had hoped for but did not achieve. They also discussed the (longer-term) impacts expected from these results? Participants in this group discussion came from three villages: Hogladanga, Tentultola and Jotaskair. Hogladanga village had gone through the NA process in the Shifting Grounds project. The other two villages, Tentultola and Jotaskair, had not been part of Shifting Grounds, but had gone through similar processes with other projects supported by JJS, exemplifying horizontal learning across these peri-urban villages, supported by JJS.

A useful outcome was the process of engagement with administration at different level, starting at lowest level and ended with people sitting at the top. Now they know what people to go to for a particular problem, and they now have a relation with people at different levels: Union Parishad level to block level DPHE and to officials in Khulna city.

For Hogladanga, some important tangible outcomes were reached. One is the test tubewell to be installed in DPHE, beyond the standard depth of 1000 feet. Another are the removal of the bamboo fences to store water in compartment in river in dry season for aquaculture, put in place by powerful groups and depriving traditional fishing community, and leading to water logging problems in monsoon. Many of these cross dams had been removed during NA, but when the water logging eased a little, dams also came back, so people expect water logging will re-appear in next monsoon season, and negotiations will have to be done again. Talks with KCC deputy commissioner on waste dumping site near Hogladanga are ongoing, and KCC has decided to modernize it. This will need to be continued to be negotiated with the government.

#### [Group 3: Continuity of NA activities after project ending](#)

Questions addressed in this group were: How can we sustain the NA process in the future? What are the activities we want to carry forward, and how can this be done after the project? The following issues were discussed:

- The experience gained in Shifting Grounds showed the community how to solve their problems. They have solved some problems, and some problems persist. The community stakeholders now realize that when they face future problems, they need a good long-term planning, and they will apply the method from this project to develop such plans.
- From the project experience, village stakeholders also got to know the government authorities and officials, and they will continue the established linkages.
- Research needed on groundwater, also in deeper aquifers, as knowledge here is still limited.
- Peri-urban water forum is to continue; it is like a baby that the local parties should look after. Need and plan to continue with quarterly or half-yearly meetings.
- All in all, the participants expressed that, now that JJS has trained them in this project, in future they should not sit idle, because they now know how to address problems and who is the right person for their initiatives.

## 5. Plenary discussion, questions and reflections

After the feedback from the groups, a lively plenary discussion followed. Mr Basu observed that the Negotiated Approach, as seen here, is mainly confined to community. One dimensional model. For Groundwater, various tiers involved. May need to look at different tiers, complexity of each tier, may make the outcome much more beneficial. Also, when negotiating with others, a good understanding of the political and administrative structures is paramount. Where are the actors, where are the persons? Then it will be heterogeneous process strategy. For instance, try to take Block level officers and District magistrates into confidence, then work with the local political leaders.

Jan Joost Kessler, external evaluator, observed that the main hypothesis of the Shifting Grounds project seemed to be that: Knowledge generated by research could improve the negotiation process. A key question then is: Have persons involved indeed experienced that knowledge generated by research on hydrology, socioeconomic, institutions, has improved the negotiation process? Mr Roy, from Hogladanga village responded and highlighted the importance of learning about the institutional context and the knowledge of the relevant government authorities and how to approach them, for what issues. Poulomi Banerjee added that in Kolkata, the villagers said they knew the problems, but they were not much aware to what extent they suffered from those problems. Through researchers they got that idea and articulating and preparing to go and talk. Rezaul Hasan pointed to the importance of groundwater research results for planning and negotiations. Zakir Hossain added that knowledge did not only flow from researchers to communities, but that also the researchers expanded their knowledge, through the Negotiated Approach process, and that this was in fact also part of the design of the project.

Vishal Narain added that at the start of the project, the people at government agencies were not sensitive, and talked only about the rural and urban. But today, we have seen participants from government who talk about peri-urban and use this language. That's an important outcome of the project, reflects an important attitudinal shift. Same for some government officials who today were presenting group results on behalf of the villagers. This signifies a similarly important attitudinal shift. The importance of the peri-urban in recent planning process was further supported by Sharlene Gomes and by the representatives of government agencies DPHE and BWDW who participated in the workshop, who expressed similar thoughts.

Partha Sarathi Banerjee stated that we should not juxtapose the experiences in NA between Khulna and Kolkata. There are too much differences in starting conditions for this project, and in the societal, political and administrative contexts.



Group Discussions on issues of groundwater and Negotiated approach

Remi Kempers and Melvin van der Veen highlighted the importance of the involvement of women and gender equality. In Hogladanga, women mentioned that before this project they were just seen as housewives, and now they were seen as a voice in the decision-making process. In the negotiation groups, women and men together are involved.

Mashfiqus Salehin described how the project had enriched his own perspective, research and teaching. He would now us the examples from Sifting Grounds and similar projects in his classes at BUET, to illustrate platforms for stakeholder engagements, and stakeholder mapping processes and conflict resolution. He also pointed to the difference between negotiation and movement. We can feel empowered to force some people to make some changes that we desire, or we can engage with them and create an environment in which they can do us a favour. So that it can work both ways.

Leon Hermans observed that today's presentations and discussions showed many examples of how the project has made a difference, in science and practice. One example was what happened the group discussion session. Here, at first mainly the government experts were sharing their good expertise, but not much of a dialogue was going on. However, after some time, an actual dialogue developed. The community people from Hogladanga started to speak up and some ladies from Hogladanga village were directly discussing with senior government officials, and spoke clearly of their views of how they would continue, and had already continued. This indicates that the project has made small, but meaningful contributions. The wider and future implications of this cannot be predicted, but will depend on how each of the participants will take the results forward in their future activities.

On behalf of the project team, all the participating stakeholder representatives and experts were thanked, and all those others who helped the project team: Especially the village communities, but also the local government representatives and experts from universities in Khulna, all of whom were very cooperative and helpful for the project to succeed.

Finally, workshop chair Wil Thissen closed the workshop. Five years ago, he came for the first time to Bangladesh, to Khulna. Each time, it's new. He experienced all the meetings with the stakeholders and members in this consortium, as very involved and engaged and as great experience. He expressed his gratitude to the Project Advisors, who are here with us today, but also before, he thanked the project team members for their excellent presentation todays, and thanked especially the JJS team for preparing and arranging all of this in Khulna.



## **6. Annexes**

## Workshop Programme

### Programme

#### *Introduction*

9:30 – 9:45      Opening and welcome. Professor Wil Thissen (Workshop chair, TU Delft)  
9:45 – 10:00      Overall project set up, goals and results. Dr. Leon Hermans (Project leader TU Delft)

#### *Morning programme: Research results*

10:00 – 11:00      Groundwater research. Md. Rezaul Hasan (BUET)  
10:30 – 11:00      Socio-economic and multi-dimensional index research. Dr. Poulomi Banerjee (SaciWATERs)  
  
11:00 - 11:30      Tea break  
  
11:30 – 12:00      Institutional research. Sharlene Gomes (TU Delft)  
  
12:00 – 13:00      Research Panel. Mr. Md. Kamal Uddin Ahmed (KWASA), Professor Md. Mustafa Saroor (KUET), Mr. Sabirul Alam (KDA), Mr. Jayanta Basu (PAG member India). *Discussion initiated by panel and followed by audience, on research results.*  
  
13:00 – 14:00      Lunch

#### *Afternoon programme: Negotiated approach (NA)*

14:00 – 14:10      Short introduction to NA and NA results. Remi Kempers (Both ENDS).  
14:10 – 14:40      NA results Khulna. Zakir Hossain (JJS) and local NA group.  
14:40 – 15:00      NA results Kolkata. Partha Sarathi Banerjee (The Researcher)  
  
15:00 – 16:00      Discussions in subgroups (with tea).  

- Group 1: Implementation. Practical challenges faced and lessons learned in the implementation of the negotiated approach. Chair: Md. Tasaduzzaman (KCC).
- Group 2: Evaluation. Outcomes of the NA process. What were the results we achieved, what were the results we had hoped for but did not achieve? What are the (longer-term) impacts we expect from these results? Chair: professor Mashfiqus Salehin (BUET)
- Group 3: Continuity. How can we sustain the NA process in the future? What are the activities we want to carry forward, and how can this be done after the project? Chair: Md. Kamal Uddin Ahmed (KWASA)

#### *Plenary closing session.*

16:00 – 16:20      Short presentations by group reporters (5 min each).  
16:20 – 16:40      Short reactions and reflections by Hogladanga NA community group chairperson, Project Advisory Group Members as desired, professors Narain and Salehin, and other participants.  
16:40 – 16:50      Final wrap-up and reflection by project leader Leon Hermans  
16:50 – 17:00      Closing by workshop chair Wil Thissen.  
  
17:00 – 18:00      Drinks

## List of participants

<b>SL</b>	<b>Name</b>	<b>Designation</b>
1.	Leon Hermans	TU Delft (project leader)
2.	Sharlene Gomes	TU Delft (PhD researcher)
3.	Will Thissen	TU Delft (chair PAG, former project leader)
4.	Remi Kempers	Both ENDS (NA coordinator)
5.	Melvin van der Veen	Both ENDS
6.	Poulomi Banerjee	SaciWATERs (postdoc researcher)
7.	Vishal Narain	SaciWATERs / MDI
8.	Partha Sarathi Banerjee	The Researcher, Kolkata
9.	Binoy Majumder	The Researcher, Kolkata
10.	Soma Majumder	The Researcher, Kolkata
11.	Mashfiqus Salehin	BUET, Professor, IWFM
12.	Rezaul Hasan	BUET, PhD researcher, IWFM
13.	Jayanta Basu	PAG member Kolkata (The Telegraph, Calcutta Univ)
14.	Ben Witjes	Country Director, Bangladesh, Mott Macdonald
15.	Habibul Hoque Khan	Director, Department of Environment
16.	Dr. Dilip Kumar Dutta	Professor, Environmental Science Discipline, KU
17.	Dr. Mustafa Saroar	Professor and Head, URP Discipline, KUET
18.	Mahmud Elias	Bangladesh Water Development Board
19.	Kazi Sabirul Alam	Chief Engineer, Khulna Development Authority (KDA)
20.	Md. Zahid Parvez	Executive Engineer, DPHE, Khulna
21.	Md. Kamal Uddin Ahmed	Deputy Managing Director, KWASA
22.	Md. Abdul Latif	Deputy Director, Agriculture Extension Department
23.	S. M. Zahid	The Daily Observer
24.	Md. Matior Rahman	Zonal Coordinator, Blue Gold Programme, Khulna
25.	Tahmina Akter	Blue Gold Programme, Khulna
26.	Biproakash Dhali	SAE, DPHE Batiaghata
27.	Md. Tasaduzzaman	Khulna City Corporation
28.	HM Alauddin	Daily Purbanchal
29.	Md. Selim Farazi	Tentultola Village (PUW Forum)
30.	Kulsum Bibi	Tentultola Village (PUW Forum)
31.	Nur Islam Sheikh	Tentultola Village (PUW Forum)
32.	Bibekanondo roy	Rajbandh Village (PUW Forum)
33.	Md. Azizul Islam	Chawk Ahsan Khali Village (PUW Forum)
34.	Abdur Rouf	Chawk Ahsan Khali Village (PUW Forum)
35.	Nivanon Kumar Roy	Hogladanga Village
36.	Subroto Roy	Hogladanga Village
37.	Utpal Roy	Hogladanga Village
38.	Mithu Roy	Hogladanga Village
39.	Birupoma Roy	Hogladanga Village
40.	Khalilur Rahman	Matumdanga Village

<b>SL</b>	<b>Name</b>	<b>Designation</b>
41.	Anwar Hossain	Matumdanga Village
42.	ATM Zakir Hossain	Executive Director, JJS
43.	Sheikh Nazmul Huda	Project Coordinator, JJS
44.	Kazi Faisal Islam	Research Officer, JJS
45.	MM Chisty	Coordinator, JJS
46.	Lina Ferdousi	HR Coordinator, JJS
47.	Md. Saiful Islam	Accounts Officer, JJS
48.	Ms. Han van Dijk	NWO UDW programme
49.	Ms. Rachel Kelders	NWO-UDW programme
50.	Mr. Jan Joost Kessler	Aidenvironment
51.	Mr. Daniel van Dijk	Netherlands Water Partnership (NWP)

## Presentations (slides)

### *Project Introduction and Theory of Change – Leon Hermans*

Shifting grounds: institutional transformation,  
enhancing knowledge and capacity to  
manage groundwater security in peri-urban  
gangetic delta systems

Leon Hermans



SaciWATERs



- Sustainable groundwater management in peri-urban areas.
- Enhance understanding and build capacity
- Peri-urban villages near Khulna and Kolkata.
- Focus on local level, with local stakeholders
- Research on groundwater, livelihoods and institutions.
- Linked to capacity building through “Negotiated Approach”.
- 4 years. Funding: NWO – UDW. Lead partner: Delft University of Technology

### **Peri-urban areas:**

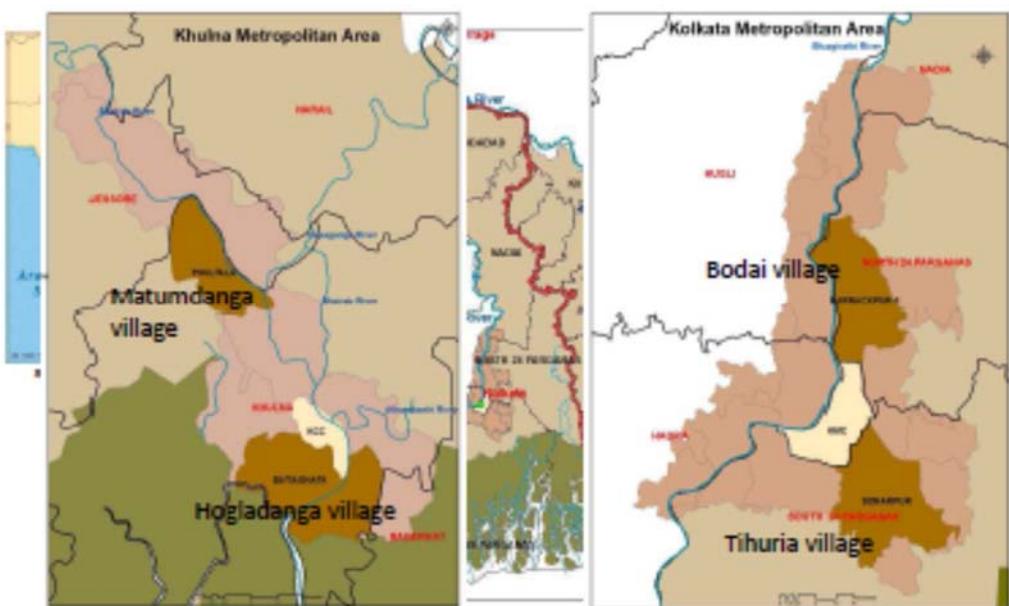
- Transition zones during urbanization
- Dynamic areas
  - social composition and
  - physical change
- Heterogeneous actors
- Institutions outdated, overlapping, difficult to enforce and sustain

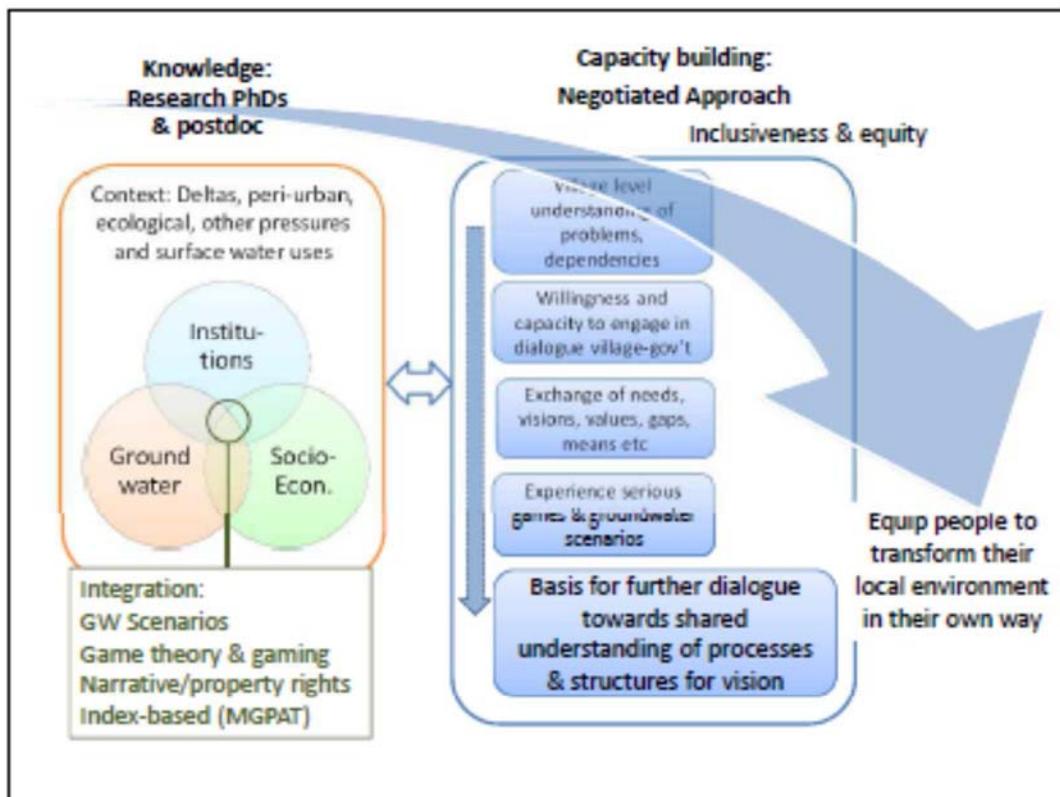
### **Groundwater management:**

- Critical resource for local livelihoods and WASH
- Invisible resource
- Increasing pressures and use
- Visible in conflicts and tensions



## **Ganges delta: Khulna & Kolkata**





## Today: Results, Review, Reflect

- 3 Researchers: Groundwater modelling (BUET), Livelihoods (SaciWATERs), Institutions (TU Delft)
- 3 Capacity building partners: Both ENDS (coord), The Researcher (Kolkata), JJS (Both ENDS)
- What have we achieved? How? And what will future bring?



## **Groundwater System Mapping**



by  
Md. Rezaul Hasan

PhD Student, IWFM, BUET, Bangladesh

September 14, 2018



### **About the research**

#### **Research focus:**

**Groundwater security in coastal peri-urban areas of South Asia**

#### Aims and goals

- Evolution of peri-urbanization around Khulna city
- Investigation of relationship between peri-urbanization and groundwater security
- Analyze relative roles of this relationship in diverse peri-urban settings.

## Peri-urban in South Asia

- Urbanization in coastal Ganges delta has been a continuous process.
- Urbanization accompanied by growth of ***peri-urban areas***

### Characterizing peri-urban

- Changing land use
  - Multiple claimants
  - Flows of goods, services and resources
  - Social heterogeneity
  - Changing locus of control over natural resources
- 
- Groundwater is often the principal source of water
  - And/or an increasing dependency on groundwater
  - Increased pressure on groundwater
  - Enhancing GW security risk in peri-urban areas

**Groundwater security is conceptualized as:**

*"the availability of water throughout the year with acceptable level of quality, accessible to people of different stakes, with tolerable level of risks resulting from climatic and socio-economic processes".*

### Processes beyond peri-urban areas may be important:

- Huge abstraction in city area to meet increasing demand
- Ever increasing agricultural water abstraction in rural areas

## Methodology

- Review of secondary literature/reports
- Scoping visits to field sites
- Direct observation
- Focus group discussions
- In-depth interviews
- Questionnaire survey at households
- Water audit
- Satellite based image analysis
- Data collection (GWL and salinity)
- Analytical works
- Developing mathematical model



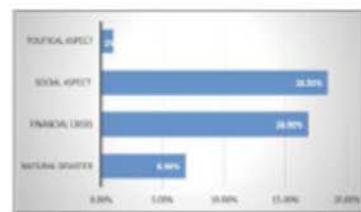
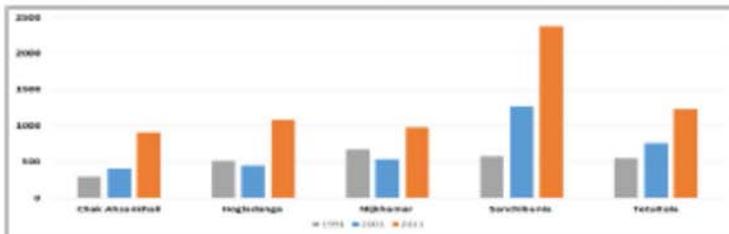
## Studied peri-urban sites in Khulna



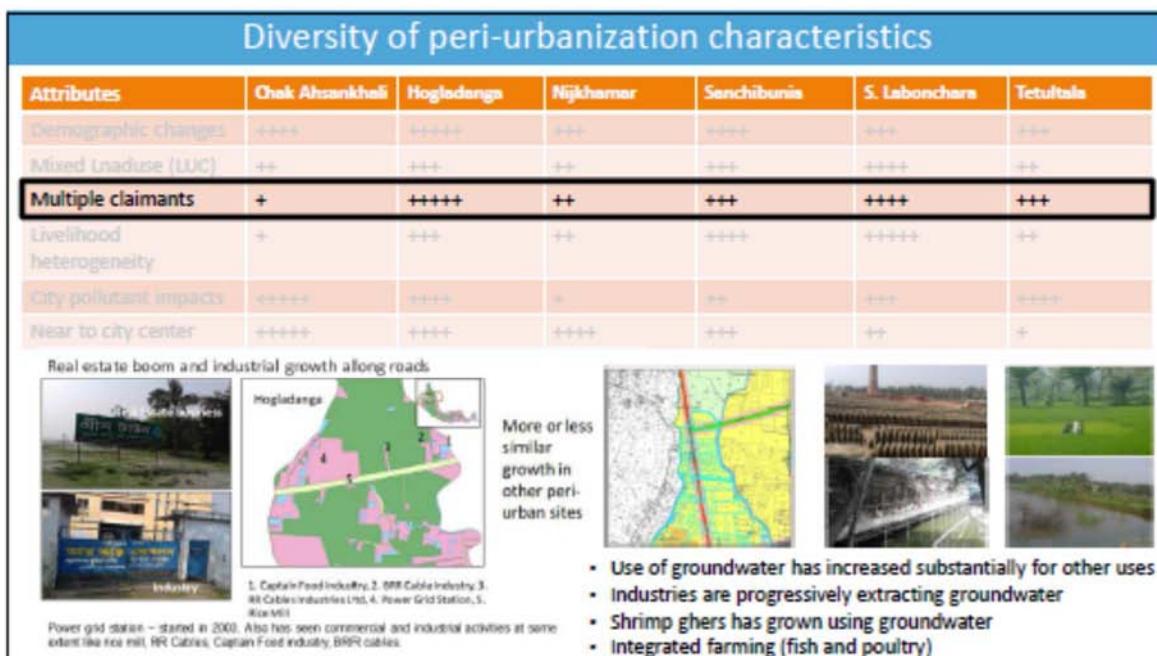
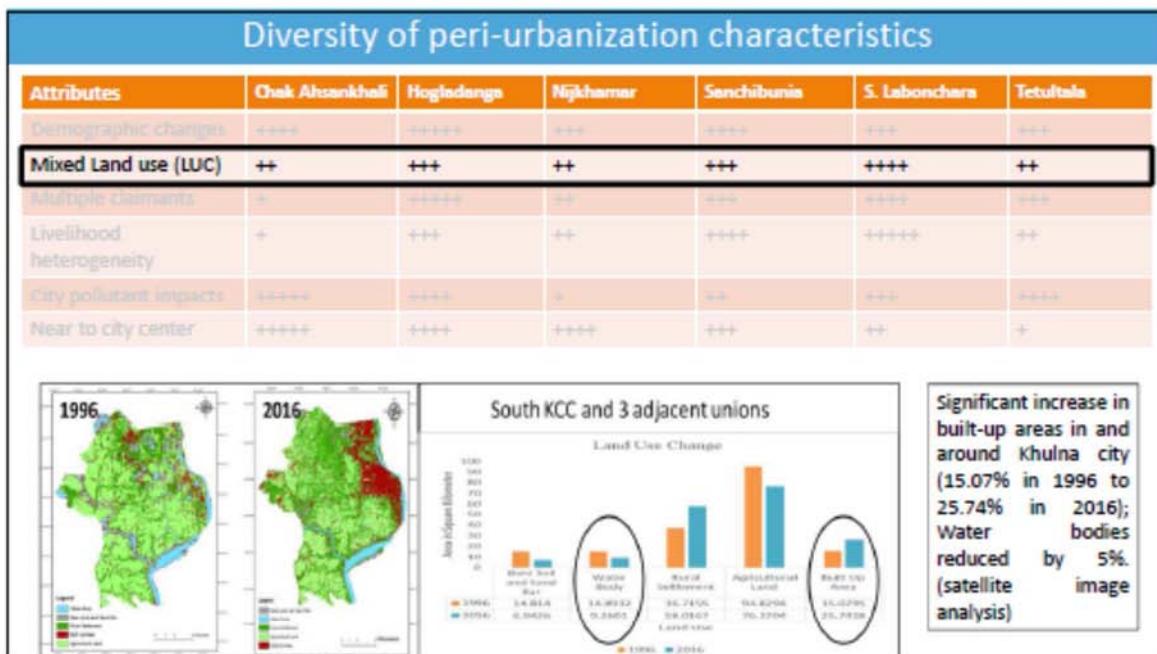
Six peri-urban sites around Khulna city. In-depth investigation for Hogladanga

### Diversity of peri-urbanization characteristics

Attributes	Chak Ahsankhali	Hogladanga	Nijhamar	Sanchibunia	S. Labonchara	Tetultola
Demographic changes	++++	+++++	+++	++++	+++	+++
Mixed Land use (LLUC)	++	+++	++	+++	++++	++
Multiple claimants	+	+++	+	++	+++	++
Livelihood heterogeneity	+	+++	++	+++	+++++	++
City pollutant impacts	+++++	++++	+	++	+++	++++
Near to city center	+++++	++++	++++	++	++	+



- About 56.6% are local inhabitants and remaining 43.4% HH are in-migrants (Hogladanga)
- In-migrants are from Morelganj (Bagerhat), Khulna city and upazilas of Koyra, Dumuria and Shymnagar



## Diversity of peri-urbanization characteristics

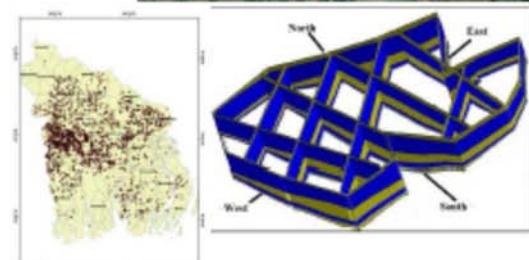
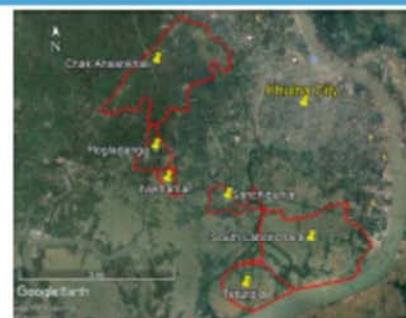
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 <p>High off-farm employment rate (2011):</p> <table border="1"> <thead> <tr> <th>Location</th> <th>Employment Rate (%)</th> </tr> </thead> <tbody> <tr> <td>Chak Ahsankhali</td> <td>42.0</td> </tr> <tr> <td>Hogladanga</td> <td>38.1</td> </tr> <tr> <td>Nijkhamer</td> <td>38.3</td> </tr> <tr> <td>Tetultala</td> <td>38.0</td> </tr> </tbody> </table> <p>High percentage of non-farm families (2011):</p> <table border="1"> <thead> <tr> <th>Location</th> <th>Agriculture</th> <th>Industry</th> <th>Trade, Services, and Others</th> </tr> </thead> <tbody> <tr> <td>Chak Ahsankhali</td> <td>~70%</td> <td>~10%</td> <td>~20%</td> </tr> <tr> <td>Hogladanga</td> <td>~70%</td> <td>~10%</td> <td>~20%</td> </tr> <tr> <td>Nijkhamer</td> <td>~70%</td> <td>~10%</td> <td>~20%</td> </tr> <tr> <td>Tetultala</td> <td>~70%</td> <td>~10%</td> <td>~20%</td> </tr> </tbody> </table>	Location	Employment Rate (%)	Chak Ahsankhali	42.0	Hogladanga	38.1	Nijkhamer	38.3	Tetultala	38.0	Location	Agriculture	Industry	Trade, Services, and Others	Chak Ahsankhali	~70%	~10%	~20%	Hogladanga	~70%	~10%	~20%	Nijkhamer	~70%	~10%	~20%	Tetultala	~70%	~10%	~20%	Inhabitants with urban resources dependent are being increased; exists heterogeneous livelihoods.
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<b>City pollutant impacts</b>	<b>++++</b>	<b>+++</b>	<b>+</b>	<b>++</b>	<b>+++</b>	<b>++++</b>
Near to city center	++++	+++	+++			
<p>Google Earth map showing the locations of Chak Ahsankhali, Hogladanga, Nijkhamer, Senchibunis, S. Labonchara, and Tetultala relative to Khulna City.</p> <ul style="list-style-type: none"> <li>City waste dumping station just besides Hogladanga.</li> <li>Two canals, carrying city and medical wastes, passes through Chak Ahsankhali.</li> </ul>						

## Groundwater security risks

### Hydrogeologic constraints

- Coastal aquifers are hydro-geologically very complex, with high degree of spatial variability.
- Unavailability of suitable aquifers (thickness and quality). It limits the number of tubewell sunk.
  - Chak Ahsankhali (suffers in access to GW) & Sanchibunia (not a issue in access).
- The shallow aquifer (~ 350 ft) taps for drinking water (i.e. Nijkamar).
  - Otherwise tapped for domestic purpose (i.e. Hogladanga)
- Shallow aquifers are saline where nearby tidal rivers/canals, like Chak Ahsankhali, Tetultala, Sanchibunia, South Labonchara.

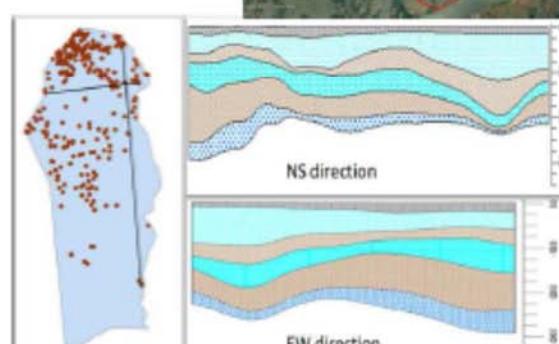
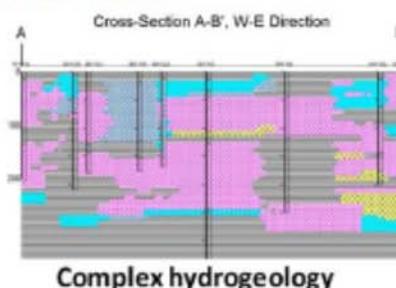


## Groundwater security risks

### Hydrogeologic constraints

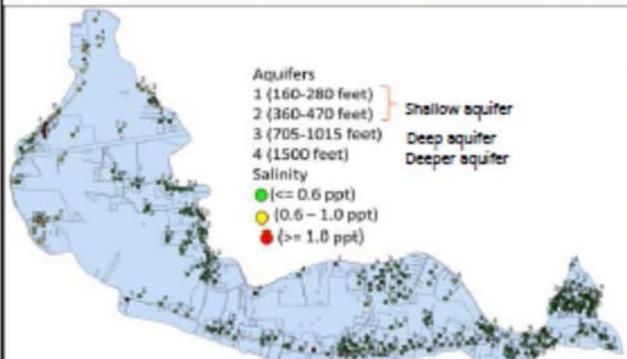
- Where water is not found at acceptable quality in shallow aquifer, the second aquifer is tapped ranging from 600 to 900 ft.
  - Pumping cost increases substantially with depth, which conflicts with affordability.

For example, in Hogladanga, Chak Ahsankhali, Tetultala and South Labonchara



## Dimensions of groundwater (in)security

Attributes	Chak Ahsankhali	Hogledanga	Nijkhumer	Sanchibunia	S. Labonchara	Tetultala
Good quality of water (1 <sup>st</sup> aquifer)	+	++	++++	++	++	++
Proximity to tidal river/canal	++++	++	+	++	+++	++
Salinity in GW (functional tubewell)	++++	++	+	++	++	+++



Aquifers

- 1 (160-280 feet) Shallow aquifer
- 2 (360-470 feet) Deep aquifer
- 3 (705-1015 feet) Deeper aquifer

Salinity

- (<= 0.6 ppt)
- (0.6 – 1.0 ppt)
- (>= 1.0 ppt)



*Chak Ahsankhali Community Map*

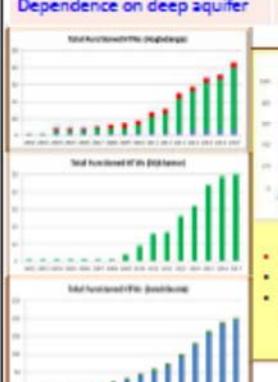


Legend:

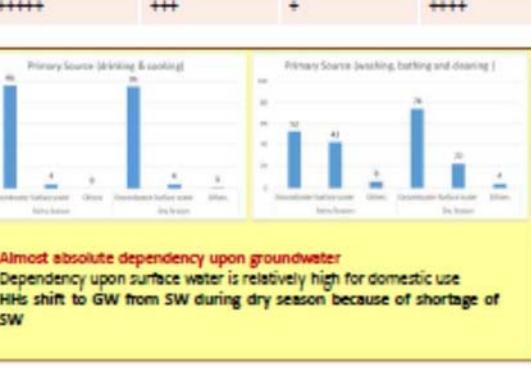
- Demand & Supply Deficit
- Ground Water
- Human Settlement
- Industrial Land
- Forest
- River
- Canal

## Dimensions of groundwater (in)security

Attributes	Chak Ahsankhali	Hogledanga	Nijkhumer	Sanchibunia	S. Labonchara	Tetultala
Increased dependency on GW (drinking)	++++	++++	+++	++	++++	++
GW irrigation	+	++++	++++	+	+	++
GW for commercial / industries	++	++++	++	+++	++++	++++
Dependence on deep aquifer	++++	++	+	+++	+++	++



- Almost absolute dependency upon groundwater
- Dependency upon surface water is relatively high for domestic use
- HHs shift to GW from SW during dry season because of shortage of SW



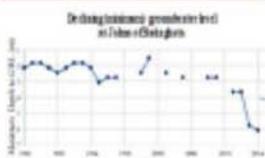
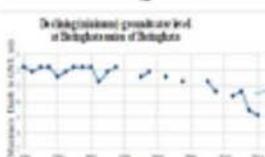
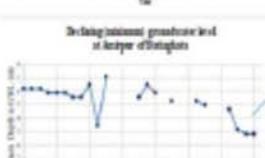
Drinking water use has increased manifolds (Hogledanga village in Sanchibunia)

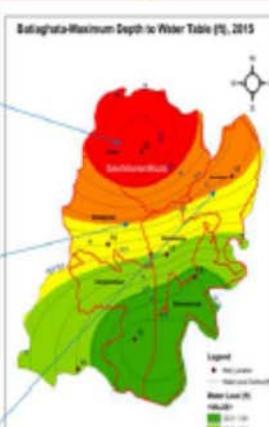
Source of Water	Before 1990	Present
Ground Water	8.2%	96.4%
Tube-well	8.2%	96.4%
Surface Water	90.6	3.2
Pond	55.1%	3.6%
River	8.2%	-
Canal	31.2%	3.6%



### Dimensions of groundwater (in)security

Attributes	Chak Ahsankhali	Hogledanga	Nijkhamer	Senchibunia	S. Labonchers	Tetultala
<b>Seasonal declination of GWT</b>	+++	++++	+	+++	++++	++



Data Source: DPHE (2015)

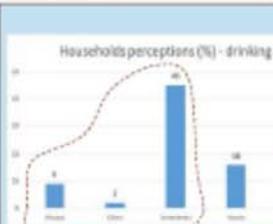
- Declining trend of GWT of 3 unions.
- Surface of maximum depth to GWT (Source: DPHE)

**Primary data collection (by Author)**



### Dimensions of groundwater (in)security

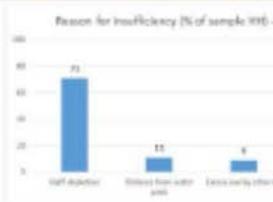
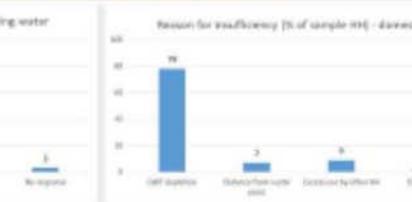
Attributes	Chak Ahsankhali	Hogledanga	Nijkhamer	Senchibunia	S. Labonchers	Tetultala
<b>Emerging water insufficiency in dry season</b>	+++	++++	++	+++	+++	++



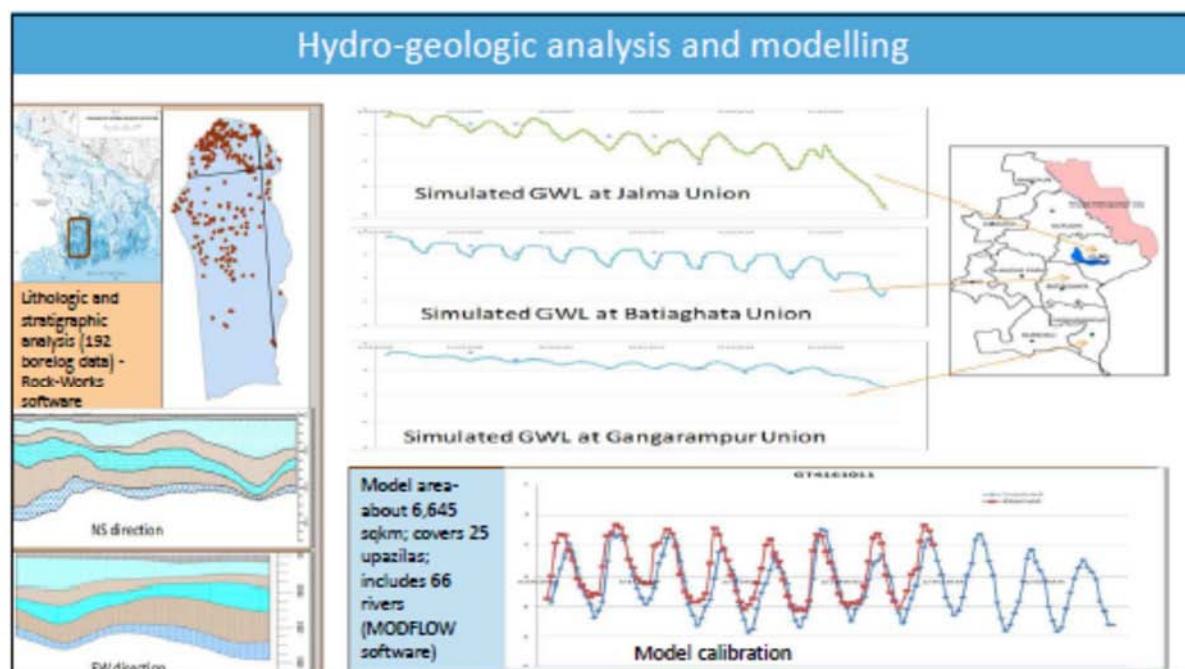

**Groundwater table depletion is the major cause of water insufficiency**

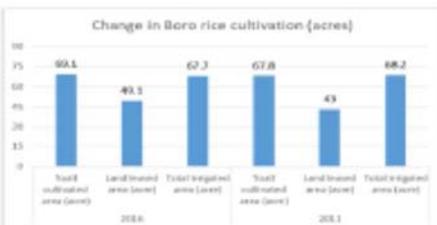
• Half of the population feels water insufficiency from their primary sources

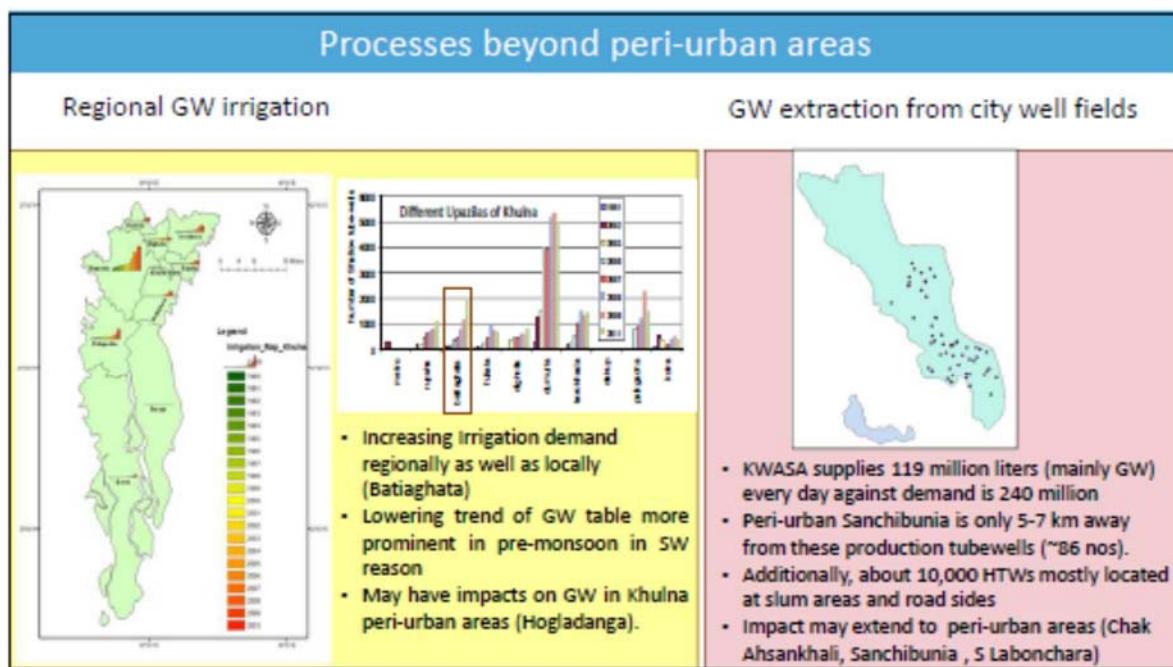
• Groundwater table depletion is the major cause of water insufficiency

Dimensions of groundwater (in)security																							
Attributes	Chak Ahsankhali	Hogledanga	Nijkhamer	Sanchibunia	S. Labonchara	Tetultala																	
Sufferings in access to GW (health, distance & time)	++++	++	+	++	++	++																	
<ul style="list-style-type: none"> <li>All the newly constructed houses/buildings, people have installed tubewells to meet their water demand. This has been in case in Sanchibunia, Nijkhamar, S. Labonchara.</li> <li>At ChakAhsankhali where deep tube-wells have been limited, one deep tube-well serves about 50 to 60 households and often there is a conflict.</li> <li>Besides, there is no conflict at Tetultala whereas found few tubewells.</li> </ul>																							
<p>Community Tubewells</p> <table border="1"> <caption>Data for Community Tubewells (approximate values from chart)</caption> <thead> <tr> <th>Location</th> <th>TW(HH+I) (%)</th> <th>TW(HH+I) (%)</th> </tr> </thead> <tbody> <tr> <td>Sanchibunia</td> <td>85</td> <td>15</td> </tr> <tr> <td>Hogledanga</td> <td>70</td> <td>30</td> </tr> <tr> <td>Nijkhamer</td> <td>95</td> <td>5</td> </tr> <tr> <td>Chora</td> <td>25</td> <td>75</td> </tr> <tr> <td>Dangatala</td> <td>75</td> <td>25</td> </tr> </tbody> </table>						Location	TW(HH+I) (%)	TW(HH+I) (%)	Sanchibunia	85	15	Hogledanga	70	30	Nijkhamer	95	5	Chora	25	75	Dangatala	75	25
Location	TW(HH+I) (%)	TW(HH+I) (%)																					
Sanchibunia	85	15																					
Hogledanga	70	30																					
Nijkhamer	95	5																					
Chora	25	75																					
Dangatala	75	25																					



Heavy withdrawals at peri-urban areas						
GW irrigation	+	++++	++++	+	+	++
GW for commercial / industries	++	++++	++	+++	++++	++++
						
Total cropped area for Aman has declined significantly in last 5 years						
More or less unchanged Boro cultivation (slight increase!)						
Land leased increased from 63.5 percent to 71.1 percent for Boro						
<ul style="list-style-type: none"> <li>Heavy local point withdrawals may impact groundwater level locally especially for the shallow aquifer.</li> <li>Irrigation pumping within peri-urban area, if persistent in considerable volume, may lower the groundwater level locally, impacting nearby hand tube-wells sunk in the shallow aquifers.</li> </ul>						



## Key messages

- Rapid peri-urbanization takes place in south and western parts of KCC over the last decade.
- There is diversity in Khulna peri-urban areas in terms of the extent of dominant characteristics peri-urbanization viz. changing demography, heterogeneous livelihood, changing land use and multiple claimants of water.
- Peri-urban community faces groundwater security risks in terms of availability, quality and access.
- Coastal aquifers are hydro-geologically very complex, with high degree of spatial variability. It limits the number of tubewell sunk, in turns access to GW.
- Proximity to the rivers and/or canals carrying saline water is one important factor for groundwater salinity in the shallow aquifer. Otherwise, deep aquifer is tapped for all purposes.
- Increased pressure on groundwater because of increase in population and emergence of multiple claimants on water (industries, aquaculture, etc.).
- Land use change within the peri-urban areas appears to be a less significant in affecting groundwater.
- Huge irrigation abstraction from the shallow aquifers in adjacent rural area impacts lowering of GWT in peri-urban areas. But the most plausible reason for deep aquifer is the huge abstraction of groundwater in the city area. Groundwater model also indicated this phenomenon.
- Peri-urban areas of Kolkata are also facing same kind of problems

Thank you

## **Socio-Economic and Multi-Dimensional Index Research**

Poulomi Banerjee, SaciWATERs



### **Outline of the Presentation**



- Overall Objective and Research Questions
- Survey Design and Sample Size
- Case studies : Drinking Water scenario
- Irrigation: Bodai and Tihuria
- GroundWater Poverty Index (GPI)
- Conclusions and Way Forward

## Overall Objective and Research Questions

- An improved understanding of the impact of the urbanization process on groundwater security and identify areas of prioritization and interventions for its effective management in peri-urban Kolkata and Khulna
- Research Questions:
  - To what extent urbanization process, infused by social differentiation, economic status and engineering principles have transformed household's choices of drinking, domestic and irrigational sources in selected peri-urban villages?
  - What are the areas of priority for negotiation and interventions in order to improve the groundwater status of the peri-urban households?

## Methods

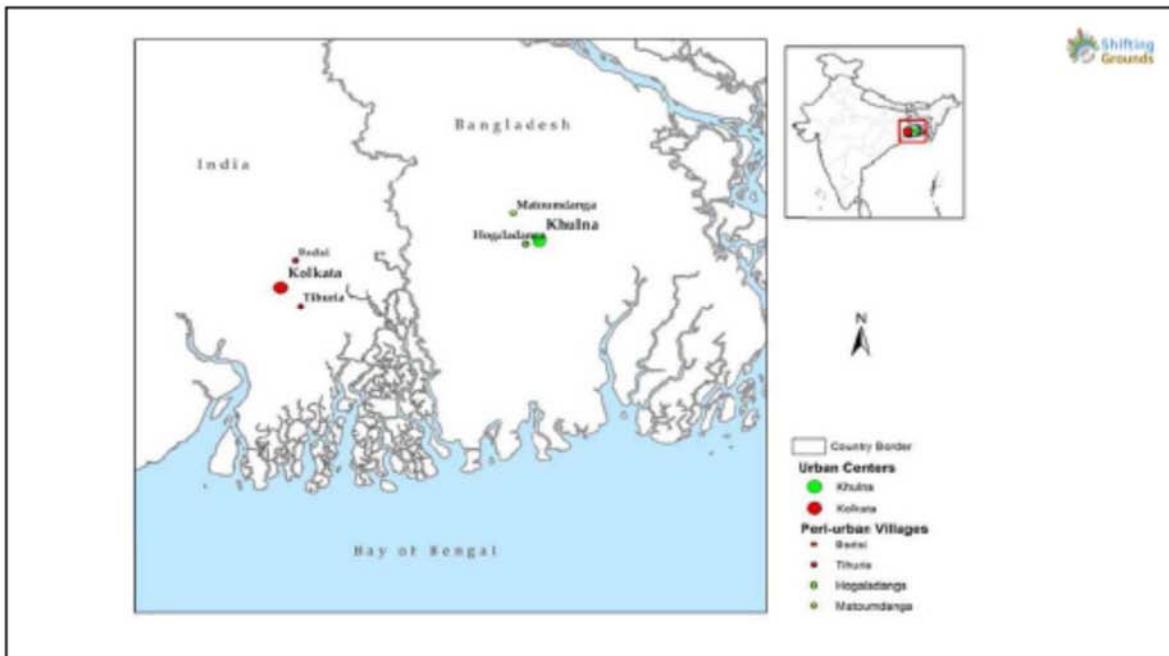
- Qualitative : RRAs, Participatory Mapping and Visual Observations, Key Interviews and Group Discussions
- Quantitative: Household Survey (*Descriptive Statistics, GIS mapping and composite index*)
- Survey Design (Quantitative): Livelihood choices (Stratification criteria)
- Sample size is the exact proportion of all identified groups in actual total population
- Qualitative survey design: Sources of Irrigation, Types of Tenancy

Sample Size (Household Survey)

Tihuria	Bodai	Hogladanga	Matomdanga
563	641	461	421
128	130	100	93

Sample design

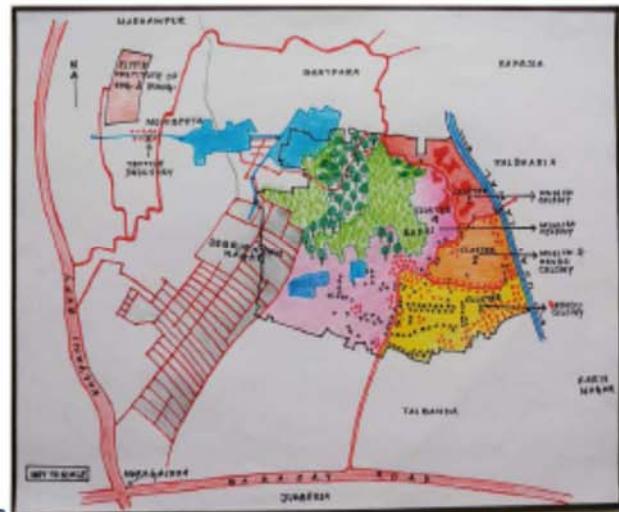
	KPI	GD
Tihuria	10	5
Bodai	16	7



## Bodai: Some Facts

- N24 Pargana, Barrackpore II, Bodai GP, 25 Kms from KMC through Kalyani expressways, Jessore road
- 4 Clusters with Muslims (80%), Hindus (15%) and migrants (5%)

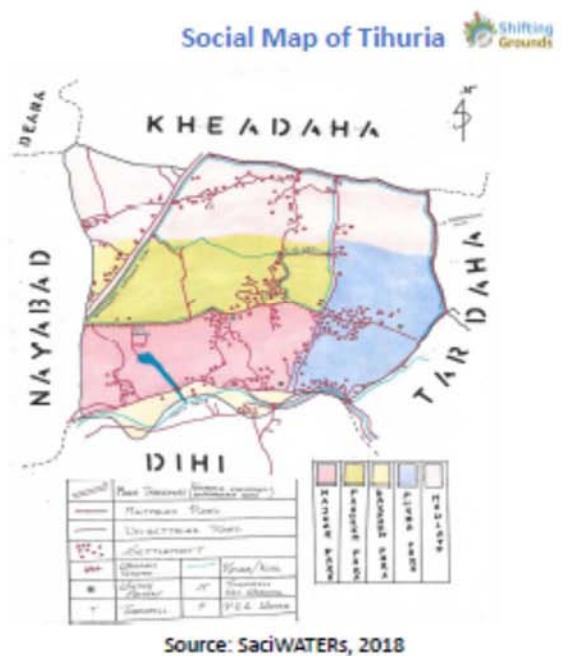
Social Map of Bodai



Source: SaciWATERs, 2018

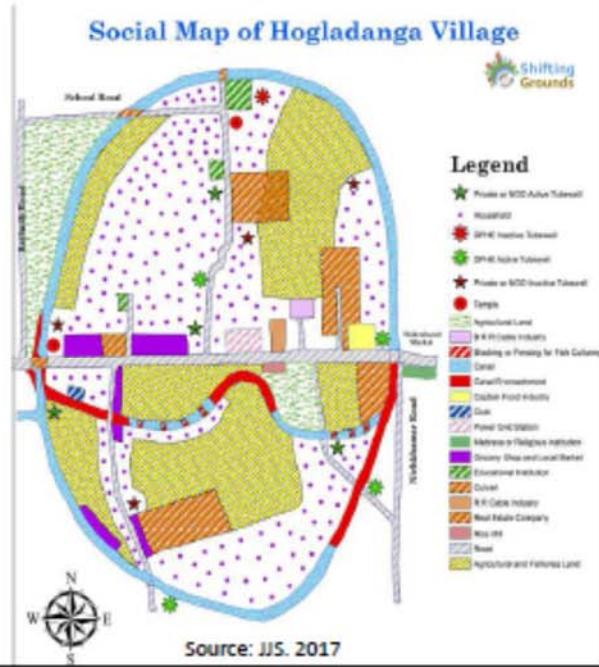
## Tihuria: Some Facts

- S 24 Pargana, Sonarpur Block, Kheyadaha GP,
  - Unique socio-economic composition
  - 5 clusters: Majher Para, Pashim Para, Purbo Para, Dakhin Para and Maulali
  - 300 years of urbanization processes
  - Metro rail at Garia is about 7 km from the village



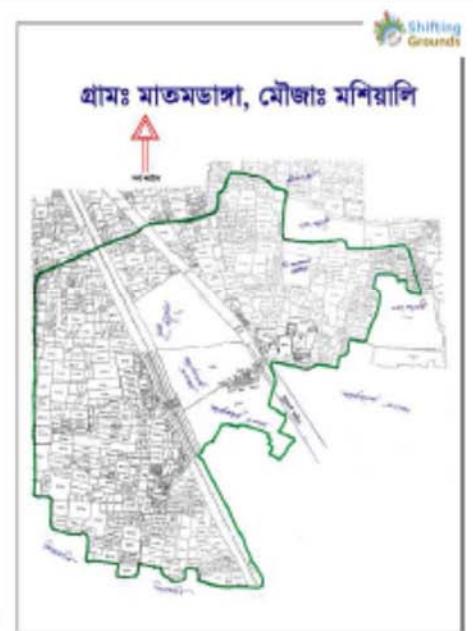
## Hogladanga: Some Facts

- Jalma Union and Batiaghata Upazila
  - Considerable migrant population since 2005 from
  - Favored destination of real estate agents and land appropriation by private bodies
  - 3 DPH active tubewells



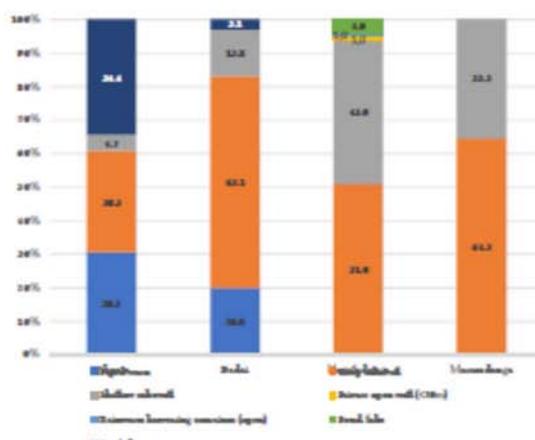
## Matomdanga: Some Facts

- Attra-Gilatola Union and Phultala Upazila
- Haphazard industrialization and public appropriation of resources
- Extensive usage of groundwater by cantonment board and industries
- Higher dependence on private tube wells



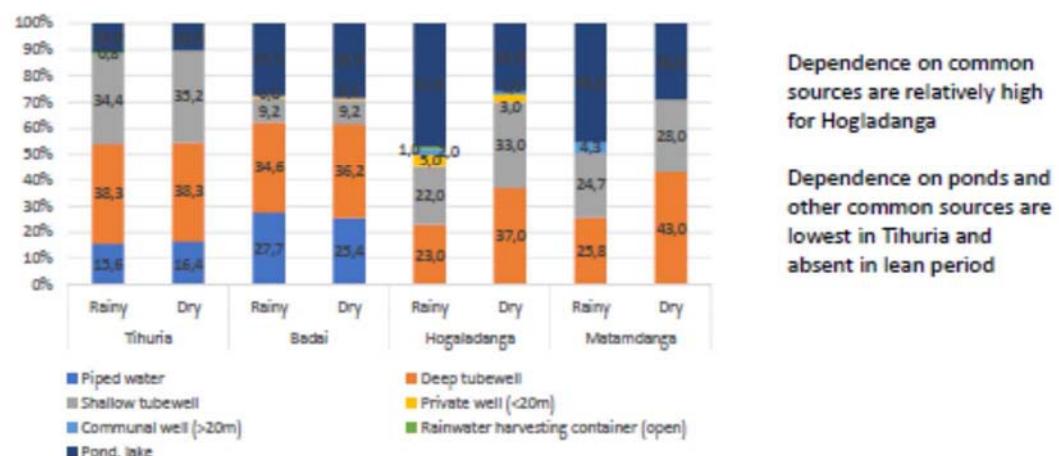
Source: JJS. 2018

## The Percentage Distribution of Primary Drinking Water sources



- Piped water supply has GW
- No direct household connect
- DTWs are significant sources for all the four villages
- DTWs for PU Kolkata are publicly managed, while it is not always the case for Khulna
- Strong presence of private water markets in PU Kolkata
- Dependence on vulnerable sources are high for Hogladanga

## The Percentage Distribution of Domestic Water sources across seasons



Dependence on common sources are relatively high for Hogladanga

Dependence on ponds and other common sources are lowest in Tihuria and absent in lean period

### Class wise Insufficiency of drinking water from primary source (%), 2016

Class	Village	Rarely	Often	Always	No response	Total
Lower class	Tihuria (41)	2.4	24.4	47.9	12.2	100
	Bodai (13)	0	61.5	38.5	0	100
	Hogladanga (41)	7.3	19.6	70.7	2.4	100
	Matamdanga (32)	9.4	34.3	56.3	0	100
Middle class	Tihuria (64)	20.3	31.5	18.8	29.4	100
	Bodai (72)	16.9	50	15.3	17.8	100
	Hogladanga (50)	20	78	2	0	100
	Matamdanga (40)	15	77.5	2.5	5	100
Upper class	Tihuria (23)	62.67	4.3	0.3	13	100
	Bodai (45)	65.6	3.3	0	11.1	100
	Hogladanga (9)	66.6	33.3	0	11.1	100
	Matamdanga (21)	76	22	2	0	100

Source: Primary survey. Number of sample households in parentheses.

### Class wise insufficiency of domestic source (%), 2016

Class	Village	Never	Very often	Always
Lower class	Tihuria (41)	19.5	42	29.3
	Badai (13)	0	40	61.5
	Hogaladanga (41)	14.6	68.3	2.4
	Matamdanga (32)	44.4	56.3	9.4
Middle class	Tihuria (64)	46.8	34.4	15.6
	Badai (72)	34.8	31.9	23.6
	Hogaladanga (50)	56	36	0
	Matam danga (40)	62.5	32.5	0
Upper class	Tihuria (23)	95.7	0	0
	Badai (45)	68.3	22.2	0
	Hogaladanga (9)	33.3	55.6	0
	Matam danga (21)	77.2	23.8	0

Source: Primary survey. Number of sample households in parentheses.

### Economic status wise percentage distribution of sample households by primary source of drinking water, Tihuria, 2016

Source	Most of the year				Peak Season				Lean Season			
	lower	middle	upper	Total	lower	mid dle	upper	Total	low er	middl e	upper	Total
PHED water supply (Common stand-post)	24.4	35.9	26.1	30.5	22	31. 3	21.7	26.6	24. 4	31.1	26.1	32
Deep tube well	34.1	26.6	34.8	30.5	34.1	25	34.8	29.7	34. 1	23.4	30.4	28.1
Shallow tube well	4.9	4.7	4.3	4.7	2.4	3.1	4.3	3.1	2.4	3.1	4.3	3.1
Bottled water	36.6	32.8	34.8	34.4	41.5	40. 6	39.1	40.6	39	34.4	31.1	36.7
Total (%)	100	100	100	100	100	100	100	100	10 0	100	100	100
Total Households	41	64	23	128	41	64	23	128	41	64	23	128

### Reason for insufficiency in drinking water source (%), 2016

Reason	Tihuria	Badai	Hogaladanga	Matamdanga
Erratic supply from public source	19.5	10	11	10.8
Location of the house on an elevated terrain	0	2.3	1	0
House situated in the rear side of the village where the water does not reach	5.5	0	10	0
Extraction by industries	0.8	44.6	8	2.2
Leakages in the pipe and lack of repairing	36.7	6.2	1	0
Do not know	11	1.5	6	6.5
No response	1.6	2.3	1	5.4
Depletion of ground water table due to agri practices	0	0	60	49.5
Not applicable	25	33.1	2	25.8
Total (%)	100	100	100	100
Total households	128	130	100	93
Source: Primary survey.				

### Quality of household's drinking and cooking water before treatment (%), 2016

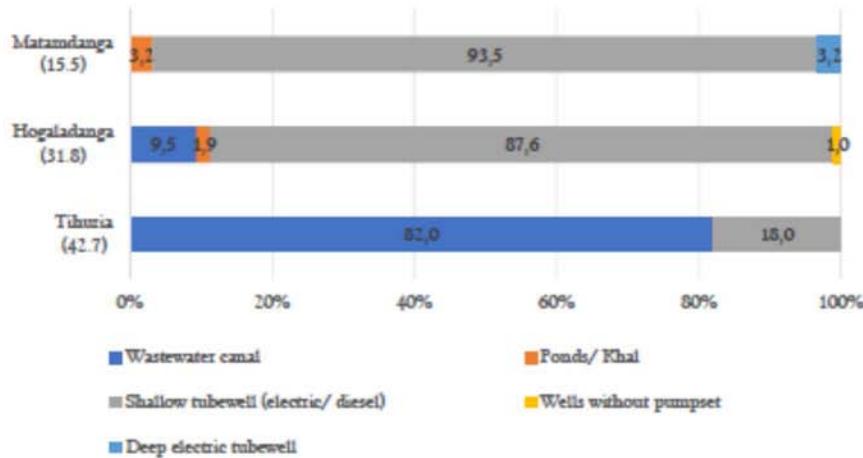
Quality	Tihuria	Badai	Hogaladanga	Matamdanga
No response	0.8	0	1	0
Do not know	3.9	0	5	1.1
Very bad	15.7	7.7	0	8.6
Poor	35.82	17.7	61	55.9
Good	44.5	73.8	26	28
Very good	0	0.8	7	6.5
Total (%)	100	100	100	100
Total households	128	130	100	93
Source: Primary survey.				

Pumping hours (%) in Boro cultivation by source of irrigation, 2016

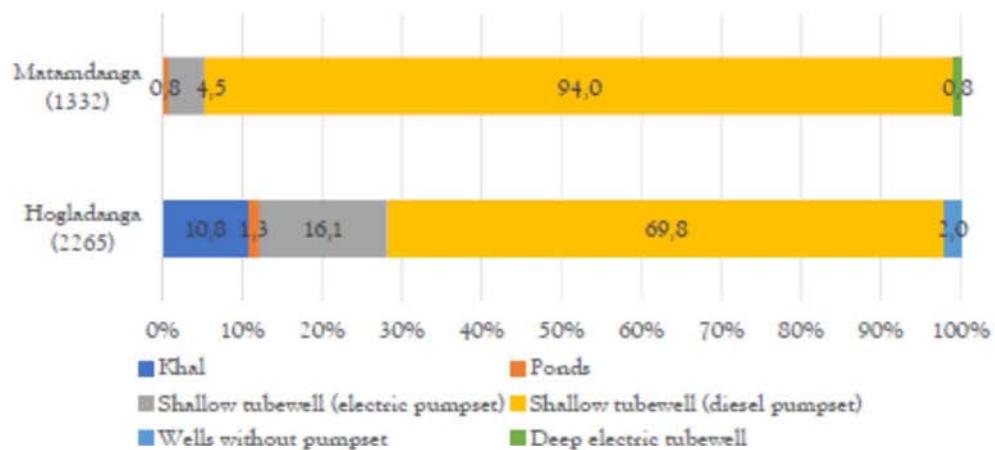
Source	Tihuria		Badai		Hogaladanga		Matamdanga	
	Last year	5 years ago	Last year	5 years ago	Last year	5 years ago	Last year	5 years ago
Khal	3.3	16.6	0.0	0.0	20.5	20.8	0.0	0.0
Ponds	0.0	0.0	0.0	1.0	5.8	6.8	0.0	0.6
Shallow tubewells with electric pumpset	0.0	0.0	27.3	15.4	21.5	22.7	5.4	5.1
Shallow tubewells with diesel pumpset	91.2	74.2	0.6	0.0	48.7	42.1	83.7	76.1
Wells without pumpset	0.0	0.0	0.0	0.0	0.8	5.3	3.5	11.2
Deep electric tubewell	0.0	0.0	72.1	83.6	2.7	2.4	7.4	6.9
Wastewater	5.5	9.2	0.0	0.0	0.0	0.0	0.0	0.0
Total pumping hours (%)	100	100	100	100	100	100	100	100
Total pumping hours (numbers)	1095	566	5029	4135	5511	3325	4295	3113

Source: Primary source.

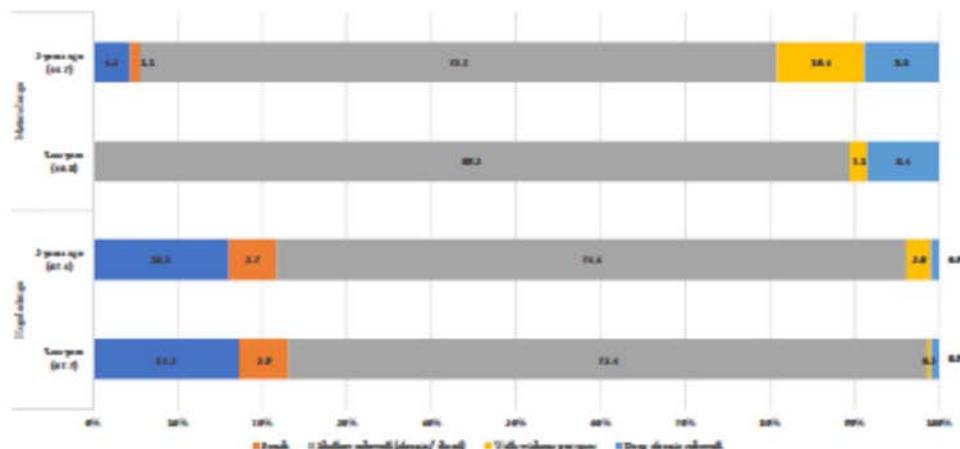
Percentage distribution of irrigated area under aquaculture by primary source of irrigation, 2016



## Pumping hours (%) in aquaculture by primary source of irrigation, Khulna,



## Percentage change in distribution of irrigated area under Boro cultivation by primary source of irrigation, Khulna, 2016

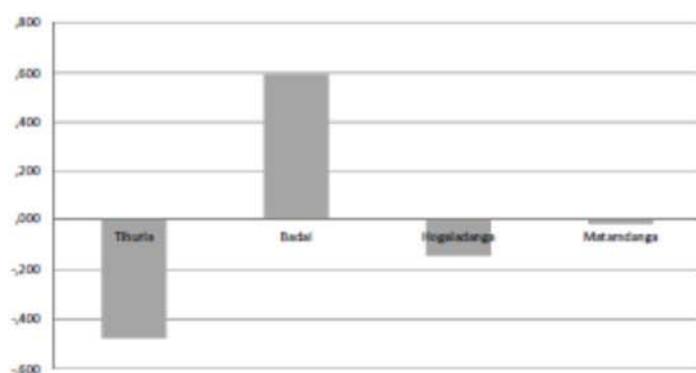


## Indicators for Measuring Ground Water Poverty (GWP)

Components	Sub-components
Resource: Physical availability of both surface and GW (Quantity, variability and quality)	1) Number of Months (in Last 1 Year) Main Water Source Sufficient to Meet Household's Drinking, Cooking, Bathing and Cleaning Needs 2) Quality of Household's Drinking and Cooking Water (Before Treatment)
Access:	1. Total Pumping Hours per unit of operated area All Crops 2) % Gross Irrigated Area
Use:	Per capita water collected (Ltr per capital)
Capacity and storage	1) Highest Level of Education among Household Members 2) Can household head read newspaper 3) Highest level of schooling that female children in the household are likely achieve 4) Asset Index (PCA with source of drinking water, construction material, toilet, kitchen)
Environment:	Quality of Household's Non-Potable Water Source



### Village wise Groundwater poverty



## Position of Hogladanga and Tihuria in terms of Groundwater Poverty: Components



## Conclusions



- There is a decline in the groundwater status in all the four cases where Tihuria emerged to be the most groundwater poor
- *Decline in the gross irrigated area and increasing pumping hours for boro depicts such declining trend*
- Usage of shallow tubewells in wastewater aquaculture ponds manifolds the stress in Tihuria
- Insufficiency attributed to physical coverage and poor maintenance is strongly reported by Tihuria
- Capacity of the households measured in his awareness and educational level, economic status plays critically for Hogladanga
- Inequity and exclusion is not only shaped by the incapacitated institutional framework but household's preference towards 'a perceived urban lifestyle'
- Scarcity is created along the axes of class
- Political alliances exacerbates inequalities, shape exclusions and collective action

## Way Forward

- Increase coverage of the public drinking water sources across four villages
- Regulation for private deep tube wells in peri-urban Khulna
- Interventions in education and awareness building in Tihuria and Hogladanga
- Reclamation of the subsidiary wastewater channels in Tihuria
- Wastewater paddy cultivation can be explored in Tihuria

*Thank you*



# INSTITUTIONAL APPROACH TO PERI-URBAN PROBLEMS

Results from Hogladanga village, Bangladesh



Sharlene L. Gomes

PhD Candidate, Delft University of Technology

## 01. RESEARCH FOCUS



### Khulna city, Bangladesh

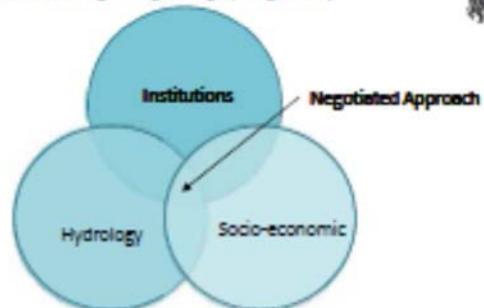
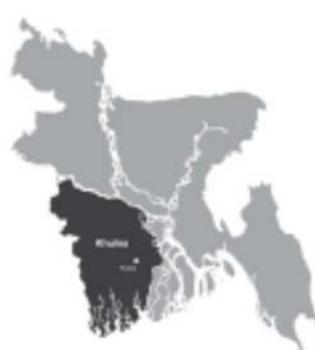
- Rapid and uncontrolled urban expansion
- Pressure on groundwater resources
- Affects drinking water supply in peri-urban communities

### Hogladanga village

- ~7 km away from Khulna city
- Groundwater dependent for drinking, domestic, agricultural activities

### Focus:

- Research on institutional context of peri-urban groundwater problems
- Support for on-going NA process in Hogladanga village (Bangladesh)



## 02. PERI-URBAN INSTITUTIONS



Formal & informal institutions



Arranged along rural  
and urban boundaries



Over-lapping  
Fragmented  
Peri-urban institutions

Rural institutions are unable to manage changing needs of peri-urban areas

Decision-making arena

- Consists of multiple actors with varying interests and goals
- Problem solving requires negotiating with other actors
- Peri-urban communities are isolated from formal policy arenas



Peri-urban communities have limited access to information about institutions and experience negotiating in policy arenas

## 03. OPPORTUNITY



- Support problem solving in Hogladanga
  - Improve understanding of institutional context
  - Build capacity to navigate decision making arena
- Developed a participatory community-based approach consisting of 4 steps

01      02      03      04

Problem  
identification

Map the institutional  
context of the  
problem

Analyze strategic  
behaviour of actors

Explore strategies to  
address problem

## 4. RESULTS

### STEP 1: PROBLEM IDENTIFICATION



- NA Activities and field reports had highlighted several issues in Hogladanga
  - Waste management, Canal encroachment, sluice gate mismanagement, fish farming value chain etc
- Access to safe drinking water supply most pressing concern for residents
  - Insufficient tube-well infrastructure to meet local needs

### STEP 2: INSTITUTIONAL ANALYSIS



#### Formal drinking water situation

- Area:** WATSAN Committee manages drinking water supply at sub-district level. Community submits application, Committee distributes tube-well licenses. DPHC responsible for installation and water quality testing. Mechanics construct the tube-wells.
- Institutions:** National Policy for Safe Water Supply & Sanitation (1998), Bangladesh Water Act (2013), Contracts for mechanics
- Outcome:** No tube-wells installed in Hogladanga, no licenses issued to village in over 5 years



#### Existing informal situation

- Area:** Option 1: Residents invest in private tube-wells. Mechanics are hired to install but local aquifer conditions are unknown. So often, tube-well installations fail.
- Institutions:** Queue system, agreements with tube-well owners, payment rules for contractors
- Outcome:** Drinking water security but inconvenient, unreliable over time, unknown quality



#### Future urban situation

- Area:** Option 1: Apply for piped surface water supply from KWASA. Projects prioritize existing city residents (not designed for future urban population). Option 2: Apply for public tube-well from KWASA. Share with other households.
- Institutions:** Khulna Master Plan (2001), Urban expansion proposal, WAGA Act (2008), T&C of water supply projects, Tariffs for different options
- Outcome:** Water security for expanded urban areas in the future is uncertain

## NA INPUTS & FEEDBACK

- De-briefing workshop
  - Attended by community government, CSO representatives on June 4, 2015
  - Discuss results of Step 2
- Institutions brief shared via IJS
  - Formal institutions related to drinking water supply
  - Eg. Process for obtaining water supply
  - Shared with the community at Mango tree meetings



- Meanwhile ongoing NA activities showed that
  - Access to safe drinking water (quality) just as important for the community
  - Reflected in their Negotiation plan (depth of tube-wells)

## STEP 3: ANALYSE ACTOR BEHAVIOR

Game Theory Models were used to examine

- Existing drinking water supply
- Future drinking water supply
- Groundwater monitoring to improve drinking water quality

- Models use 4 inputs: actors, actions, outcomes and costs and benefits
- Insights
  - Why communities cannot get their preferred strategy
  - Compare different future strategies to access groundwater
  - Compare non-cooperative vs cooperative groundwater monitoring
- BUT models are not so easy to interpret for a community**



## STEP 4: EXPLORE STRATEGIES THROUGH A ROLE PLAY GAME



TU Delft

## CAPACITY BUILDING WORKSHOPS

TU Delft

Facilitated by JJB

March 27, 2018 : Community residents  
March 28, 2018 : Local government representatives

### Session 1 Session 2 Session 3

Peri-urban  
drinking water  
situation

- Existing Situation

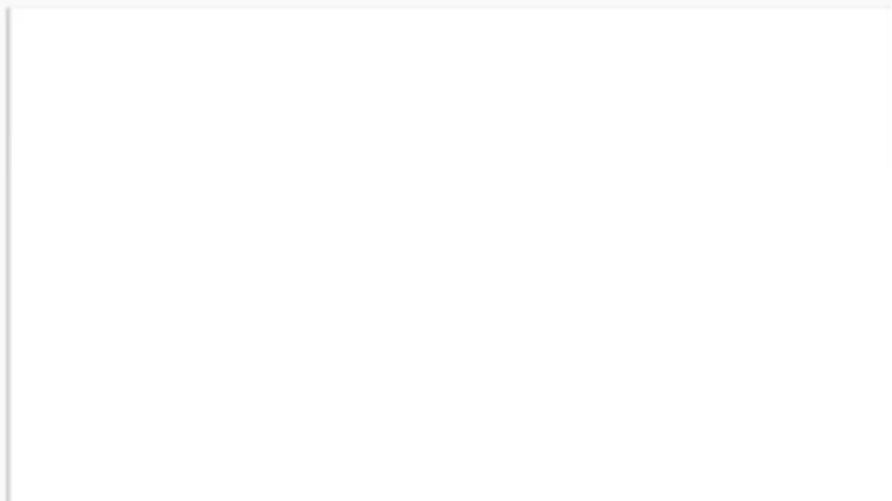
Urban drinking  
water situation

- Future Situation

Groundwater  
monitoring

- Cooperation & challenges of negotiating  
solutions

## 05. COMMUNITY FEEDBACK



For a list of publications about this research visit:  
[https://www.researchgate.net/profile/Sharlene\\_Gomes](https://www.researchgate.net/profile/Sharlene_Gomes)

# THANK YOU



## Initiative for Solving Water Related Problems through Negotiated Approach in Khulna

14<sup>th</sup> September 2018, Kolkata, India

**ATM Zakir Hossain**, Executive Director, Jagrata Juba Shangha (JJS)



SaciWATERs



### Hogladanga Village - The Study Area

- Hogladanga village is under Jalma union of Batiaghata upazila, 5 Kilometers away from Khulna City besides Khulna Satkhira highway
- Number of Households: 189; Farmer 29.6%, Day laborer 19.60% and small Business 19.70% and around 09% are involved in Fish Farming, About 32% household heads are illiterate
- 43.4% households settled here after Aila (2009) and Sidr (2007) especially from exposed coastal areas. 22.2% settled in the last five years



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## Agriculture

29.6% families depend on agriculture for their livelihood among which 18.5% are tenant farmers and 11.1% own land. Rice, Vegetables are major crops, Pulse and Sesame are also produced. In the last 10 years underground water use for irrigation increased from 13.5% to 65.5%

Because of new settlements of new comers, crop lands are decreasing fast

Source	Source of Irrigation	
	Before 10 Years	Present
Ground Water	13.5%	65.5%
Tube wells	13.5%	65.5%
Surface Water	86.5%	34.5%
Pond	11.5%	11.5%
Canal	57.7%	23%
River	17.30%	0%

Source: Baseline Survey, IIS, 2006

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## Fisheries

- 9% households involved in fish farming. 4% are engaged in shrimp Cultivation and rest 5% are engaged in white fish cultivation(Rui, Katla)
- Some powerful villagers fence canal for fish cultivation that is responsible for water logging



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## Safe Water

- Currently 96.8% people use tube-well water for drinking and households use purposes, before 10 years which was only 6.3%
- About half of the households spend more than 1 hour in a day to collect fresh water from their targeted deep tube-wells

### Safe Water Sources

Source of Water	Before 10 Years	Present
Ground Water	6.3%	96.8%
Tube-well	6.3%	96.8%
Surface Water	93.6	3.2
Pond	56.1%	1.6%
River	6.3%	-
Canal	31.2%	1.6%

Source: Baseline Survey, IIS, 2006

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## Water Related Problems

### Drinking Water Scarcity

- During summer season, water level go down, ponds and canals are being dried out
- Quality of ground water is not good because of excessive iron and presence of arsenic in shallow aquifer
- Currently people get water from (400-450) feet deep tube-well but they are not satisfied with the water quality, they demand to get water from deeper aquifer over 1000 feet

### Water logging Problem

- Only canal is encroached and grabbed by powerful people, disrupted free flow of water and causing water logging in the village
- Fishermen, blocking the canal with fence that reduces water flow
- Improper Sluice gate management is responsible for not getting enough water in the canal
- Real Estate business buying land here and there, filling land by sand and interrupting the process of aquifer recharge and creating water logging

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## Negotiated Approach Process in Khulna



### 10 Steps Negotiated Approach for Solving Water Related Problems

- Engaging Community in Situation Analysis Process
- Social Mapping
- Prioritization of Issues
- Stakeholder Mapping
- Issue Based Negotiation Plan
- Small Scale Participatory Water Management Plan
- Community Negotiation Group Development
- Negotiation and Advocacy Skill Development
- Finalization of Water Management Plan with Stakeholders Suggestions
- Individual Meeting with authorities



## **Engaging Community in Situation Analysis Process**

### **Village Profile/Handbook Development**

#### **Organizing Community**

- Water Rights farmers Group
- Water Rights Fishermen Group



#### **Knowledge development**

- Negotiated Approach
- Citizen right
- Water Policy & Law
- Water Policy and Practices
- Ground Water Layer & Water Cycle
- Ground Water Pumping and Consequences of over Pumping
- Saline Intrusion & Arsenic Contamination in Ground Water

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## **Social mapping**

- Villagers develop a social map identifying households, roads, river and canal, school, college, religious institutions and others
- They also identified their water related problems within this map



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## Prioritization of Issues

- Accessibility to safe drinking water
- Canal Encroachment and Water Logging
- City Corporation Waste Dumping



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## Stakeholder Mapping

- Union Parishad
- Upazila Parishad
- Department of Public Health and Engineering (DPHE)
- Bangladesh Water Development Board (BWDB)
- Department of Agriculture
- Department of Fisheries
- Khulna City Corporation (KCC)
- Khulna Development Authority (KDA)
- KWASA
- Department of Environment (DoE)



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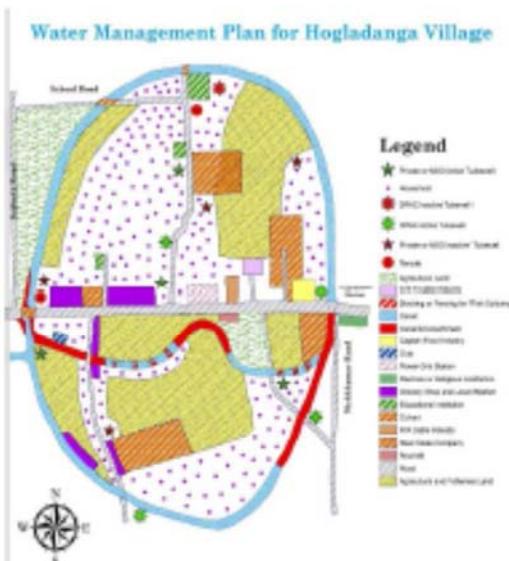
## **Issue Based Negotiation Plan**

Priority Issues	Target Organization	How	Expected Outcomes
Accessibility to Safe Drinking Water	<ul style="list-style-type: none"> <li>▪ DPHE</li> <li>▪ DoE</li> <li>▪ Upazila Parishad</li> <li>▪ Union Parishad</li> </ul>	<ul style="list-style-type: none"> <li>▪ Capacity building workshop with community participants</li> <li>▪ Organizing workshop with government authorities and stakeholders</li> <li>▪ Media Mobilization</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ensure sufficient drinking water</li> <li>▪ Government Authorities will provide more focus on this issue</li> <li>▪ Print media will provide more attention on this issue</li> </ul>
Canal Encroachment and Water Logging	<ul style="list-style-type: none"> <li>▪ Deputy Commissioner</li> <li>▪ KCC</li> <li>▪ KDA</li> <li>▪ DoE</li> <li>▪ BWDB</li> <li>▪ Upazila Parishad</li> <li>▪ Union Parishad</li> </ul>	<ul style="list-style-type: none"> <li>▪ Capacity building workshop with community participants</li> <li>▪ Organizing workshop with government authorities and stakeholders</li> <li>▪ Media Mobilization</li> <li>▪ Discussion with other initiators – Blue Gold</li> <li>▪ Individual meeting with departments</li> </ul>	<ul style="list-style-type: none"> <li>▪ Adequate water drainage system</li> <li>▪ Canal re-excavation</li> <li>▪ Repair and maintenance of Ramdia sluice gate</li> <li>▪ Government Authorities will provide more focus on this issue</li> <li>▪ Print media will provide more attention on this issue</li> </ul>
City Corporation waste dumping	<ul style="list-style-type: none"> <li>▪ Deputy Commissioner</li> <li>▪ DoE</li> <li>▪ KCC</li> <li>▪ KDA</li> <li>▪ Upazila Parishad</li> <li>▪ Union Parishad</li> </ul>	<ul style="list-style-type: none"> <li>▪ Capacity building workshop with community participants</li> <li>▪ Organizing workshop with government authorities and stakeholders</li> <li>▪ Media Mobilization</li> </ul>	<ul style="list-style-type: none"> <li>▪ Stop City Corporation Waste Dumping/Modernizing the dumping system</li> <li>▪ Ensure Safe and Sustainable Environment</li> <li>▪ Print media will provide more attention on this issue</li> </ul>

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# **Small Scale Participatory Water Management Plan**

Villagers developed a participatory Water Management plan indicating Existing water points, Required water points, efficient drainage system, proper maintenance of sluice gates and Illegal canal encroachment



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## **Community Negotiation Group Development**

Hogladanga Farmers and Fishermen Group formed a negotiation group along with the coordination of JJS. The selected group members are in the followings:

- Ashok Kumar Ray
- Nivanan Kumar Ray
- Utpal Ray
- Subroto Roy
- Birupoma Ray
- Mithu Ray



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## **Negotiation and Advocacy Skill Development**

- Prioritization of water related problems
- Advocacy Strategy Development
- Action Plan Development
- Update Participatory Water Management Plan
- Continuous follow-up and linkage with related department and authorities



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## **Finalization of Water Management Plan with Stakeholders Suggestions**

- Community Negotiation Group present small scale participatory water management plan
- Water related authorities provide suggestions for solving peri-urban water related problems:
- ✓ Need development of polder 28/1 and 28/2
- ✓ List out the illegal grabbed canal and government will take proper initiatives
- ✓ Repair and Maintenance of Ramdiah sluice Gate
- ✓ Mass media should take pro-active role for solving peri-urban water related Problems
- ✓ Peri-urban water related problems should solve through small small scale planning



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## **Individual Meeting with authorities**

Community Negotiation Group conduct meeting with BWDB and DPHE for solving their drinking water problems and water logging problems



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## Results

- Upazila Administration took initiative to remove canal barriers
- Peri-urban issues are now in discussion at different level
- Initiative to install taste tube-well over 1000 feet for identifying suitable aquifer at Hogladanga village is taken by DPHE
- Linkage between community and government stakeholders is developed
- Peri-Urban Water Forum is functional with involvement of communities, all related government authorities and civil society

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### Sustainability: Peri-urban water Forum

SL	Name	Designation and Organization
01	Md. Kamal Uddin Ahmed	DMD, Khulna WASA
02	Dr. Dilip Kumar Dutta	Professor, Environmental Science, Khulna University
03	Kazi Md. Sabirul Alam	Executive Engineer, KDA
04	Dr. Mustafa Serwer	Professor, Urban and Regional Planning, KUET
05	Mahmud Elias	Executive Engineer, BWDB, Khulna
06	Engr. Zahid Parvez	Executive Engineer, DPHE, Khulna
07	Md. Taseduzzaman	Education Officer, KOC
08	Md. Abdul Latif	Deputy Director, DAE, Khulna
09	HM Alasuddin	Staff Reporter, The Daily Purbenchol, Khulna
10	Samsuzzaman Shahin	Bureau Chief, Bangladesh Protidin
11	Md. Babul Reza	Executive Director, Tarongo
12	Nivenon Kumar Roy	Community People, Hogladanga Village
13	Omar Ali Sheikh	Community People, Tentultola Village
14	Kulsum Bibi	Community People, Tentultola Village
15	ATM Zahir Hossain	Executive Director, JIS



Media Coverage: Peri-urban water Forum Meeting

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**Negotiation is a continuous process-----**





**NWO**  
Netherlands Organisation  
for Scientific Research

## NEGOTIATED APPROACH EXPERIENCE, KOLKATA

 *The Researcher* for socio-economic studies

Partha Sarathi Banerjee  
The Researcher.Kolkata

### The beginning

After selecting the village Tihuria in Sonarpur block for the Negotiated Approach (NA) process, preliminary meetings were held with the panchayat officials and the village community to introduce our project objectives to the villagers and also to get us acquainted with the problems of the regarding groundwater use.

In the politically sensitive rural polity of West Bengal, special care was taken from the very beginning to take the panchayat leadership into confidence and proceed through them to prevent any kind of misunderstanding to crop up.



## First NA workshop



The initial process was culminated in the first NA workshop held in October 2015, which enabled interaction between the community and the whole project team to understand each other. The community got better acquainted with the project objectives and the project team gained better knowledge about lack of groundwater security in the village.  
Workshop outcomes:

- Irregular and inadequate supply of drinking water from the PHE overhead tank is the main problem.
- Number of deep tube wells installed by panchayat is also not sufficient to cater the whole village population.
- Villagers are scared about the quality of groundwater, but not aware about the status of the same.
- Surface water pollution caused by waste water intrusion from the canal linked with the city.
- A large number of villagers have to buy packaged water though its quality is not ensured by any kind of testing.



## Mango Tree meetings



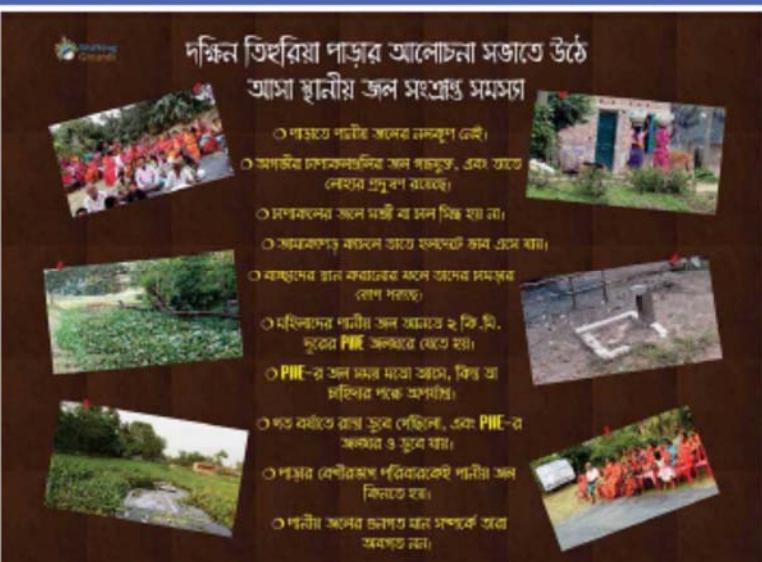
Then a series of Mango Tree meetings were held in different localities (paras) of the village that helped up to reach out to the larger community and involve them in expressing their apprehensions about the quality of groundwater they were using.

Outcomes of Mango tree meetings confirmed that:

- Access to safe drinking water is the key issue in this village.
- Most of the households have their own hand pumps extracting water from the shallow aquifer, water from which are used for different household works, including drinking and cooking in many cases.
- Villagers are having digestion problems and children having skin diseases presumably as a result of using groundwater from the hand pumps.
- PHE supply outlets are very few and not covering the whole village. The supply is also inadequate, and sometimes has turbidity due to piling of groundwater in the same.
- A large number of households buy packaged water, plants for which have come in large numbers in the block.
- Even for the packaged water, no monitoring system exists.

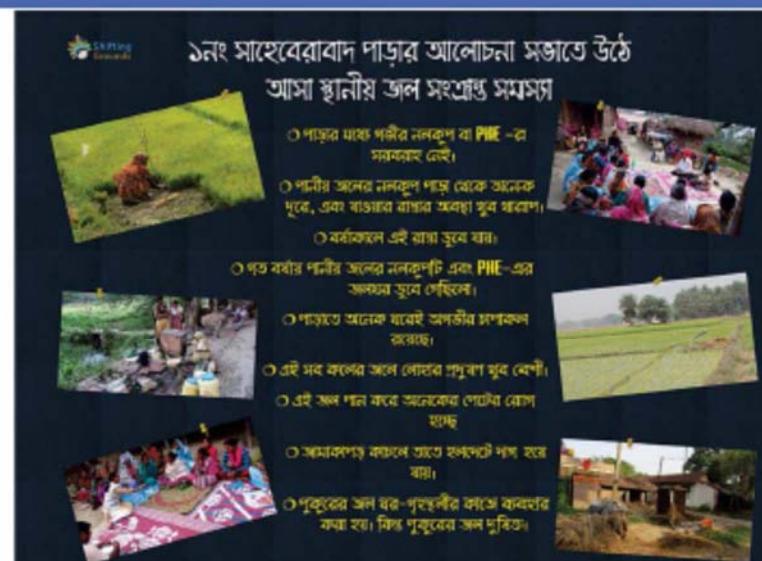


**দক্ষিণ শিল্পিয়া পান্ডুর আলোচনা মণ্ডপে উঠে**  
**আমা স্থানীয় জল মৎস্যপ্রক্রিয়া সম্মেলন**



- পান্ডুয়ে গভীর জলের নমনকূল দেখি।
- অগভীর জলকলাবিহীন জল বজালত, এবং তাতে নেহার পুরুষ বাজেট।
- মাঝেমধ্যে জল করার ক্ষেত্রে আমের নমনকূল (রোপ পরাম)।
- মহিলাসম্মত পানীয় অস আমাতে ২ টি. টি. পুরুর PHE কল্পনার মেটে যাব।
- PHE-র অল মাত্র মাত্র আম, বিষ ও মহিলার পুরু অসবাপ্ত।
- গত বছিতে গোৱা ভূবে সেভিলা, এবং PHE-র আমের ও ভূবে যাব।
- পুরুর বেলোরাখ পরিবেশেই পানীয় অস কিলতে হব।
- পানীয় আমের ভূবে যাব সম্পর্কে আম অবগত নন।

**১নং মাহেবেৰোবাদ পান্ডুর আলোচনা মণ্ডপে উঠে**  
**আমা স্থানীয় জল মৎস্যপ্রক্রিয়া সম্মেলন**



- পান্ডুর মাঝে গভীর নমনকূল বা PHE-র সমন্বয় দেখি।
- পানীয় আমের নমনকূল পান্ডু বেক আমেক দূৰে, এবং বাজারের বাজার অবৈধ ভূবে যাবেন।
- বৰ্ষাকৃষি এই গোৱা ভূবে যাব।
- গত বছার পানীয় আমের নমনকূলৰ এবং PHE-র আমের ভূবে সেভিলো।
- পান্ডুতে আমেক যাই অগভীর জলশাখার ক্ষেত্ৰ।
- এই সব ক্ষেত্ৰে আমে লোকের পুরুৱা ভূবে যেশী।
- এই আল পান মাত্রে আমেকের লোকীয়া বোল রাখছি।
- আমাবলোক ক্ষেত্ৰে তাতে হোলেটো দুশ হবে যাব।
- পুকুৰের অস বৰ-পুকুৰীয় ক্ষেত্ৰে বাবুলোৱ যাব। বিষ পুকুৰের অস দুবিতা।

**মহিলা প্রতিষ্ঠানের গোষ্ঠীর মাথে আলোচনায় উঠে**

**আমা শ্রান্তীয় জল মৎস্যপ্রদূষ মামড়া**

- জল মৎস্য প্রয়োজন করে আলোচনায় PHE-এ মুখ বরেছে। মিশ আবের কেন্দ্রিকভাবে জল আসে না।
- পানীয় আবের জন্য এই প্রক্ষেত্র মহিলাদের স্বাধীন প্রয়োজন করে হচ্ছে।
- প্রথম কালে PHE-এর সহায়ে করে বাচ্চা।
- অনেক পরিমাণে মাত্রিক অগভীর নদীগুলি রয়েছে।
- অগভীর নদীগুলির জন্য লেখার প্রযুক্তি রয়েছে।
- জল গাছ বরাবর।
- অলিম্পিয়ান কামুকা কালো নর। বাটীক মহাশূণ্য জল আম খুব ব্যবহৃত হচ্ছে। দ্রুতিক্রম ব্যবহৃত হচ্ছে।
- আনোক চার্বী পরিবার একটি অধিক ধরন ও যুক্ত সব করাবে।
- চাবের মাঝসম্ম কানাম অনেকেই এখন বিজ্ঞা করার বিষয়ে লেখার পৃষ্ঠা রয়েছে।

**১০নং সাহেবেৰাবাদ পাড়ার আলোচনা সভাতে উঠে**

**আমা শ্রান্তীয় জল মৎস্যপ্রদূষ মামড়া**

- প্রক্ষেত্র যাচ একটি বৈশি নদীগুলির মাঝে।
- এই প্রক্ষেত্র পরিবারার জন্য আলোচনার প্রয়োজন। এই নদীগুলির উপর নির্ভরশীল।
- নদীগুলির জল স্থৰতা ক্ষেত্রে প্রস্তুত রয়েছে। জল যোব দিল বনাম বন্দুকের রয়ে রয়ে।
- PHE-এর জলকে পাত্ত করে আনোক মুখ।
- আনোক পরিবারের ব্যক্তিগত অগভীর নদীগুলি রয়েছে।
- এই সকল নদীগুলির জল ধর-গৃহস্থালীর কানে ব্যবহৃত করা হচ্ছে।
- আম লেখার প্রযুক্তি আনোক বেলো।
- এই জল কর করাম লেখার কোল দেখা দেখ।
- জাতীয় কানেক ব্যবহার করা বাব না। প্রশ্ন ক জল শিখ করাম।
- আলোচনাত করাম আবে ফ্লুস কর কর বাব।
- পাত্তার মাঝে জল দিলকষ্ট ব্যবহার করাম করো।
- আনোকভাবে পুরুষ আছে। কিন্তু পুরুষের জল দুর্বিপ্রয়োগ করে পোক।

## The second NA workshop



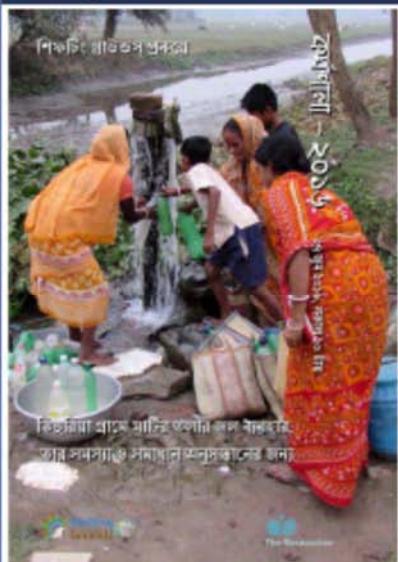
Subsequent to the MT meetings, the second NA workshop held in June 2016, where the outcomes of the MT meetings were discussed and the problems were projected before the panchayat officials present, thus opening the channel of negotiation between the villagers and the panchayat officials.

## Outcomes of the 2<sup>nd</sup> NA workshop:

- An institutional brief prepared by one of our researchers (Sharlene) with pictorial presentation of the groundwater situation, narration of the rules and acts governing its usage and the departments responsible for implementing the same was presented and discussed.
  - The issue of people's right to access safe water was brought to the community's knowledge for the first time.
  - The GP leadership present in the workshop came to know the problems faced by the community regarding access to safe water and acknowledged the project's efforts to bring the issues in discussion.
  - Apprehensions of misunderstanding between the GP leaders and the project works seemed to be over for the time being.



## Policy brief booklet



ପ୍ରକାଶକ ଏବଂ ମହାନ୍ ଲିଖିତକାରୀ ଏବଂ ଗୋଟିଏ ପାଦ ଏବଂ ପାଦକାରୀ  
ହାତୀ ଯାଇ ଏହା ପାଦକାରୀ ହୁଏ ଥିଲା । ପାଦକାରୀ ଏବଂ ପାଦ  
କାରୀ ଯିବେ ତାହା ଲିଖିଲା । ଏହା ପାଦକାରୀ ହୁଏ ଥିଲା । ଏହା ପାଦକାରୀ  
ହୁଏ ଥିଲା । ଏହା ପାଦକାରୀ ହୁଏ ଥିଲା । ଏହା ପାଦକାରୀ ହୁଏ ଥିଲା ।

A group of approximately ten people are sitting in a circle on the ground outdoors. They appear to be in a casual setting, possibly a park or a community center, with trees and buildings visible in the background. The individuals are dressed in a variety of colorful clothing, including shirts, shorts, and a vest. Some are looking towards the center of the circle, while others are looking at each other, suggesting an interactive session like a group discussion or a workshop.

मेरी विद्यालय क्रान्ति का एक अन्य उद्देश्य इसके सहित जुड़ा है कि विद्यालय की विभिन्न विभागों में विभिन्न विषयों का अध्ययन करने वाले छात्रों के बीच विभिन्न विषयों के बारे में विस्तृत विचारण करना। इस विचारण का उद्देश्य यह है कि विद्यालय की विभिन्न विभागों के बीच विभिन्न विषयों के बारे में विस्तृत विचारण करना।

ପିଲି କାହାର କାହାର ଦେଖି ଏହା କାହାର କାହାର ? କିମ୍ବା କାହାର  
କାହାର କାହାର କାହାର କାହାର ? କାହାର କାହାର କାହାର ? କାହାର  
କାହାର କାହାର ? କାହାର କାହାର ? କାହାର ? କାହାର ?

निर्माण वा प्राप्ति कर्ता नामी—प्राप्ति वाक्यात्; अस्ति वाक्यात्  
त्रितीय वा तीव्र वाक्यात् नहीं; अस्ति वा विभिन्न वाक्यात् विभिन्न वाक्यात्; विभिन्न  
वाक्यात् वा विभिन्न वाक्यात् विभिन्न वाक्यात्।

National Water Policy अनुसार नदीयांकन का समावितान एवं नदीयांकन का नियन्त्रण एवं नियंत्रण नहीं, बल्कि नदीयांकन को एवं नदीयांकन का नियन्त्रण एवं नियंत्रण।





## Mid-term review workshop



- Held in September 2016, this workshop gave the community to share their perceptions and expectations about the project works.
- The community representatives expressed positive opinions about the project, but wanted something concrete to be done to help them to improve the situation.
- The workshop also gave the community and the project team an opportunity to more closely interact with the GP leaders.
- Subsequently, arsenic program was taken up with the support from Arsenic Knowledge and Network.



## Arsenic awareness and detection programme

Then a series of arsenic awareness and detection programmes were taken up by organizing a workshop, followed by spreading IEC material regarding health impact of arsenic contamination and testing of drinking water samples with arsenic detection kit.

### Outcome of Arsenic Awareness and Training Workshop

- Arsenic experts disseminated the knowledge regarding arsenic contamination in groundwater and the severity of its impact on human body.
- A number of panchayat members and health workers along with community representatives received basic knowledge about the threat of arsenic.
- It was agreed upon that as a first step groundwater samples would be tested to check the presence of arsenic and the extent of it.



## Arsenic tests and arsenic mapping of Tihuria village

- 40 samples collected from domestic tube wells were tested with the help a Arsenic Kit, and the samples found to have arsenic more than the permissible limit were further tested in the Ramkrishna Mission lab.
- 17 samples found in the kit tests to have arsenic above the safe limit, while 9 samples were confirmed to have arsenic above permissible limit in the lab tests.
- With the results of arsenic tests, arsenic mapping of the village was prepared.



## Arsenic workshop

- The results of arsenic tests were discussed in a workshop participated by panchayat members, health workers, community members, PHE official and NGO and medical experts.
- Village Water and Sanitation Committee members attended the workshop and expected to take up the issue.
- As the threat of arsenic proved to be real in the region, panchayat members from other villages of the gram panchayat also requested to test groundwater in their villages.
- The GP leadership also wanted our project activities be extended to other villages under the GP.



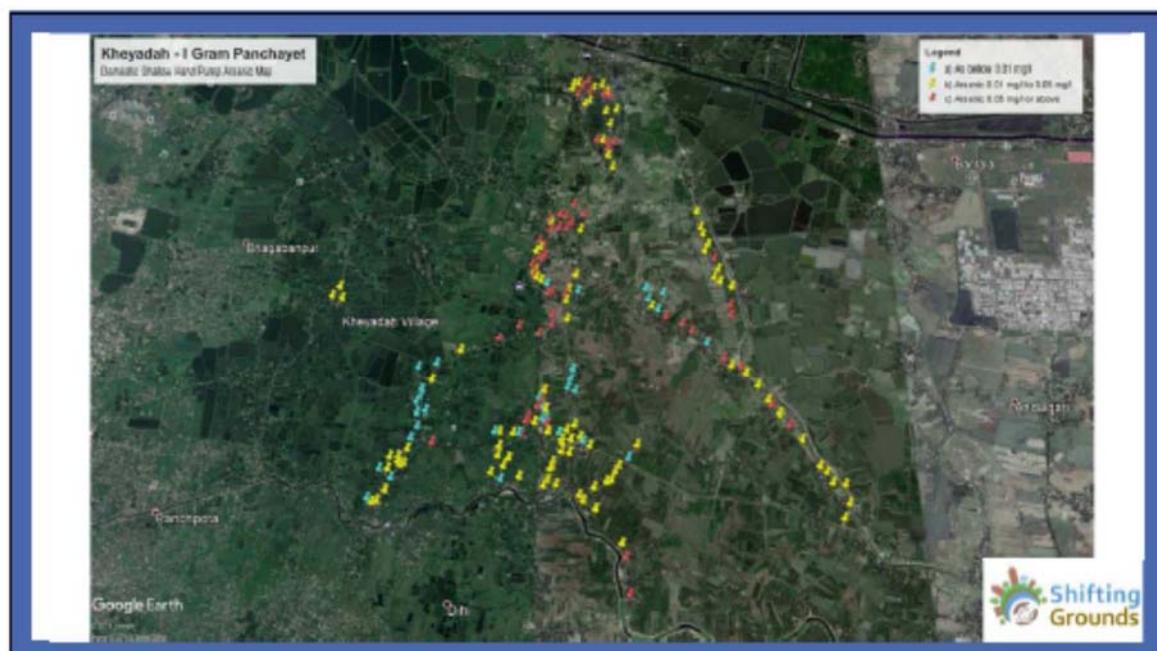
## Arsenic Mapping of the entire GP area



- Subsequently water samples from all the 7 villages under the panchayat were tested by the kit and arsenic mapping done for all the villages.



Outcome of the arsenic tests in 7 villages	
Total sample tested	150 nos.
Domestic TW	150 nos
Arsenic found above 0.01 mg/l	125 nos
Depth of domestic TWs	Min - 20 ft, Max - 340 ft.
General use of domestic TWs	55%
Drinking and cooking	
Cooking only -	45%



## Health camp

To check the impact of arsenic contamination, a health camp was organized in Tihuria, in which Community Medicine Doctor Kunal Majumdar checked the probable patients of arsenic.

Arsenic health camp outcome

Village name	Tihuria
Total no of patients checked	26
No of patients diagnosed with suspected arsenicosis manifestation	10



## The final arsenic workshop

The almost year-long arsenic programme was culminated in a workshop. The workshop urged -

- every participant to spread awareness regarding arsenic to the large community,
- the health workers to undertake health scanning to detect probable cases of arsenic impact on human body and
- The panchayat staff to facilities testing of water from each and every tube wells used for human consumption.
- The workshop inferred that monitoring of water quality is of utmost importance for the community health and should be given priority and require concerted efforts by all the stakeholders.
- A bio-sand filter was introduced in the workshop by one NGO.



#### What could be achieved through the NA

- ✓ Through the NA process in Tihuria, the issue of groundwater security, of universal access to safe groundwater, for human intake could be brought into the public discourse and recognized by the GP leadership and block officials as one of immediate concern.
- ✓ The VWSC has been activated to some extent and negotiation started though at it is still at the initial stage.
- ✓ The Researcher have learned how to apply a structured community empowerment and engagement process through their experience with the Negotiated Approach.



#### Final workshop in Kolkata and way forward



The Final workshop was held on 14 September 2018. In this workshop, the community and the panchayat leaders came up with valuable insights and words on way forward.

- ✓ Community representatives said that in the initial meetings of the project, villagers participated, but still had apprehensions about our project objectives. What we wanted to do and with what interests?
- ✓ It required some time and only after the arsenic detection and awareness generation programme, the community understood clearly that the project was working in their interest only.
- ✓ The link between the community and the panchayat leadership to resolve the drinking water problem seems to have finally cemented as the panchayat leaders promised to take forward the project findings to the upper administrative bodies and seek their intervention to resolve the problem.
- ✓ The 3-year long negotiated approach activities seems to have been able to finally create the necessary atmosphere to connect the project findings with the community and panchayat leadership that might go a long way to resolve the perpetual groundwater issues.



আসুন, আমরা আলাপ-আলোচনার মাধ্যমে সমস্যা সমাধানের পথে  
এগিয়ে চল।



ধন্যবাদ

**Thank YOU**



## Shifting Grounds: Institutional transformation, enhancing knowledge and capacity to manage groundwater security in peri-urban Ganges delta systems

Shifting Grounds aims to build knowledge and capacity among local actors to support a transformation process in peri-urban delta communities in Bangladesh and India for a pro-poor, sustainable and equitable management of groundwater resources across caste/class and gender. This is to be based on an improved understanding of the dynamic interplay between local livelihoods, the groundwater resource base, formal and informal institutions and links with nearby urban centres in Khulna and Kolkata. These two cities provide a good basis for comparison, being part of the same Ganges delta system, yet located in different countries.

Funded by the Netherlands Organisation for Scientific Research (NWO), the Shifting Grounds project is executed by a group of academicians, researchers and civil society organisations. Delft University of Technology (TU Delft) leads the consortium that consists of SaciWATERs, Bangladesh University of Engineering and Technology (BUET), Jagrata Juba Shangha (JJS), The Researcher and Both ENDS.



Website: <http://saciwaters.org/shiftinggrounds/>

