



AQUATIC AGRICULTURAL SYSTEMS BANGLADESH

Community Water Management from a micro level perspective

RESEARCH REPORT ON PARTICIPATORY MAPPING

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Introduction and background information

AAS in Bangladesh aims to answer to the challenge of creating a more intensive, diversified and productive agricultural system to contribute to more diversified and resilient rural livelihoods in coastal Bangladesh.

In a context where water can be everywhere but can also be a scarce resource for irrigation, water management is the key prerequisite to open the potential opportunities of intensification and diversification of the livelihoods to the communities.

Within AAS, this particular project “Community Water Management from a micro level perspective” follows these objectives:

- Understand the current practices in terms of water management in selected communities.
- Identify the good practices, the challenges, the constraints in water management.
- Draw a menu of solutions to improve water management at the community level.
- Experiment good practices in water management

This project will in addition have a clear focus at the micro level (at the village and intra-village scales) but will also underline the inter-connections between the different scales and the role of coordination. AAS selected 16 communities to work with in Coastal Zone of Bangladesh. These villages are located in three different parts of the coast corresponding to three different level of salinity: high (polder 3), medium (polders 29 and 30) and low (polder 43-2F). From our perspective of water management the issues and challenges are very different in these three areas.

Participatory Mapping of 'Fultola' Village

LOCATION

Zilla	:Khulna
Upazilla	:Botiaghata
Union	: Botiaghata
Polder	: 30



Participatory Mapping of Fultola Village



Date of Mapping: 15th March 2014

Brief Description of Fultola Village

The village is situated on the bank of Kazibacha River and shape of the village is square. The village is surrounded by Kismot Fultola village which is adjacent to Northern part, Debitola is in Southern portion and Basurabad is in Western part of Fultola. There are four "para"s inside of the village, namely, South para, middle para, North para which is located adjacent metal road and West para is located middle portion of a village. Other sporadic community available in North side and close to village road and some of community is in middle portion of village which also

closest to village road. Main road of the village is very close to river and locally villagers called WAPDA road (main embankment). Around 90% roads are kacha road and there are six entrance points of this village. There are two Temples; one is inside of a village, in North para and another is located outside of a village boundary and near to river as well as opposite of south para. There are two schools in this village, one is sited at south para besides of village road and another school is placed North part of the village which also connected by road. Community clinic is sited besides on South para and linked by road. One hatchery is situated in South para and near to main road. One and only village market which is next to main road and opposite to South para. And a Farmers Club is located inside north para and connected with village road

All the agricultural fields situated beside the Kazibacha River, can grow only one crop i.e., Aman crop. Except these, others lands are able to produce two crops. Though they are trying to grow two crops in a year but in most of the cases the villagers could not able to produce more than single crop (Female). The agricultural fields located at the eastern side of the village and between settlement area and main road, produce only one crop in a year but these areas are also treating to produce two crops by the villagers. In the two cropping fields, production of one crop is confirmed but another crop depends on water availability (male). Sesame (*Til*) is the second most important crop in the village (Male). Those agricultural fields which are comparatively elevated produce 'Til' (Female). Heavy rainfall creates water logging condition and in the winter season deficiency of water creates water stress condition. These two are the main causes of production only one crop though the land is able to produce two.

In the two cropping agricultural fields, villagers follow two types of cropping patterns/seasons, one is 'Aman' and another is 'Rabi'. In the 'Aman' season they produce different variety of 'Aman' named 23, 11, Balam, Chouno, Bansful Balam, IRRI, Mota, Barishal, Kumraghosh. But IRRI is most common crop. At the river side agricultural fields only 'Balam' are grown as those fields are not able to produce another crop [Female]. The 'Balam' crop is most popular as it can grow fast and could be harvested within Agrahaian. As the river bear salt water at the winter season (from Poush month) so the villagers want to grow 'Balam' crop so that they could harvest before winter (Male).



Inlet-outlet pipe and canal

There are many low lands in the village. In the rainy season the canals and agricultural fields become over-flooded with water. As a result, the crops grown in the low agricultural fields are damaged by over-flooding. After the month 'Karthik' water reduces and the low lands releases from the over-flooding.

There is no way and no available places where the over-flooded water pass through. There is no catchment area (male), no proper maintenance of gate (female). Though the embankment of the canals is highly elevated but the elevation of the bottom of canals is quite similar to the elevation of agricultural fields. Most part of the village is surrounded by canal and other small canals are available inside village area. One excavate canal is between connected with canal and culverts with village road. There is one and only sluice gate (Flush in) and that is presented on main road (WAPDA road). Other two sluice gate which are sited outside of the village in North and

South part as represent in of a participatory map. Some culverts are presented inside of village roads.

There is no shallow pump or deep tube-well in the village (male) as shallow pump supply saline water. Only deep tube-well can supply fresh water but those are so costly that villagers can't bear that. So the fate of agricultural crops is completely depends on only rain water and canal water. If the ground is bored up to 1050" to 1100" (male) or 1200" (female), only then sweet water will be found. Pond water is not used in the agricultural lands. Tube-wells which are available now in the village provided drinking water. Some of these are owned by private and some by Government.

Sequential Process of Drawing Map

<ol style="list-style-type: none"> 1. Kazibacha River; 2. The agricultural land between the river and the Wapda road (main road); 3. Wapda road (main road); 4. Canal situated at the southern side of the village and go through the western side where meet Nattoo's shop (told by many male). Here, the canal crosses the village boundary; 5. Culvert on the canal at the west; 6. Area of the village; 7. Main entry gate of the village beside the Banyan tree; 8. Road situated at the northern side of the village started from the main road and end at the western culvert (from east to west); 9. Most eastern road inside the village (from south to east); 10. School at the northern east (told by a male); 11. Culvert on the canal at the south; 12. Small canal at the northern side of the entry gate; 	<ol style="list-style-type: none"> 13. Small road between the entry gate and that small canal; 14. Small road and canal started from main road (northern part of the village); 15. Inside the village road (from east to west) two connectivity culvert; 16. Western parah; 17. Northern Parah; 18. Southern Parah; 19. Middle prah; 20. Agricultural Fields; 21. School at the east side of the village; 22. Temple (Matth) on the main road; 23. Hatchery; 24. Culvert on the northern road; 25. IPM/Agricultural Club (established more than 10 years); 26. Debitala Village (South); 27. Kismat Fultala Village (North); 28. Basurabad Village (West); 29. Temple (Mandir) inside the village; 30. Market beside the Matth; 31. Community Clinic (Told by a female); 32. Households.
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Field Observations of Fultola Village

Research team from 'Shusilan' observed that there are too excessive water in monsoon season and too little water in winter season. Due to this reason, production of Aman and Rabi crops are hampering in every year. Though there are many large and small canals there but these are silted and narrow. As a consequence, flush in during the winter season and flush out during the rainy season both are equally slowed down resulted water logging.



Focus Group Discussion Session in Fultola Village

There is only a sluice gate in this village at the eastern part which acts only as flash in. There is an inactive non-formal gate committee in the village. In spite of gate committee, the gate is controlled by the land-owners whose lands are located beside the gate area i.e., at the easternmost part of the village. Because, there is no connective canals between the gate and these cultivation areas, and flush in occurs through these eastern lands. At the time of over flow of flush in the land owners try to control water flow so that their crops could not hampered with excessive water flow. Due to water deficiency, villagers cannot produce paddy at the high lands though they are interested to grow but they are bound to grow Sesame '(Til)'. The total village area turns into a cup shaped where the boundary area is comparatively high while the middle area is low and water logging condition occurs during rainy season in every year. The land-owners of high lands and low lands manage their cultivation practices with a strategy. The strategy is, during the 10 days water available time, high lands will get water at first five days and the low land will get the last five days. Thus every farmer will be gainer and the process is win-win sharing.

Except the flush in gate there are also two sluice gates out of the borders of the village which are very important to the villagers as the total agriculture and aquaculture practices are depend on these gates. The gate situated at the northern side of the village is 'Kismat Fultala' gate and the gate at the southern side is 'Debitala' gate. The 'Kismat Fultala' gate is about 1500 ft distant from the village whereas the 'Debitala' gate is more than 2 km. The first one is most important than the second one because chief of the gate committee is a 'Fultala' dweller. So in gate operation, decision and needs of 'Fultala' villagers is given prioritized. For that reason there is a good management practice of flash in and out of water. Moreover, this gate is now reconstructed by BWDB.



Focus Group Discussion Session in Fultola Village

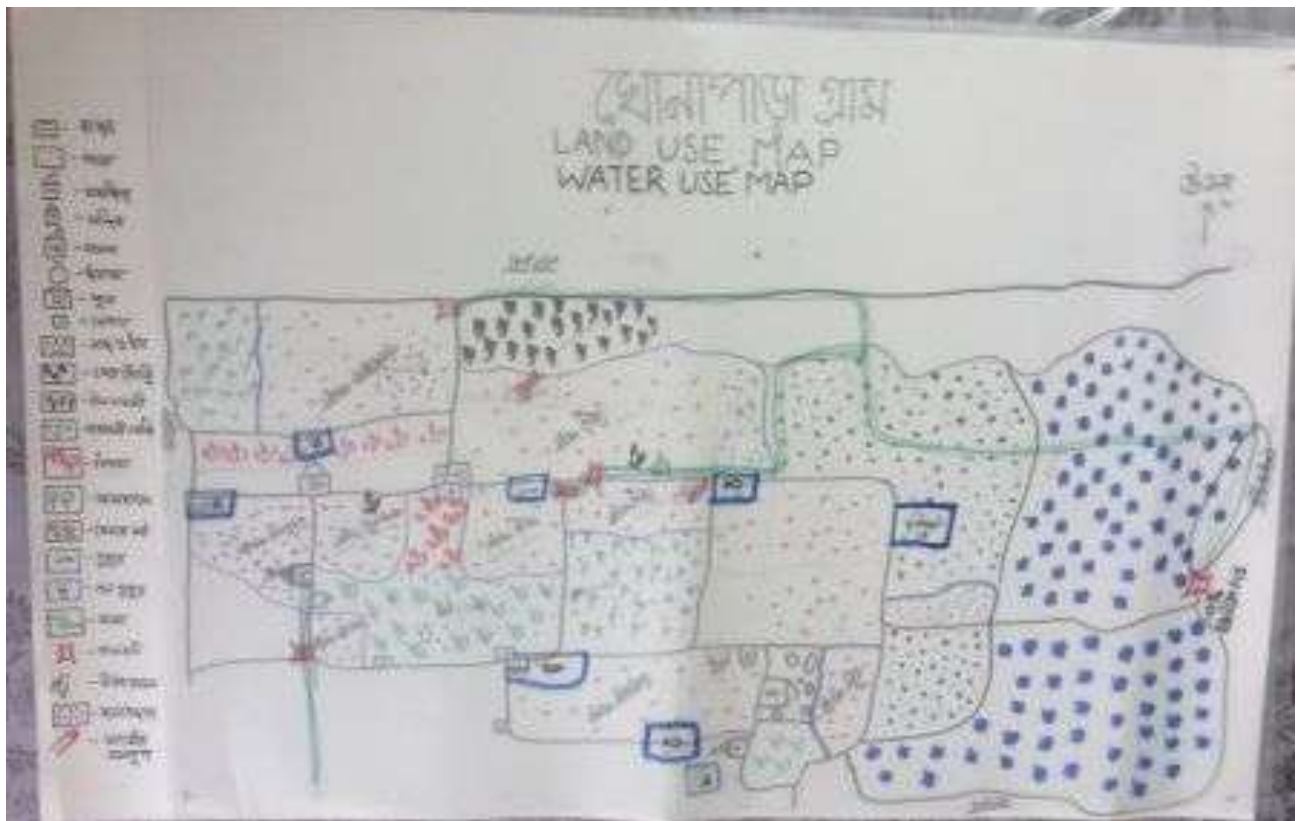
Participatory Mapping of 'Ghona Para' Village

LOCATION

Zilla : Satkhira
Upazilla : Debhata
Union : Noapara
Polder : 3



Participatory Mapping of Ghona Para Village



Date of Mapping: 18th March 2014

Sequential Process of Drawing Map

1. West side Road	9. Fish Gher
2. Grocery Shop	10. Beel area
3. West side Mosque	11. Para
4. Hindu Para Temple	12. Drain
5. Eidgah	13. Pond
6. Club	14. PSF Pond
7. Madrasa	15. Tube-well
8. Mosque	16. Boring area

Brief Description of the Village

Ghonapara village is surrounded by two villages namely Swetpur at east side and Nangla at north, west and south sides. The total area of this village is 311 acre and total population is 1685 out of which 75% people are Muslim and 25% are Hindu. There is an estuary of four canals at the east side of the village which is maintained by a sluice gate. There are two Mosques, one Temple, one Madrasa, one Eid-gah, and one Club in this village. There is also a village field for sports. Primarily, total village can be divided into eight paras which are situated at the western side of the village and it covers approximately two third of the total village area. This area is comparatively high land which is low saline zone and here in some places paddy and vegetables are grown through the year round. On the other hand, the eastern side is moderately low land and medium saline zone which only capable to produce one seasonal paddy and fresh water fish. Mostly eastern side is very low land and high saline zone which only can uses for producing shrimp. At the southern west side of the village there is a plantation forest of mango tree and there are some medium sized bamboo forests.

There are three PSF in this village out of which two are usable now and another one has broken down. There are also five big ponds here at different distances throughout the paras which are used for cultivation of fresh fishes and domestic purpose except drinking. There are four areas where water logging condition occurs in every year during rainy season. There are two tube-wells for drinking water and 10-12 shallow tube-wells (220 ft) for pumping water in three seasonal paddy fields which are very important to the villagers. There are two narrow canals inside the village with three culverts.

Field Observations of Ghona Para Village

There are only two usable PSFs but these are situated at westernmost side which is not available to all the villagers and also not sufficient to all too. The villagers harvest rain water in ponds at the rainy season but in summer time pond water becomes non-palatable to drink due to shortage of water layer water become saline and create acidity when it drunk. At present, they are solving their drinking water problem only by buying fresh water from 'Hadipur' which is situated more than 4 km distant from the village. It is very expensive to the poor people and not a proper solution to those villagers who have really a big family member.



FGD Session in Ghona Para

There is a conflict among villagers with the sluice gate which situated at the estuary of four canals to get water. Some lands (2 sq. km.) at both side of the canal are grabbing by a land lord and mainly he has the control power over the gate. So people have to pay to the land-lord to get water but sometimes water is not available to them when they actually want/need because of the land-lord do not have any concern to discuss with the villagers to operate the gate. The aquaculture and agricultural practices is mainly depends on this gate as maximum important agricultural fields and all shrimp fields are situated at the side of this canal.

Villagers focused on the drainage system of the village as only few canals are there to draining water which is not enough. Not only this, the canals are too narrow to drainage excess water appropriately during heavy rainfall. So water logging condition occurred in the settlement areas, three seasonal vegetable fields, and plantation area during the rainy season which damages one crop of the three seasonal crops in every year.

There is another conflict here between units and within units to get water and drainage water. When the shrimp cultivators need saline water then the paddy and fresh field cultivators need fresh water. Sometimes, when excess water in paddy fields is need to drainage out then the shrimp cultivators do not want to permit them any place to drain it. On the other hand, among the shrimp cultivators, some fields get water easily from the eastern canals but the fields which are comparatively remote from the canal do not get water and they depend on those cultivators who are near to the canals. If these (nearer) cultivators allow to supply water to the remote ones then only they could cultivate shrimp otherwise not.

It seems to the observers that there is a little conflict among the villagers about the drawn map during FGD. It may be the male participants who participated in drawing the map have little idea about some places which are not near to those participants. The participants may be the representative of one/two paras.

In participatory mapping session, female members were more than male ones but they participated little in comparison to male. Female participants had most important demand about drinking water and ponds.

Participatory Mapping of ‘Kazla’ Village

LOCATION

Zilla : Satkhira
Upazilla : Kaligonj
Union : Nalta
Polder : 3



Participatory Mapping of Kazla Village



Date of Mapping: 20th March 2014

Brief Description of the Village

The village Kazla situated at the bank of ‘Balidanga’ river at north side and the southern village entrance embankment boundaries the south part of village. The east side of the village is surrounded by ‘Kashibari’ village and west side is surrounded by ‘Indronagar’ village. Total area

of the village is 813 acre and total population is 1,425. out of which 732 are Male and 693 are Female. There are nine paras in this village and covers almost about 50% land mass and located at south side. There are two Mosques, two Temples, one Madrasa, one school in the village. The total area can be divided into high land which is low saline zone (paras), moderately high land which is moderate saline zone (agricultural fields) and low land which is high saline zone (shrimp cultivation area/aquaculture fields).

All paras are divided into nearly two equal parts with a cultivated area which is called as ‘Don’ by the villagers. This area is cultivated with three paddy crops paddy through the year round and water logged condition occurred in each rainy season. The other half of the village area which situated at north side covers all agriculture and aquaculture practices. These agricultural practices are differentiated into two crop fields and one crop fields by the villagers. Two crop fields cover two paddy crops named ‘Aman’ from month ‘Asar’ to ‘Karthik’ and ‘IRRI’ from month ‘Magh’ to ‘Boishakh’ and one ‘Rabi’ crop from month ‘Agrahaian’ to ‘Poush’ which includes Mustard, Potato, Cauliflower, Pumpkin. One crop fields cover one paddy crop which cultivated in month ‘Vadra’ which harvested in month ‘Poush’ and fresh water fish cultivation like Rhui, Mrigel, Tablet, Vetki etc. in the rainy season when no other crops are used to grow due to water logging. Two third of total cultivation area is shrimp cultivation area as brackish water is available here and not suitable for producing agro crops. During the rainy season when water becomes fresh then fresh water fishes are cultivated in these shrimp cultivation fields with shrimps.

There are six/seven shallow pumps in the agriculture and aquaculture cultivation area and, about eight shallow pumps in the ‘Don’ area for supplying water during the winter season. Six ponds, six culverts, Two deep tube-wells are available here which are most important to the villagers and only one drainage system found in the shrimp cultivation area. In settlement areas two plantation forests of mango are situated at the western side of the village and there are more or less large and small bamboo forests throughout the village.

Sequential Process of Drawing Map

1. The road from ‘Nalta’;	10. Temple;
2. Main village entrance road from aforementioned road;	11. Madrasa;
3. Main culvert;	12. Paras;
4. ‘Don’ in the village;	13. Bridge;
5. School;	14. Name of surrounding villages;
6. Culverts on the ‘Don’;	15. ‘Hathkhola’ market (important but out the village);
7. Roads inside the village;	16. ‘Beelgullo’ beels (out of village); and,
8. ‘Balidanga’ river;	17. Ponds (told by female)
9. Mosque;	

Field Observations of Kazla Village

Drinking water is not available in ‘Kazla’ village. People are mandatory to buy drinking water from a long distance and it is near to 10 km. But it is quite difficult to buy everyday due to money problem and market distance problem. Somehow, if they have to drink tube-well water available inside the village at 110 ft depth then they need to buy anti-acid tablets as that water



FGD Session in Kazla

creates acidity. The people are too poor to place a deep tube-well personally as it needs more than \$ 3000. Moreover, ground water layer has checked up to 1000 ft. but no palatable fresh water has found.



FGD Session in Kazla

It was very surprising that only one drainage system is available in the village situated at the north most side in shrimp cultivation area and linked with 'Balidanga' river. Moreover, the canal is too narrower to flash out excessive water during rainy season. As a result, during heavy rainfall water logging is a common feature in this village. The land-owners who have fields near to the river can easily flash in and out water in to their fields but those land-owners whose fields are far away from the river suffers a lot as former land owners do not want to give any space to latterly noted farmers to drain or bring in water by making any canal on their lands. But without using

land there is no alternative way to get or remove water in or from lands to the river. So, villagers claim to the Government is to generalize the temporary canals which are used just only by some powered land-owners.

Some village people have shallow pump in their agricultural fields and some have no one. But these people have an indigenous mutuality to get water from nearest one. The farmer who has no pump machine tries to convince nearest farmer who has a pump by giving him one fourth (25%) of his total production of crops alternative of water and farmer will never claim any pesticides, insecticides, fertilizers from another farmer for that 25% crops.

There is a big conflict within village people and between adjacent village people to get water in the shrimp cultivation area during tide. Within village area, those cultivation areas nearer to river get water easily but the adjacent fields, do not get if there will an earthen kettledrum around fields. So, if land-owners of fields want to give water then it will only possible to get water in fields. It creates conflict sometimes. On the other hand, between adjacent villages, the nearer villagers put fish catching cages in the river. As a result, water flow become reduces and people of 'Kazla' do not get sufficient water when they need. Meanwhile a clash taken places in every year.

The more positive thing in this village is that they all have mentality to doing something in a combined way. They want to solve their water problem as a team though they have economic barrier. They are ready to pay money to improve their water related situation. But, as are too poor so they expect some economical and technical help from Government or any other non-governmental organization.

Participatory Mapping of 'Akra' Village

LOCATION

Zilla : Khulna
Upazilla : Dumuria
Union : Sarabpur
Polder : 29



Participatory Mapping of Akra Village



Date of Mapping: 24th March 2014

Brief Description of the Village

The village is situated on the bank of Gengrail River which is north-south direction. Then Vodra River is lying besides on this village which is East-West direction. Shape of this village is similar to square. Village is surrounded by Rotonkhali and Dulbaria village which is northern part of area, Chandgor is in Eastern portion of village, Sudormohol village is sited in Sundormohol. There are three “para” inside of a village, such as West para, middle para, East para which are located adjacent metal road inside village. Main road of village is very close to river and locally villagers called WAPDA road (main embankment). A single metal village road is linked with main road. There are three temples inside of village; each temple is located in each para. One school is sited middle para besides of village road. One community clinic is available in middle para. There are few shops situated in this area which is close to road. Basically all infrastructures are situated along village road.

Different type of land use practicing in a village. Shrimp cultivation (saline water) is practicing mainly in South-Western zone of village and adjacent to Vodra and Gangrail River. Shrimp cultivation (sweet water) is practicing in northern side of village and adjacent to locality. Some sporadic sweet water shrimp cultivation plot is in north side of village. One crop pattern is occurring in north side of village.

Doi khali canal is in north portion of village and two branches of canal enter into village. Gazi’s canal is attached with Vodra River. One big govt. pond is located between East and mid para of village. Around twelve culverts are present in village road. Two shallow tubewell is in East para. One inlet sluice gate is available in WAPDA (Water and Power Development Authority) embankment.

Sequential Process of Drawing Map

1. Inside village metal road	7. Para
2. Temple	8. East para
3. East to West road	9. Pond
4. Embankment of WAPDA road	10. North para
5. River	11. School
6. Doi khali canal	12. Temple
	13. Mosque

Field Observation of Akra Village

Drinking water is a great problem in this village. People have to buy drinking water from a long distance and it is near to 10 km. But it is quite difficult to buy everyday due to poverty and distance problem. Moreover, ground water layer has checked up to 900 ft. but no palatable fresh water has found. Only one pond is available inside village which is main source of drinking water. Village people are highly reliable to this pond. Some water boring is available inside village but it does not work properly.



FGD Session in Kazla

Another problem is water logging condition in monsoon period because of no sufficient drainage system. The Jaliakali canal is too small and also silted as this is mainly responsible to water logging in Northern part of the village. The sluice gates at southwestern part have no sufficient space to flash in and also co-ordination problem is present for maintaining shrimp cultivation in South-western part of village.

The villagers said that agriculture production is too costly because fossil fuel is high price to maintain water pump. At cost benefit ratio they cannot satisfy to grow crops in Rabi and Aus season. That's why they have no intention to grow crops in Rabi and Aus season. They raised their voice to set up transformer as they think it can reduce the production cost of crops during Rabi and Aus season. Seed storage is also a problem in this village. There has no seed storage to preserve the food. One metal



One and only Drinking Water Source in Akra

road is present inside village which divide two parts. North part in village where one crop pattern and sweet water shrimp cultivation is going on and opposite side of village where saline water shrimp is practicing.

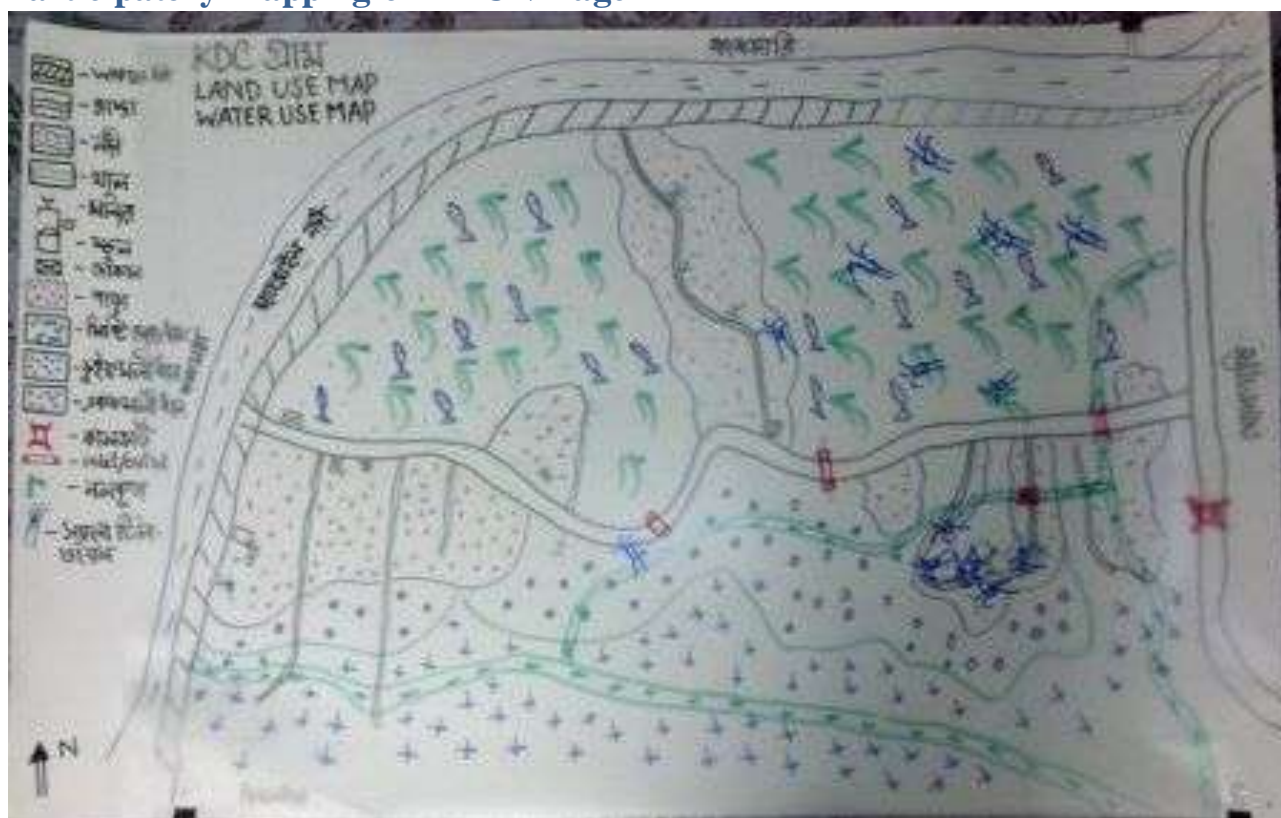
Participatory Mapping of 'KDC¹' Village

LOCATION

<i>Zilla</i>	: Khulna
<i>Upazilla</i>	: Dumuria
<i>Union</i>	: Sahas
<i>Polder</i>	: 29



Participatory Mapping of KDC Village



Date of Mapping: 24th March 2014

Brief Description of the Village

The village is situated on the bank of Gengrail River which is North-western direction. Shape of this village is similar to rectangle. Village is surrounded by Digholia which is South portion area of this village. Ghosgati is in Eastern side and Kakmari is located in Northern part of KDC. There are

¹ K-KAZIRHULA, D-DUDHARHULA and C-CHARABANDA

three separated homestead area which are combined name as KDC. i.e., Kazirullah, Dudharhula and Charabanda. Kazirullah is the biggest village among these villages and Charabanda village is located initially to enter all other villages. Main village is present and which is accessible to all villages and connected with WAPDA embankment road. Some other road is connected with main metal village road. There are three temples inside of village; each temple is located in each village. One school is sited in Kazirhula besides of WAPDA embankment road. There aren't few shops situated in this area which is close to road.

Different type of land use practicing in a village. Shrimp cultivation (sweet water) with rice cultivation is practicing mainly in Northern zone KDC and adjacent to Gangrail River. Two crop pattern is doing in Southern part of KDC which available adjacent to village and road. One crop pattern is doing in next to two crop pattern. It is almost Southern part and close to Boundary of KDC.

Three culverts is available inside KDC, one important culvert is in main road other two is present in two canals. Two inlet/outlet pipes is in KDC road. Shallow tube-well is more in Charabanda village. Major drinking water is available in each village. Some canals is running off in KDC and connected with each other.

Sequential Process of Drawing Map

1. Main road	13. Temple
2. Households	14. WAPDA road
3. Mango tree	15. Kobiraje's house
4. Culvert	16. Chitto's house
5. Households	17. Inlet/outlet pipe
6. Culvert	18. Shops
7. Road (Charaband road) in South direction	19. Shallow tubewell
8. Households	20. School
9. Sohurre's House	21. Tubewell
10. Gurebalar's road	22. Ghengrail river
11. Sudhirmama's road	23. Embankment road
12. Road (Dudharula)	

Field Observation of KDC Village

Most important a change of KDC is that they are practicing agricultural crop pattern insists of shrimp (saline) cultivation. Major portion of land is converted from Shrimp culture to agricultural practices. Households of KDC are close and connect with village road and they are doing different agricultural and fish cultural activities in their surroundings.



FGD Session in KDC

KDC is covered with Ghengrail River. River is already deposited more by siltation which causes water logging condition inside canal. Water quality is not sufficient up to the mark for drinking purposes. Iron is abundant in water that is harmful for KDC dwellers. In KDC, one sluice gate is very important to this community which is present near to Charabanda. During rainy season, excessive water is flashed out from Ghonagati and created water logging condition. As a result,

they lost their crops because of no sufficient digging canal is inside of this area. Canals of KDC are very narrow and silted to out excess water during monsoon. As a result, during summer water is drying very quickly because of same reasons. One major inlet/outlet pipe is situated in Charahbanda which is situated in private land and create water conflict between north and south part of KDC. Owner's have no interest to pass water through his land because crop will be damage.

Challenges Faced at Participatory Mapping and FGDs Session

- In each FGD session though 15 people were invited to come but it was more than double in number of participants. The flow of huge participants could not minimized as villager groups of each village were habituated to get signing money from 'World Fish' per sitting. Against this issue though there were number of discussions conducted with 'World Fish' program officer but the research team think that it was also difficult for them to control the flow;
- In FGD sessions, except 5 or 6 the main concentration of other participants was signing in the signing sheet;
- In most of the cases the participated community groups of 'World Fish' were the representative of a 'para' only rather than the total village. The research team tried to find out details information of whole village but it was difficult in some cases;
- The place for FGD session was quite uncomfortable in some cases (Akra, KDC) to the facilitators as well as the participants.