Char Development and Settlement Project Phase IV Bangladesh

Development of the Fisheries and Livestock Extension System in the Chars of CDSP IV

Mission Report No 7

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Government of Bangladesh/ IFAD/Government of the Netherlands

Implementing Government Agencies

- **Bangladesh Water Development Board (BWDB)**
- **Ministry of Land (MOL)**
- **Local Government Engineering Department (LGED)**
- **Department of Public Health Engineering (DPHE)**
- **Department of Agricultural Extension (DAE)**
- **Forest Department (FD)**
  and NGOs

BETS **Euroconsult Mott MacDonald** **Socioconsult**

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List of Abbreviations

ACI	Advanced Chemical Industries (Animal Health Care/Pharmaceutical Company)
AI	Artificial Insemination
ASPS II	Agricultural Sector Programme Support, Phase II (Danida)
BAP	Bismillah Agro Production Ltd
BRAC	Bangladesh Rural Advancement Committee (PNGO)
BRRI	Bangladesh Rice Research Institute
BUS	Bahumukhi Unnayan Sangstha (CBO)
CBO	Community-based Organization
CDSP	Char Development and Settlement Project
CLW	Community Livestock Worker
CSG	Credit and Savings Groups
CV	Cluster Village
DAE	Department of Agricultural Extension
Dec	decimal (40 square meters)
DFO	District Fisheries Office
DLO	District Livestock Office
DLS	Department of Livestock Services
DoF	Department of Fisheries
DUS	Dwip Unnayan Sangstha (PNGO)
DVM	Doctor of Veterinary Medicine
FD	Forest Department
FF	Farmer Forums
FFS	Farmer Field School
FLI	Field Level Institutions
FMD	Foot and Mouth Disease
FnF	Pharmaceutical Company
GIFT	Genetically Improved Farmed Tilapia
GIS	Geographical Information System
GNAEP	Greater Noakhali Aquaculture Extension Project
HH	Households
HYV	High Yielding Variety
IDE	International Development Enterprises
IMC	Indian Major Carp
LADC	Local Area Development Committees
LCS	Labour Contracting Societies
LF	Local Facilitator
NABA	Noakhali Agribusiness Association
PKSF	Palli Karma Sahayak Foundation (Micro-Finance wholesale organization)
PMG	Producer and Marketing Group
(P)NGO	(Partner) Non-Governmental Organization
PPR	Peste de Petits Ruminants (goat disease)

PW	Poultry Worker
RFLDC	Regional Fisheries and Livestock Development Project (Danida)
RHH	Rice Husk Hatchery (for ducklings)
SAAO	Sub-Assistant Agricultural Officer
SARCCAB	Support to Agricultural Research for Climate Change Adaptation in Bangladesh
SDI	Society for Development Initiatives (PNGO)
SFG	Social Forestry Groups
SNCA	South Noakhali CBO Association
SRT	Sex-reversed Tilapia
SSUS	Sagorika Samaj Unnayan Sangstha (PNGO)
TA	Technical Assistance
TFF	Tree Farming Fund
Tk	Taka
(S)UFO	(Senior) Upazila Fisheries Officer
ULDC	Upazila Livestock Development Centre
ULO	Upazila Livestock Officer
WFC	World Fish Centre
WMG	Water Management Groups

Executive Summary

1. Livestock and fisheries play an important part in livelihood and food security for the people of the Chars under CDSP IV. Most households have poultry birds, around half rear cattle and a quarter rear goats. Most households have ponds, although partly for catching wild fish, especially still in Caring Char and Urir Char. Around half stock fish in their ponds.

2. The Char environment remains high risk, as a result of flooding from *khals*, tidal surge and rapidly falling water tables in the dry season. Therefore **m**ost rearing systems are low risk and low input: scavenging poultry, free-range grazing of goats, cattle and, in large holdings known as *bathans*, sheep and buffalo. Almost all livestock are indigenous breeds. Unlike the common aquaculture systems of Bangladesh, Char households stock tilapia and grass-feeding carps and barbs.

3. As a result, productivity is low and is constrained by lack of services, especially vaccination and deworming services for livestock and good quality, large size fingerlings in the aquaculture.

4. Initial development needs should therefore address these problems. Farmer training should be oriented towards improvements of low input systems and services should concentrate on vaccination, other basic animal health care services, supply of quality fish seed, nursing to fingerlings and limited supplies of key inputs for semi-scavenging poultry, backyard fodder and inputs for pond preparation.

5. CDSP IV has a range of field level institutions. These may be classified as production groups (Farmer Forums, Social Forestry Groups and NGO Credit and Savings Groups) on the one hand and service provision groups (Water Management Groups and Community-based Organizations inherited from Danida's RFLDC on the other).

6. The production groups are mainly engaged in training. The Farmer Forums cover no more than 10% of all households and are mainly focused towards crop agriculture. There is interest in the FF in obtaining services for livestock and aquaculture, but no group initiative in this direction.

7. The Credit and Savings Groups cover all households and do offer training in poultry rearing, goat rearing and cow rearing. Curricula are available for aquaculture, but no training has yet been offered because of minimal demand by women members. The training curricula are - standardized, prescriptive and too content-intensive; they are administered mainly by hired trainers. KAP survey suggests that participants find the training difficult to follow and not east to practice.

8. To date, training of the SFG has been limited to issues of social forestry in climate change mitigation. Short-term income generating activities in the SFG concentrate on supply of medicinal plants, fuel wood and fruits; there has been no consideration of developing livelihood opportunities in utilization of fodder crops on the embankment and aquaculture in associated borrow pits.

9. CDSP IV has already made a positive contribution to capacity building of Water Management Groups as institutions for service provision through training in organizational and financial management. Management committees are already engaged in income generating opportunities which will contribute towards sustainability, some of them in the fisheries sector. However, current bank balances are limited and regular planning meetings remain focused on infrastructure. WMG need to widen their perceptions and resource base through cross visits to CDSP III WMG and nearby CBOs, alliances with those CBOs and forging links with higher level service providers.

10. Given the limited development of livelihood opportunities in the livestock and fisheries sectors, and in the lack of service provision, there is little opportunity to generate surplus production for the market at this stage.

11. An improved fisheries and livestock extension service within CDSP IV requires:
    - Improved agricultural knowledge and information systems in both sub-sectors;
    - Establishment of a system of service provision, focused initially on input supplies; and
    - Greater coordination between elements of the CDSP IV Project.

12. There is a need for curriculum reform in the NGOs, cutting out general materials, offering a more practical orientation and focusing the content much more on low-input systems (semi-scavenging poultry and homestead fodder development for stall fed cattle and goats). CSG participants or their men folk should be encouraged to follow training in aquaculture centered upon low inputs systems (tilapia and herbivores).

13. A training programme for the integration of livestock rearing and aquaculture into embankment livelihood should be introduced by the Forest Department.

14. Follow-up training for aquaculture and cattle rearing should be arranged for Farmer Forums through coordination between DAE and the Departments of Fisheries and Livestock Services

15. Service provision in the fisheries and livestock sectors should be coordinated through the Water Management Groups, supported by CBOs from RFLDC still operating on the periphery of the CDSP IV Project area.

16. Given the budget limitations of the WMG, these services should be expanded in an incremental manner with an initial emphasis on

    - Vaccination, deworming and other animal health care facilities.
    - Provision of good quality fish seed through local nurseries.
    - Key inputs such as lime, urea fertilizer, feed ingredients for improving poultry nutrition and fodder planting materials.

17. A 'local area network' should be established linking the production groups (FF/CSG/SFG) with the WMG; members of these production groups may become 'affiliated members' of the WMG and take part in planning meetings for development of agricultural services.

18. Resource persons should be identified in each WMG and training organized for them as Poultry Workers, Community Livestock Workers (for vaccination and health care of ruminants) and Aquaculture Resource Persons (for management of fish seed nurseries). Kit boxes should be provided to these resource persons.

19. The training of these Resource Persons may be organized through the ULO and the Sagorika SUS veterinarian in the livestock sector (around 15 days) and through the UFO and private hatcheries in the aquaculture sector (around 6 days).

20. Vaccines and other veterinary inputs may be organized through the DLO/ULO or through the South Noakhali CBO Association (SNCA), which already has links with both GOB and private sector suppliers. The cold chain may be maintained to grass roots level by linking SNCA to the NGO office clinic.

21. It is recommended that the best quality tilapia seed should be obtained through Bismillah Agro Production Ltd (BAP), which is a member of the improved seed supply network developed in Noakhali by RFLDC and the World Fish Centre. BAP may also assist in channelling quality seed from carp and Thai Sharputi hatcheries in this network.

22. Planting materials for homestead fodder may be sourced from the ULOs.

23. Supplies of feed ingredients are available through the dealerships already established by SNCA and national feed companies.

24. To implement this system, CDSP should
    - Carry out an immediate inventory of local resource persons (PW, CLW, ARP, Local Facilitators) still operating in the CDSP IV chars and nearby through CBOs and of the names and locations of Farmer Field Schools implemented by RFLDC though WMG/CBO and Sagorika SUS.

- Elaborate on the service network of each WMG through listing of FF/CSG/and SFG in their service areas (simple GIS system).
- Consolidate links between WMG and former RFLDC CBO**(Responsibility DTL, I&I).**
- Appoint short-term national specialists in the livestock and fisheries sectors (former Aquaculture and Fisheries Coordinator of RFLDC/Sagorika SUS Veterinary Surgeon or similar) for coordination of activities in the two sub-sectors.
- Conduct training of new batches of resource persons attached to the WMG through the UFO/ULO and partner **(Coordination by L and F Specialists).**
- Conduct stakeholder workshops in the two sub-sectors to develop the respective input supply and service networks (details in the Report)**(Coordination by F and L Specialists).**
- Conduct meetings with Project Partners to
    - Encourage DAE support in arranging follow-up sessions with UFO/ULO **(Agriculture Advisor).**
    - Discuss the feasibility of replacing hired trainers with permanent fisheries and livestock coordinators in the NGOs to act as the focal point for training in each sector.
    - Revise the NGO training curricula in poultry, goat and cow rearing.
    - The introduction and revision of the aquaculture curriculum in the NGO and arrange necessary budget.
    - Review the scope for support to goat and cow rearing and aquaculture through seasonal loans **(all coordinated by DTL, S and L Component).**
    - Discuss with the FD the introduction of a curriculum for integrated livestock and aquaculture development in the embankment social forestry resource system **(Responsibility: SF Advisor).**

1. Introduction/Background

In the chars covered by Char Development and Settlement Project, Phase IV (CDSP IV), Caring Char, Char Nangulia, Noler Char, Urir Char and Char Ziauddin, the fisheries and livestock sub-sectors are widely recognized as forming an important part of livelihood of the settlers/farmers. Especially during the early stages of settlement, capture fisheries and extensive grazing of ruminant livestock (cattle, buffalo and sheep) may be a more important source of income than crop agriculture, while backyard rearing of poultry (chickens, ducks and pigeons) are an important source of subsistence. With empolderization and more secure settlement, there is likely to be a shift towards aquaculture and more intensive forms of animal husbandry.

In the design of CDSP IV, it was assumed that the development of the fisheries and livestock sectors would be covered by the Regional Fisheries and Livestock Development Component (RFLDC) of Danida's Agricultural Sector Programme Support Phase II (ASPS-II). RFLDC had long been an unofficial partner of CDSP, especially seeking to add value by stocking fish in community ponds and taking up several of the Water Management Groups as Community-based Organizations to provide services to the community. In CDSP IV, from mid-2012, RFLDC supported the development of Farmer Field Schools as a participatory training approach in the new chars, through training Local Facilitators nominated by the Water Management Groups. Unfortunately, in the next phase of its support to the agricultural sector in Bangladesh, Danida has changed its orientation towards a national programme implemented by the Department of Agricultural Extension. The coverage of that project will be uncertain; it will certainly be less intensive in and possible even absent from the area covered by CDSP IV. Thus, although the CDSP-contracted NGOs do have some role in the promotion of backyard poultry and cow rearing, there will be a gap in the scope of fisheries and livestock development activities in CDSP.

In the fisheries and livestock extension system developed by RFLDC, the training of farmers in Farmer Field Schools and the development of Community-based Organizations are complementary. The Community-based Organizations provide services such as distribution of quality fish seed and rearing stock such as day-old ducklings, and provision of quality feed and vaccination services to their members and clients and link the farmer producers to local and regional markets so as to obtain a better price for their produce. The individual CBOs are clustered together into District CBO Association, one of which operates in Subornachar Upazila of Noakhali. Some existing CBOs are located in or are on the fringes of the new chars of CDSP IV, especially in Char Nangulia and Noler Char.

It is not expected that the resources available to CDSP IV will enable it to replicate the fisheries and livestock extension model developed by RFLDC. However, as the sub-sectors develop in the new chars, there will be a need for similar services and the challenge is to construct a practical extension system working with the CDSP Field Level Institutions (FLI: Water Management Groups, FFs, Credit and Savings Groups of Non-governmental Organizations, Social Forestry Groups) and linking them to the higher level services providers (Upazila and District Fisheries and Livestock Offices and private agribusiness).

2. Terms of Reference

The objective of the consultancy was thus to assist in building an appropriate fisheries and livestock extension system in the chars of CDSP IV to ensure that the necessary services reach the isolated communities. Specifically the Consultant was requested to

- Review the current status of the fisheries and livestock sector in the chars under CDSP IV;
- Identify the main development needs in the sector;
- Review the existing service provision in both the public and private sector (Upazila Fisheries and Livestock Offices, Non-governmental Organizations, including those contracted to CDSP IV, Community-based Organizations, FF and Water Management Groups, private agribusiness);
- Assess how the existing field level institutions of CDSP-III and CDSP-IV can be involved in fisheries and livestock extension services;
- Assess and propose how the Department of Fisheries can extend its extension activities in the CDSP area working with these CDSP institutions;
- Assess and propose how the Department of Livestock Services can extend their extension activities in the CDSP under the NGO component and budget, based upon a joint implementation and monitoring plan;
- Evaluate the scope for development of marketing opportunities for fisheries and livestock products (fish, milk, eggs and meat) through Water Management Groups, so as to offer an improved share of the end market price to the producers;
- Advise on the implementation modalities of the system and its further guidance by the TA team;
- Identify the need for possible further national consultant inputs in capacity building of the key actors in such a system and in implementation of the system.

3. Brief Description of Activities

Despite the uncertainties created by the political situation in Bangladesh, the Consultant arrived in the country on November 15. Although this was not in his Terms of Reference, he spent the afternoon of that day in discussion with the institutional consultant involved in the review of the Feasibility Studies for 'CDSP V', particularly in relation to the integration of fisheries and livestock development activities into the programme. He was asked to assist the CDSP IV Technical Assistance team to elaborate on the planned activities for the new phase.

After a day on personal business in Dhaka, the Consultant traveled down to Noakhali with the CDSP IV team on November 17. He had requested and was delivered a large number of Project reports for review prior to arriving in Bangladesh and he spent the morning of November 18 refreshing his understanding of this material. A meeting was then held with the CDSP IV team that afternoon, at which the Consultant proposed a programme comprising two bundles of activities

a) Field visits to CDSP Field Level Institutions in each of the 5 chars; and
b) Interviews with key actors

It was decided that the visits to the Field Level Institutions (FLI) should focus on those of relevance to the broader agricultural sector, namely:[1]

- The Water Management Groups, organized by the Bangladesh Water Development Board and the Technical Assistance Team;
- The Local Area Development Committees in Caring Char and Urir Char;
- The Farmer Forums established by the Department of Agricultural Extension;
- The Social Forestry Groups, set up by the Department of Forests; and
- The Credit and Savings Groups, developed by the Partner NGOs (PNGO)

and would address elements 1, 2 and 4 of the Terms of Reference. The Consultant noted this program of visits to the Field Level Institutions should cover all five chars since various items of baseline data showed major differences between the resource bases and levels of development of the five areas (Table 1) and even different ecological zones in different chars, since these reflected the potentials for livestock and fisheries/aquaculture development in the same way as the Productivity Zones affected cropping potentials. This framework was understood by the CDSP Team, but it was agreed that this sample framework was too ambitious given the political uncertainties.

The second group of activities would focus on interviews with the key service providers in the sector, namely

[1] It was considered that the other FLI, the Labor Contracting Societies established by the Local Government Engineering Department and the Water Management Groups and the Tube Well Groups, set up by the Department of Public Health Engineering and the NGOs were less central to the issue in hand

- The Upazila and District Offices of the Department of Livestock Services and the Department of Fisheries;

Table 1: Summary Table Showing Different Levels of Development of the Five CDSP IV Chars

Variable	Char Ziauddin	Char Nangulia	Noler Char	Caring Char	Urir Char
Settlement History	12	9	9	6	21
Reason for Movement	Land availability	River erosion	River erosion	River erosion	River erosion
Family Size	6.33	6.04	5.89	5.39	6.57
NGO	5.93	5.26	5.25	5.02	6.05
% Female	4	4	5	3	10
Illiteracy	74	80	76	81	73
Tin House	13+20	10+16	12+20	6+3	36+38
Tube Well for bathing	26	18	20	6	58
Ring slab Latrine	21	13	10	14	24
Value of Assets	28,792	29,224	33,512	20,300	123.415 (including Buffalo Bathans)
Income from					
Field Crops	14,842	12,935	12,439	18,789	32,500
Homestead (Vegetable)	2,188 (2,259)	3,340 (4,025)	2,634 (2,428)	1,167 (2,007)	9,978 (9,489)
Aquaculture	2,167	3,177	1,119	1,443	9,108
Fishing	1,150	1,631	2,620	2,573	2,780
Livestock	879	1,993	2,213	1,439	13,531
Poultry	1,380	1,768	1,373	2,161	3,831
Total	65,743	69,152	69,281	71,475	104,400
NGO Monthly	3148	3706	4147	3995	4760
Principle Occupation					
Agriculture	28	46	38	24	34
Fishing	4	1	3	5	2
Average Cultivated Area (dec)	137	137	121	186	402
(NGO dec/acres)	96/0.95	134/1.33	117/1.16	151/1.51	232/2.32
Average Land Area	90	123	107	144	308
Rice yield	2.4	1.7	1.9	1.9	1.8
% Hh with Non-rice cash crops	44	23	35	8	30
Use of organic fertilizer	26	25	30	6	2
Livestock					
% HH with milk cow	33	42	45	31	67
% HH with goat	10	13	13	28	29
% HH with pond	92	97	91	81	96
% HH culturing pond	47	62	42	25	84
NGO Average Livestock Holdings					
Cattle and Buffalo	1.11	0.97	1.15	0.81	2.32

Goat and Sheep	0.58	0.70	0.67	1.34	1.59
Poultry	10.29	8.88	8.26	8.31	14.25
Aquaculture					
Average Pond Area	12	23	16	12	60
Reasons for no culture					
Tidal surge	55	67	86	82	62
Low water	31	32	13	18	19
Aqua yield/dec	2.8	1.8	1.0	1.9	2.0
# non-crisis months	6	7	6	7	9
% HH suffering crisis	76	86	73	91	59
Main shocks					
Serious illness	33	22	22	11	17
Displacement by flood/cyclone	33	35	39	67	36
Crop Loss	29	37	41	68	76
Loss of livestock	6	17	7	19	20
Law and order	6	9	7	36	26

Source: CDSP-IV Baseline Survey Report, February 2012; Base Line Survey of Social and Livelihood Component

- The local management of the partner NGOs;
- Private agribusiness, especially fish and prawn hatcheries and private sector providers of vaccine services, as well as the processing plant of Milk Vita in Subornachar.

This group of activities would address points 3, 5, 6 and 7 of the Terms of Reference.

Despite this forward planning, the prevailing political instability made a firm program of field visits problematic and it was also agreed that the need to be in Dhaka at the latest by December 5-6 for debriefing of the Project Coordinating Director and the Embassy of the Kingdom of the Netherlands before the safe departure of the Consultant effectively meant that the field work had to be completed by the third week of the Mission. Thus, in an effort to get the work started, it was agreed that the field visits should begin as quickly as possible and the gap in the *hartals* prevailing allowed the initial field program to be arranged in the following two days during the first week of the Mission. Details of this and the subsequent activities are set out in Annex II.

From Annex llit be seen that considerable progress was made in conduct of the field visits and in arranging other meetings in the first week of the Mission. However, from the middle of the second week and following the announcement of the election schedule on November 25, the political situation in Bangladesh deteriorated and field visits were disrupted by an almost continuous transport blockade called by the opposition parties. Since Noakhali has the reputation of being an opposition stronghold, the Consultant was advised by the Team Leader not to risk even traveling to the CDSP office and stay in his hotel. As a consequence, field visits could not be arranged to Caring Char and Urir Char and meetings with the District Fisheries Office, the Upazila Livestock Office and the representative of FnF Pharmaceutical were constantly postponed. The CDSP team in Noakhali tried its best to facilitate the important contact with a representative of the remaining NGO, Society for Development Initiatives

(SDI), and with the Acting DFO and these meetings were arranged at the Guest House during the second period of blockade.

With some easing of the transport restrictions to allow travel by rickshwa, a presentation was made to the CDSP field team on the Wednesday of this week, which allowed some crucial feedback and sharpening up of the implementation modalities for the framework. The amended presentation was then made to the Project Coordinating Director and to the Embassy of the Kingdom of the Netherlands in the final week of the Mission in Dhaka.

4. Findings

4.1Current Situation of the Fisheries and Livestock Sector

4.1.1 Fisheries and Aquaculture

At the time of the Feasibility Studies for CDSP IV, the situation in the five chars under review was described as one of transition. In the early stages of settlement and development of the char lands, settlers tend to obtain their supplies of fish from the wild fishery, either marine fish from the surrounding coastal or freshwater fish caught in the interior *khals* through netting and trapping. This situation is described in the studies conducted by Mahbubul Islam and Moniruzzaman (2007) for Caring Char, Char Nangulia and Noler Char, by Shahim Ahmed and Zahidul Alam (2008) for Urir Char and is summarized by Demaine in his chapter in Moving Coastlines (2010).

Leaving aside the complex coastal fisheries, households in the new chars were also engaged in catching fish in the numerous *khals* (canals) which cross the new lands. Every household had small or large fishing gears (fishing traps and different nets) for fishing in these internal canals during the rainy season. For households further away from the river, this was an important dimension of the fishery, while for some coastal fisher families it formed a supplement to their main occupation. In fact, this fishery did not take place only in the *khals*. Because these are becoming shallower because of sedimentation, there was a good deal of overbank flooding at the height of the rainy season. At such times both male and female household members and children were involved in fishing when water comes to their household platform. The fish caught were mainly used for household consumption, with the surplus sold to the market. It is estimated that the average income derived from inland fishing amounts to around Tk100 per day, but total income depends on the length of the season, which varies considerably from 1-2 months to over six months in some cases.

In some larger canals, there was a more formal system, whereby the *khals* were leased out in the rainy season. This system applied to three canals in Char Nangulia, the Nangulia Khal, the Bhuiyar Khal and the Katakhali Khal and two canals in Noler Char, the Milon Khal and the Hoar Khal and its tributaries. The leases were operated through the Union Parishad of Char Bata in Char Nangulia and Horni and Chanandi Unions in Noler Char. The lease agreements were verbal, not written. People using big nets paid Tk 100-500 for the entire fishing season, the amount depending on the catchment area for fishing. Other people using small fishing gears did not pay. The earnings from the lease of *khals* were used for local institutional developments (mosque, schools, Madrasa etc.). Local committees look after the leased *khals*.

In Urir Char the number of canals was rapidly decreasing due to siltation, non-excavation and encroachment. Over the five years to 2008, half of the *khals* were lost. At that time, only nine were remaining. With the approval from the Upazila Parishad, the Union Parishad leased out all *khals* on

a yearly basis through open tender. In 2008, the lease amount was Tk 127,000 taka for the four canals in the south of the island and Tk 8,000 taka for the five canals in the north. The lease money was deposited to the Union Parish ad's revenue account. The general population is completely prevented from fishing in or even entering the leased out *khals*.

The transition between inland fisheries and aquaculture in a new settlement area like the new chars is complex. In fact, as noted above, the inland fishery is characterized by two elements, fishing in canals and casual catching in flooded areas outside the canals. It is virtually impossible to assess what proportion of the catch derives from each of the fisheries nor indeed from small open ponds and ditches which are used to trap fish after the flood waters have receded. These so-called 'trap ponds' or ditches may be regarded as the first stage of aquaculture development. They may be seen as a conscious attempt to appropriate a higher proportion of the available catch for an individual household.

In fact the movement to aquaculture in the new chars at the time of the Feasibility Studies showed a steady spectrum from a ditch towards a fully developed pond in which a more intensive system may be practiced. In the new chars, at that period, just about every household has at least one ditch-like pond. At first people excavate a pond just like a ditch to raise their household platform. They use this ditch just for bathing, washing, cooking etc. After establishing a new house, they increased the size of their ditch over a period of 2-3 years, surrounding it by a dyke to create a small amount of agricultural land for *rabi* cropping (winter cropping) and for wild fish trapping. Ponds in the new chars were classified by Mahbubul Islam and Moniruzzaman as follows in terms of stage of development.

Type: 1. Ditches/ponds without dykes:

This is the initial step of pond excavation in the chars. These are small ditch-like ponds without dykes, their size ranging from 4-10 decimals. These ponds are not used for aquaculture but for trapping wild fish. People excavate the ditch with their own labor. This is the dominant type of pond in chars that are still maturing as Caring Char and Patar Char. In more developed chars, the numbers of this type are smaller.

Type: 2. Ditches/ponds with broken/incomplete dykes:

This is the second step of pond excavation in the new chars. These are small ditch-like ponds with incomplete dykes. Their size ranges from 8-15 decimals. They are always affected by tides and flood. As a consequence, again these ponds are not used for aquaculture but for trapping wild fish. The depth ranges from 4-8 feet and water is retained for about 3-4 months. After excavating such a ditch, it takes 2-3 years to develop to a semi-structured pond and then a further two-three years to develop it up to a structured pond. Local people usually raise the dykes through their own laboring. These ponds are mainly found in Patar Char, Char Rahman and parts of Char Nangulia. Only a few ponds have developed to this level in Caring Char.

In both of the first categories of ponds, local people are both consciously and unconsciously trapping fishes from nature. These include small indigenous species (known as *Kachki*), catfish (*Shing, Magur*), *Bata, Gulla*, and snakehead (*Taki, Shol*). In ponds with small dykes sometimes local varieties of tilapia are collected from the upper chars and reared after the flood.

Type: 3. Ditch/ponds with crops-land surrounded by dykes:

This is the third step of pond excavation in the chars. This type constitutes a ditch with some agricultural land surrounded by dykes. In this category, dykes are not so high and are being raised year-by-year through household labor. These ponds are still affected by tides and flood. Depth ranges from 6-10 ft. and water is retained for 4-5 months. The size range of this type of pond is between 20-50 decimals, including both the ditch and agricultural land. In these ponds, people have the opportunity for short-time fish culture, as the ponds are not so deep. Most people still stock wild fish species, but some stock carp species (*rohu*, silver carp, bighead and grass carp) using traditional processes. The agricultural land within the surrounding dykes is used for fish culture in the rainy season and for cultivating *rabi* crops when the water recedes to the ditches.

Type: 4. Well-defined Ponds:

This type of pond is excavated with high dykes, is deeper (10-15 ft.), has better water retention (6-8 months) and is not liable to flood. Some people who are financially better off can excavate such ponds in one season, using hired labour. The size of this type of pond varies from 20-50 decimals. They are practicing extensive poly culture, without technical improvements. Over the last two years, there has been an increasing trend towards dyke raising.

The relative proportion of these different types of pond varies according to the different chars. It is clear that the less consolidated the char, the greater the proportion of relatively undeveloped ponds. Table 2 summarizes the general differences between these four types of pond described above.

Table 2: Summary characteristics of different types of pond in the New Chars

Particulars	Pond Type -1	Pond Type-2	Pond Type-3	Pond Type-4	Remarks
Dyke status	No dykes	Broken/incomplete dykes	Ditch/ponds with crops-land surrounded by dykes	Well protected dykes	Gradually raising the dykes
Range of pond size (decimal)	4-10	8-15	20-50	20-50	Annually increasing the size.

Water retention period (month)	3-4 month (Up to October)	3-5 month (Up to Nov.)	4-6 (2 month in crop-land, up to Dec.)	6-8 month (up to Jan-Feb.); very few retain water around the year.	Including rainy season
Culture strategy	No stocking	No stocking	Traditional (Wild- Poly culture)	Traditional Carp-poly culture	Technically weak
Types of species cultured	Wild fishes: Shol, Taki, Kachki, Bata, Koi, Shing etc.	Wild fishes: Shol, Taki, Kachki, Bata, Koi, Shing etc.	Wild fish and few carp species	Rui, Catla, Silver, Tilapia, Bighead, Grass carp, Puti,	Without management
Prawn culture	No	No	No	Very few household stock prawn	Results in prawn culture good
Source of fry/fingerling	No stocking	No stocking	Upland (fry traders/ Patilwala)	Upland (fry traders/ Patilwala)	Lack of quality fingerling
Feeding	No feeding	No feeding	No feeding	Little use	Only rice-bran used
Marketing	Used for household consumption	Used for household consumption	Mainly household consumption; rests are sell.	Sell to the local market and use for household consumption	Local market price low.
Flood affection	100% affected	100% affected	Combination of affects from rain and tidal surge (full moon, new moon)	Normally not affected; but exceptionally affected by tidal surge and flood	If improve drainage system it will reduced.
PL nursing	No	No	No	No	Not aware
Dyke cropping	No dyke	No	Rabi cropping (winter) in	Tree plantation /	Good production

			area surrounded by dykes.	cropping practiced	from cropping
Average depth of pond (Range in ft.)	4-6 ft.	4-8 ft.	7-10 ft	10-15 ft	Annually increasing depth
Objectives of pond excavation	- Soil used for house-base upgrade. - Bathing, cooking and washing	- Soil used for house-base upgrade -Bathing, cooking and washing .	-Household use -Fish culture. -Few ponds dig a well to keep water for a long time in the pond.	-Fish culture. -Household use. - Few ponds dig a well to keep water for a long time in the pond.	Tendency to excavate a well in the pond to retain water for longer.

Source: Harvey Demaine: Wild Fisheries and Aquaculture, Chapter 5 of Moving Coastlines

Over the five years since the Feasibility Studies, the situation has changed considerably, with more and more ponds being developed into categories 3 and 4 as the wild fishery has declined. According to the CDSP IV Draft Baseline Survey, 92% of households in the Project area have at least one pond or ditch. Of these, 51% are actually practicing fish culture (Table 3). In Caring Char, the proportion of households with ponds is less and the numbers of households culturing falls to just 25%. These figures are more or less confirmed by the Agricultural Benchmark Survey, which also records that 93% of ponds are within the homestead area. Average pond size varies from between 15 to 28 decimals (600 to 1120 square meters according to zone, except for Urir Char, where the average size is 72 decimals (2,880 square meters). This is explained by the fact that the ponds in Urir Char were excavated during the land accretion period by erecting small dykes across areas of low-lying land.[2] Some rather larger ponds are being developed in the other chars alongside the embankments where earth has been excavated for the dyke construction. These farmers have quickly recognized that, although they have lost arable land in the construction, the borrow ponds are a resource for aquaculture and the better-off are converting the land into ponds around their homestead, mainly inside the embankment, but in some cases also outside.

In this context, aquaculture practices in the CDSP IV are of two types. Most households – especially the resource poor women clients of the NGO groups - are culturing in following traditional practices ('extensive' in the conventional aquaculture development terminology).75% of those culturing their

[2] Sadly the Agricultural Benchmark Survey does not cover the fisheries and livestock sector. Any similar survey in the future should correct this lacuna.

ponds only stock and harvest with no feeding or fertilization, largely because of the high risk posed by flooding from tidal surge or water logging during the monsoon or from the limited period of water retention, especially in parts of Char Ziauddin and Char Nangulia. It is interesting to note that the species of fish most frequently stocked are tilapia (over 80% of households), grass carp and silver carp (over 70%), which is rather different from the dominant culture of Indian major carp (rohu, catla and mrigal) in Bangladesh (Figure 1). From the field interviews with the poor women members of the NGO Credit and Savings Groups, it was explained that the tilapia stocked was the normal breeding fry rather than the sex-reversal tilapia (SRT), derived from fry treated with methyl-testosterone which is spreading widely in Bangladesh and especially in the Greater Comilla region. This was because the non-SRT fry were available cheaply as 'swim-up fry' from local ponds, the owners of which sometimes advertized their availability by 'miking'. Interestingly the same reasons of easy availability were given by the rather better-off male majority members of the Farmers' Forums, with more developed ponds, who might well have benefited from the SRT fry. The prevalence of stocking grass carp was explained in rather similar terms, namely that the fish grew quickly on a diet of grasses cut from the wild and thus were also a low cost investment.

Only relatively few farmers, among the leadership of the Water Management Groups (and Community-based Organizations inherited from RFLDC), are seeking to culture in a rather more intensive manner. In this case and with reference to tilapia there is interest in culturing the monosex type of tilapia with a view to sale in local markets. This has been encouraged by an initiative taken under the Support to Agricultural Research for Climate Change Adaptation in Bangladesh (SARCCAB) project which has been conducting agronomic research in the CDSP area and which has formed an alliance with the NGO Shisuk based in the Daudkandi area of Comilla District. Shisuk has promoted the use of improved quality seed through the WMG in the area, with a partial subsidy, probably with a view to encouraging sales from their associated hatcheries (see below, Section 4.2.3.1).

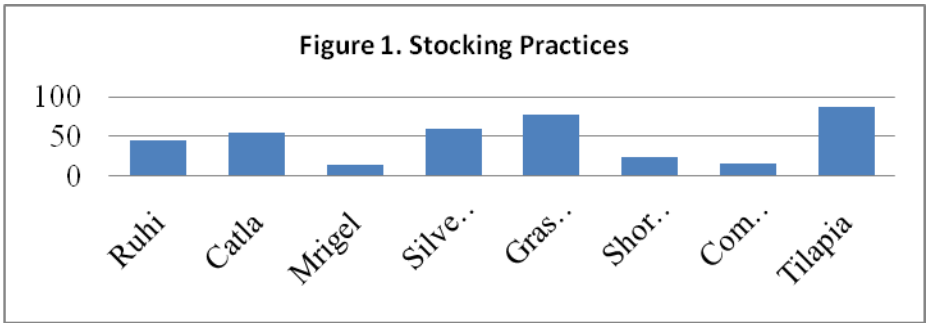
It is notable that only in the relatively more isolated context of Urir Char do the households culturing fish face problems with supply of fingerlings. Almost all of these are obtained from local vendors (*patil walas*), although it may be that the choice and quality of the fingerlings may be a problem

Table 3: Characteristics of Fish Culture by Char

	Char Ziauddin (N=100)	Char Nangulia (N=600)	Noler Char (N=300)	Caring Char (N=300)	Urir Char (N=100)	All (N=1400)
HH with pond/ditch (%)	92	97	91	81	96	99
HH culture pond/ditch (%)	47	62	42	25	84	51
Type of culture (%)						
Traditional	81	80	82	53	54	75
Semi-intensive	16	19	18	47	43	24

Intensive	2	01	0	0	3	1
If not cultured why? (%)						
Flooded during high tide	55	67	86	82	62	75
Lack of fingerling and other inputs	6	0	0	0	13	01
Risk of theft	8	1	1	0	6	1
Low water retention	31	32	13	18	19	23

Source: CDSP IV, Draft Baseline Survey



According to the Baseline Survey, yields are very low in the study area, (1.74 kg/ decimal), far below the national average (Table 4). The highest average yield is in Char Ziauddin, 2.8 kg/ decimal, the least isolated area and the area probably most exposed to previous extension activity, and the lowest in Noler Char, only 1 kg/ decimal. More than 67% of total production from ponds / ditches is used for household consumption. Per household income from the pond is Taka 4.515. However, in Urir Char the per household income is around double that in the other chars, due to the average bigger size of pond/ ditch there.

Table 4 : Fish Production and Consumption

	Char Ziauddin (n=43)	Char Nangulia (n=362)	Noler Char (n=115)	Caring Char (n=62)	Urir Char (n=81)	All (n=663)
Average Production (kg/HH)	37	43	25	30	89	43
Production (kg/dec.)	2.8	1.8	01	1.9	02	1.74
Average Consumption (kg/HH)	28	29	20	25	52	29
Average income from pond (Tk/HH)	4070	4730	2750	3000	8900	4515

Source: CDSP IV, Draft Baseline Survey Report, February 2012

4.1.2 Livestock

Although the shift between offshore fisheries and more managed systems of inland fisheries and aquaculture is a natural transition during the occupation of the char land, livestock rearing is in general a new livelihood opportunity for the settlers. There appear to be some constraints to livestock rearing at the earliest stages of char land settlement. It is only when the char is sufficiently consolidated and has been colonized by grassland vegetation that it offers the opportunity for livestock grazing. At this point livestock becomes a crucial part of the household economy, as a source of food and of financial and social security. In such societies, cattle and buffalo and to a lesser extent sheep and goats become what may be described as a 'walking bank balance' which also bears interest when the animals produce calves, kids and lambs.

4.1.2.1 Ruminant Livestock

Table 5 drawn from the CDSP IV Baseline Survey shows that overall (75%) sample households are rearing ruminant livestock of one type or another (cow, buffalo, goat and sheep). 41% of the sample households have at least one milking cow, 41% have a bull and 17% have a goat. Only in Urir Char there is considerable number of households (12%) with buffalos, with an average number of 7 animals. The Baseline Survey of the Social and Livelihood Component conducted in 2013 offers data on average holdings of ruminant livestock. In line with the Baseline (Table 5) average cattle and buffalo herds average just one animal per household, except for Urir Char (2.12) and less than one head of goat and sheep except for Caring Char (1.39) and Urir Char (1.59).

These differences in ruminant livestock holdings relate to the continuing existence of extension grazing systems in Caring Char and especially Urir Char. These extensive systems are described by Shamim Ahmed and Zahidul Alam in their study and summarized by Demaine in Moving Coastlines (2010). These sources claim that the livestock holdings in Urir Char are larger than the data presented in the CDSP Baseline. From data based upon participatory rural appraisal methods, on Urir Char almost all families rear cattle, with a typical holding of 4-6 head. Among the 4-6 head of cattle, at least one head is a milk cow. Buffalo holdings are typically larger, because most are reared under the Bathan system (see below). Perhaps 90% of households rear Black Bengal goat, with a holding of 2-3 animals. A few households (4%) rear sheep, with the flock size ranging from 10 to 40. The two systems of rearing which contribute to this situation are as follows:

Borga system

All sheep rearing households, an estimated 60% of cattle rearing households and 30% of goat rearing households rear the animals according to the *borga* system, the equivalent of a share cropping system in crop cultivation. Under this system, comparatively richer persons buy cattle, goat and sheep and give these to poorer persons to tend. Male calves are typically sold in 1-2 years, while heifers are used for milk and calf production. The proceeds of the rearing are shared between the owner and the person that is in charge of rearing. In case of cattle, for example, if a bull calf is bought for Tk5,000 and is sold for Tk15,000 after rearing 1-2 years, the

owner gets Tk10,000, while the rearer retains Tk5,000 taka. In the case of milch cows, the milk and the first calf is retained by the *borga* cropper. (S)he – and often it is a lady - receives a 50% share of the next calves. The cow then remains with the investor and when sold, he receives the profit. This is a highly effective system that includes a strong social custom in this particular community.[3]

Under this system, cattle and sheep are taken in the morning by the *borga* croppers to the grazing land near the river bank and are brought home at dusk. This is done by their family labor. It sometimes happens that the male member leaves the cattle and sheep at the grazing area while on his way to other work (day labor, agricultural activities, fishing etc.).He then takes them home when he returns. Cattle are kept near the dwelling house in a corral. Here they are provided with water, grass, straw and salt. Pulse shells in the *rabi* season and rice bran in the *aman* season are added to the daily feed. Goats are mainly grazed on grasses found on the roadside, in the homestead, at the pond side, on *ails* (rice field bunds) and on fallow lands. They are not taken to the open grazing land, since they cannot retreat in the event of a high tide which floods the grazing lands on most days. By contrast, cattle, sheep and buffalo can easily walk or swim back to higher land or specially prepared mounds called "*killa"*.

Bathan Operation

Some buffalo and sheep, and to some extent cattle, are reared in "*bathan*" systems, in large herds in open grazing land. Most *bathan* have their own *killa*, where animals stay at night time. The *killa* normally has a fenced space for this purpose. The person who takes care of the herd is called a "*batainna*". He normally earns Tk2,500-3,000 per month including food or Tk3,500-4,000, excluding food. In Urir Char there are 55-60 buffalo *bathan*, 50-55 cattle *bathan* and 18-20 sheep *bathan*. A *bathan* typically ranges from 30-300 head of cattle, 50-200 buffalo and 100-200 sheep. About 75 individuals own these *bathans*. Half of the owners are from elite households in Sandwip and Companigonj Upazilas. There are a few smaller *bathans*, which have evolved and are managed by several families in partnership.

From the Baseline Survey, on average each livestock holding household produces 114 litres of milk per year and the annual income from milk is Taka 2,850. The highest average milk production as might be expected is in Urir Char, 203litres/ year, which is due to the large number of milking cows and buffalos ownedby the households in Urir Char under the Borga and Bathan systems. The study by Shamim Ahmed and Zahidul Alam (2008) suggested that 40% of the large ruminants reared in the Bathan system were milkers and that production per animal per milking day was 2.0 -2.5 litres per cow and 3-4 litres for each milk buffalo. These authors estimate that, at that time 800-1000 kgs. of milk was been exported to Noakhali and Sandwip

[33] There may be variations in the Borga system. The system was also found amongst the NGO CSG group interviewed in the northern part of Char Nangulia, where at the sale of the animal of fattened cows, the richer buyer takes is repaid the amount invested and the profit shared. Around 20% of the women in the two groups gathered benefited from this system

daily from these systems for manufacture of curd and sweets as well as raw milk.[4] Some of the buffalo milk was being semi-processed into curd at the trawler ghat.[5] However, prices were low because of the high transport costs.

Again the productivity of ruminants is generally low in the Project area at this stage because all of the animals reared at indigenous strains (unimproved *desi* cattle), lack of access to veterinary services and almost total absence of improved feeds. As with the poultry sector, training in improved methods of rearing are being offered by the NGOs and at least some of the women trained appear to be absorbing the basic messages of the need for hygienic stalls and access to feed. Two trained women in Polder Samaj in Char Ziauddin were actually preparing silage for cattle feed in the dry season. At least some - possibly the more experienced ladies - were profiting through cattle fattening. However, cases of significant loss from mortality were also mentioned and the only access to veterinary services – vaccine and deworming treatment - is in the local markets, where the treatment prescribed by the shops is erratic and often missing the target of the disease.

Table 5: Characteristics of Ruminant Livestock Rearing by Char

	Char Ziauddin (N=100)	Char Nangulia (N=600)	Noler Char (N=300)	Caring Char (N=300)	Urir Char (N=100)	All (N=1400)
Nos. of HH rearing livestock	65 (65%)	468 (78%)	222 (74%)	213 (71%)	85 (85%)	1053
HH with milking cow (%)	33	42	45	31	67	41
Average no. of cows	1	1	1	1	2	1
Avg. milk production (Lt))	99	91	118	104	203	114
Avg. milk consumption (Lt)	48	46	70	70	110	64
Avg. income from Milk (Tk)	2970	2730	2950	2600	4060	2850
HH with bull (%)	28	47	39	28	67	41
Average nos. of bull	2	2	2	2	3	2
HH with goat (%)	10	13	13	28	29	17
Average nos. of goat	2	2	2	3	3	02
HH with buffalo (%)	1	0	1	0	12	1
Average nos. of buffalo	3	1	7	0	7	6
HH with sheep (%)	0	0	0	0	3	0.2
Average nos. of sheep	0	0	0	0	4	4

Source: CDSP IV, Draft Baseline Survey Report, February 2012

[4] The SDI buffalo rearing project (see Section 4.2.3.6) continues to export the milk to Sonapur, Maijdee, Companiganj (Basurhat) and Sandwip by various trawler routes.
[5] It was confirmed by the SDI representative that this practice still exists.

4.1.2.2 Poultry

Table 6 shows that on 89% of all households in the Project area rear poultry, almost entirely (995) through a semi-scavenging system (scavenging plus use of a small amount supplementary feed). The average number of birds for each household is 6 chicken and 7 ducks. Flocks in Urir Char are slightly higher than the average, in line with the rather larger resource base per household, but unlike the ruminant sector, there is no major difference from the other chars in the rearing system. This general pattern is confirmed by the Baseline Survey of the Social and Livelihood Component conducted in early 2013, although the average holdings recorded tend to be lower at 9 birds (chickens and ducks) overall and 14 birds in Urir Char.

Average egg production per year is 156 from both duck and chicken and total meat production is 36 kg per year. Consumption of eggs (30%) is more than the consumption of meat (17%). Average yearly per household income from eggs is estimated 817 taka and from meat 4,949 taka. The female members of the households reportedly do the activities as regards rearing the poultry birds. In a few cases the male members do the task and the women assist.

Table 6: Characteristics of Poultry Rearing Systems

	Char Ziauddin (N=100)	Char Nangulia (N=600)	Noler Char (N=300)	Caring Char (N=300)	Urir Char (N=100)	All (N=1400)
Rearing status						
HH rear poultry (%)	80	92	82	93	93	89
Fully scavenging (%)	3	0	2	0	0	1
Scavenging plus (%) supplementary feed (%)	97	100	98	100	93	99
Fully supplementary feed (%)	0	0	0	0	0	0
Average Nos. of Chicken	4	6	5	6	9	6
Average Nos. of Duck	7	7	6	6	9	7
Annual production of eggs	275	139	127	208	209	156
HH consumption of eggs	84	39	43	56	64	47
Income from eggs	1210	660	760	1108	1372	817
Annual production of meat (Kg)	47	32	26	42	75	36
HH consumption of meat (Kg)	7	5	3	7	10	6
Income from meat (Tk)	9009	4307	4961	5010	7881	4949

CSDP IV, Draft Baseline Survey Report, February 2012

Productivity is low in the poultry sector because almost all households rear local unimproved birds (*desi* chickens and ducks), because of the high mortality of the flocks, especially chicks, and

to a lesser extent because of the limited access to improved feed. The training of women farmers in the Credit and Savings groups conducted by the NGOs does include some mention of improved breeds such as Sonali hens, but none of the four women trained in the group interviewed in Char Ziauddin had adopted these, probably correctly so since they do not breed naturally – requiring restocking every year - require better feed rations and are more susceptible to disease. It may be noted, incidentally, that the training system adopted by the NGO BRAC in Char Ziauddin involves the women selecting the focus of their own training. Thus, although poultry rearing is the most widespread activity amongst these women, only about one quarter had been trained after eighteen months of operation of the CSG. It was explained that other ladies might be trained in the sector at a later stage, but each training group of 20-30 women is drawn from a number of CSG.

This is not to say that the *desi* breeds are not vulnerable to disease and it was clear from the field interviews that mortality is **the** major problem for the poor farm households. In Char Ziauddin, despite some presence of the Regional Fisheries and Livestock Development Component of Danida, there was almost no access among the Credit and Savings Group participants to vaccination services. The very few women who had been trained in poultry rearing were aware of typical diseases and vaccination, but the only one who had treated her birds obtained vaccines from shops in Aktopalia market. One Local Facilitator in the Char Bagga Khal Water Management Group had been trained as a Poultry Worker under the cooperation between CDSP IV and RFLDC in 2012-13, but she had moved to the other Water Management Group. The situation was largely repeated in the other locations.

4.2 Review of Existing Services

4.2.1 Government of Bangladesh Departments

4.2.1.1 Department of Fisheries

Aquaculture in Bangladesh, particularly small-scale pond aquaculture, has taken off dramatically over the past thirty years, especially under the influence of a number of major donor-funded aquaculture development and extension projects. Supported by these projects, the Government of Bangladesh first created a network of fish hatcheries which ensured the reliable supply of good quality carp seed to farmers. On-farm research and development work then identified key parameters of successful pond aquaculture: appropriate pond preparation, including preliminary fertilization, stocking with an appropriate mix of species to use the different ecological niches in the pond and at the right density, judicious feeding and fertilization during grow-out, maintenance of a good pond environment and multiple harvesting to ensure efficient utilization of pond fertility and feed.

The Department of Fisheries has been responsible for overseeing this rapid development of aquaculture in Bangladesh. However, the Department has limited resources, especially at the grass-roots where the Upazila has a technical staff of just three persons: the Upazila Fisheries Officer, the Assistant Fisheries Officer and a Field Assistant. Often one or more of these positions

is unfilled. The staff has limited logistical facilities – motorcycles, computers - in the absence of foreign-aid projects. Although there have been a number of government funded projects, including one offering credit for poverty alleviation activities in aquaculture, there is tendency for such projects to be targeted towards relatively better-off farmers. The Department of Fisheries has an unclear perception on poverty focus. Thus most aquaculture development has taken place on a project mode based on the increased resources offered by donors; in some cases, these resources are channeled through large national NGOs such as CARITAS and BRAC, both of which have their own specific fisheries programs.

In the same vein, in Greater Noakhali, activities in aquaculture over the last 14 years were largely centered around the cooperation with first GNAEP and then RFLDC and Government projects have been mainly focused on activities relating to inshore fishers, such as provision of livelihood allowances during the ban period of the hilsa and other inshore fisheries and, more recently the issue of ID cards to fishers to give them protection against wrongful arrest by the coastguards. In discussion with the Acting District Fisheries Officer, it was encouraging to note that there was an awareness in the Department of the specific needs of the chars identified above and ideas about possible livelihood options such as crab fattening. However, DoF has no projects in this direction at present.

4.2.1.2 Department of Livestock Services

Development of the livestock sector in Bangladesh is in the hands of the Department of Livestock Services. The Department published its National Livestock Development Policy in 2007. This notes the importance of the livestock sector nationally, with a contribution of around 3% of GDP.It claims 75% of the population rely on livestock to some extent for their livelihood and notes that livestock has been the fastest growing sub-sector in agriculture in recent years. However, it confirms our observation above that productivity is extremely low and livestock products (milk, meat and eggs) provide no more than 20-30% of the current latent demand in the country. Shortages of quality inputs, inadequate services and physical infrastructure, institutional weaknesses, limited skilled manpower, and inadequate research and technology development are identified as constraints to livestock development.

These constraints which are mainly institutional rather than technical are reflected in the situation in the Noakhali chars. Like the Department of Fisheries, the Department of Livestock Services locally has severe limitations in extending services in the rural areas, especially when they are isolated. The Department of Livestock Services has a larger staff at Upazila level than the Department of Fisheries, since it has two functions, veterinary care and extension. Thus in a typical Upazila Office there is an Upazila Livestock Officer and his deputy, with perhaps one Field Assistant, and a Veterinary Surgeon, supported by one or more Veterinary Field Assistants and a Compounder (for mixing medicines). However, just as with the Department of Fisheries, at any one time some of these positions will not be filled. Staff are also frequently away in training of

one type or another. It is a feature of the situation in Noakhali that often the Veterinary Surgeons are Upazila Livestock Officers in charge. A particular problem now facing the Department is that most Veterinary Field Assistants were trained under a specific project over two decades ago and most are nearing retirement. There is no ongoing mechanism for training a new cadre. The same is true of the cadre of Artificial Insemination Volunteers, created under a previous project, who were previously stationed at small units at Union level, sometimes even in the Union Parishad complex. Most of these have now retired and have not been replaced.

The Upazila Livestock Offices are usually situated in what are termed Upazila Livestock Development Centres (ULDC), which, apart from the Upazila Livestock Office itself, may contain an artificial insemination centre and a service for treatment of large animals. In Subornachar Upazila, a new centre was established with GOB funding under RFLDC. This Centre with a new two-storey design is now open and has a training room. At present, the Subornachar ULDC has a full complement of senior, both an Upazila Livestock Officer and a Veterinary Surgeon, seconded from Sadar Upazila.

The ULDC are backstopped by District Veterinary Hospitals, to which problems may be referred and to which requests for diagnostic tests can be directed (for example, preliminary diagnosis for Avian Influenza). The ULDC should be equipped with a refrigerator for storage of vaccine. This is often in theory; in practice many of these facilities lack maintenance and have fallen into disrepair. Thus, for example, refrigerators have broken down, making it impossible to maintain the cold chain. The chain is usually already compromised by the unavailability of chiller vans to transport the vaccine from the central production facilities in Dhaka and Comilla and by the erratic supply of vaccines in general. RFLDC provided new refrigerators to some of the Upazila offices in Noakhali, but maintenance remains a problem.

The District Livestock Officer in Noakhali freely admitted that the supply of vaccines was not sufficient to cope with the demand. This was made worse by what he termed as ‘waste’, the practice of larger farmers to purchase vaccine at subsidized prices from the ULO/ULDC as a single vial (ampoule) of 100 doses, but only use 15-20 doses. Overall he estimates that at least 50% of vaccine is wasted. The 100 dose vials are an improvement on the situation in the private sector, where vaccines are imported in 500 dose vials more suited to the large farms of the developed world, but they are still too large for small-scale farmers. The Department of Livestock Services has proposed reducing the size to 50 doses, but this would increase the price. The DLO has attempted to address this problem by arranging vaccination days for poultry in particular every Tuesday when farmers can bring their animals to the ULDCs; however, he observed that most farmers are unwilling to bear the transport costs and are increasingly demanding services at their doorstep.

In this regard, in the absence of donor-supported projects, the Upazila Livestock Officers and particularly the Veterinary Surgeons lack transport facilities which would enable them to extend their services to the vast majority of poor clients in isolated areas like the chars. Several extension projects have supplied motorcycles to Upazila Offices, but rarely is a separate motorcycle

provided to the Veterinary Surgeon. This means that veterinary services are seldom available more than a few kilometers from the Upazila headquarters. This situation reinforces a tendency for veterinarians in particular, to serve only the larger, more commercial peri-urban farmers (small-scale commercial dairy farmers, layer and broiler farms) who will pay extra for those services. These same farmers tend to be the focus of whatever training events are organized by the Upazila Livestock Officer. RFLDC provided motorcycles for the Upazila Livestock Officers in Noakhali and a budget for maintenance to facilitate support to the project, but the motorcycles are several years old and it is not clear whether these are still running, given constraints on the GOB maintenance budget. Given these logistic constraints, the Department of Livestock Services recognizes that it needs to work through local field institutions in order to get services to the grass roots level.

The Department of Livestock Services, like many other government departments, tends to be largely dependent for its service provision in general on donor projects. There is one Government of Bangladesh project to upgrade the quality of buffaloes operating in Hatiya, Companiganj and Subornachar Upazila through artificial insemination, but this appears to be targeted at larger farms such as those engaged with Milk Vita (see Section 4.2.4.2 below). In a similar vein, the District Livestock Office In Noakhali also supports a pilot project developed by the NGO SDI for the development of buffalo rearing in Urir Char (thus in Companiganj Upazila of Noakhali and Sandwip Upazila of Chittagong District). The ULO, Noakhali Sadar, and the DLO have arranged training for the 200 beneficiaries and the 5 technicians involved in this project, as well as facilitating supplies of vaccine and de-worming medicines for the project on a regular basis. The training of the technicians and the DVM hired to supervise was for 15 days. This project is described in more detail in Section 4.2.3.6

Other services available include supplies of improved grass cuttings (Napier grass for higher land and German grass for waterlogged areas) which were planted in the ULDC compounds under a small development project sponsored by RFLDC in 2012-3. The DLO, Noakhali, noted that a promising initiative might be to offer households thirty (plastic) bags of Napier cuttings to grow in their homesteads, which could be cropped in a monthly cycle. Each bag would yield 3-5 kgs. of grasses each cycle, adequate for improving the nutritional status of a local milk cow or for fattening.

4.2.2 Field Level Institutions

4.2.2.1 Water Management Groups

Given the focus on the water sector, the Water Management Groups are the core field level institution of CDSP IV. A total of 19 Water Management Groups have now been formed in the various chars (11 in Char Nangulia, 5 in Noler Char, 2 in Char Ziauddin and one in Caring Char. The main functions of these WMG is operations and maintenance of the water management structures, including the sluice gates, re-excavation of khals and addressing problems of misuse of the facilities and water courses. However, the Water Management Groups also support CDSP IV in

local road construction through organizing Labor Contracting Societies, monitoring of the quality of road construction and needs for maintenance, organizing LCS for latrine construction, support to land settlement activities and site selection for various facilities.

Unlike the other three groups which will be discussed below, the Water Management Groups have their own income sources and a formal bank account which are managed by the group.[6] Income derives from monthly savings, share capital, admission fees and from a percentage of the construction budget of the LCS of the LCS activities for their supervisory role. As stated clearly by the Deputy Team Leader of CDSP IV, it has long been the objective of CDSP to make these organizations sustainable and to this end they are being encouraged to expand their services beyond the Water Management Sector. All of the WMG discussed had begun to develop such services, thus

(a) At Char Bagga Khal UMG in Char Ziauddin, the organization was buying and selling rice and had accumulated a bank balance of Tk36,000

(b) The Al Amin UMG in Noler Char had developed a fish pond for the production of fish fingerlings under the Project introduced by the NGO Shisuk as part of the co-operation with the IFAD-funded SARCCAB in which they had invested Tk30,000 and already gained a profit of Tk50,000[7]

(c) The 11 WMG in Char Nangulia were also engaged in this Project, collecting a total of Tk300,000 for lease of a large area of pond at Chobbih Dag Samaj and again had already started to sell fish. The three WMG represented at the meeting in Kaludar Bazar CDSP Site Office, Bhuiyar Khal WMG, Nonar Khal WMG and South Nangulia WMG had bank balances derived from savings and investment of Tk70,000, Tk60,000 and Tk60,000 respectively. The two represented at the meeting at Haji Idris Bazar in the northern part of Char Nangulia (North Katakhali Khal #1 and #2 had balances of Tk50,000 and Tk38,000 respectively, including Tk8,000 from the initial returns from the Shisuk Project.

In Char Nangulia and Noler Char, the sums available were potentially greater since some of the WMG were associated with the Community-based Organizations established by the Regional Fisheries and Livestock Development Component. The Al Amin WMG in Noler Char was still sharing an office with the Progoti Samaj Unnayan Sangstha, which had received a Block Grant from RFLDC of some Tk232,000 and had invested in input marketing, especially for fish feed. Several members of the WMG were also members of the CBO. In Char Nangulia, Bhuiyar Khal WMG had previously shared an office with the Janata Samaj Unnayan Sangstha, which had access to more than Tk300,000 in Block Grant through which it had made investments in goat kid

[6] The NGO Credit Groups of course have a savings function, but the funds are managed by the NGOs.

[7] This is one of seven such Community Enterprise Schemes, one in Char Nangulia, four in four in Noler Char and two in Boyar Char. The SARCCAB Project ended in early 2013 but contacts have been made with seed suppliers in Comilla. Whether the hatchery involved is supplying the best quality seed is to be determined/

multiplication and fish culture. Perhaps unfortunately, the joint use of the office had ended because each WMG under CDSP IV is expected to establish its own office. Some members of South Nangulia WMG were also members of the Janata Bazar CBO. These same WMG were also benefiting from Poultry Workers trained by RFLDC under the co-operation in Farmer Field Schools in 2012-13.

Apart from the WMG which are or have been directly associated with the RFLDC CBOs, there are other CBOs quite close to the CDSP IV Project area with which links could be made to obtain services. This linkage is discussed further in Section 4.2.3.7

4.2.2.2 Local Area Development Committees

In Caring Char and Urir Char, where the chars will not be diked, it was not expected that there would be Water Management Groups. In fact one WMG has now been established in Caring Char. However, the Field Level Institution perceived as playing a similar organizational role for the Project to the WMG is the Local Area Development Committee (LADC). Six of these have now been established, three in Caring Char and three in Urir Char.

The LADC each comprises 30 members elected from the various communities within their perceived service area. Because of the transport blockade, it was not possible to visit any of these organizations to ascertain their current function. The Mission Report on Field Level Institutions prepared in late 2012 comments that they are involved in planning of field level activities, but that they do not collect savings, have no bank account and are not registered. As such, they have no basis of sustainability and thus no basis of providing services requiring any investment. It was understood that these institutions may also be dominated by the Union Parishad chairman.

It was reported that some of the young people involved in the special project for the improvement of buffalo rearing in Urir Char (two Community Livestock Workers and two milk collectors) are members of the LADC. It is difficult to know whether this should be regarded positively since the project has so far been a separate NGO project, with no attachment to the local institutional framework.

4.2.2.3 Social Forestry Groups

In some respects, the Social Forestry Groups established under CDSP IV parallel the Water Management Groups in that they are mainly oriented to the management (operations and maintenance) of a key physical environmental resource. Whereas the WMG focus on water, the SFG focus on protection of the embankments being constructed under the project, the foreshore beyond these embankments and the banks of local roads. Just as the WMG support the efforts of the BWDB, the SFG support the activities of the Forest Department in maintaining the various types of plantations. According to the type of plantation, the SFG is responsible for O and M activities for a stretch of 1.5 – 2.0kms, offering labor for planting, thinning and replanting.

Each SFG comprises a total of 25 members drawn from households living along the roads and embankments, some of them resource poor and some of them having lost part of the land in the construction activities as a consequence of excavation of the borrow pits for the physical structures. The case of the large embankments the loss of land may be considerable. Among 9 representatives of Embankment SFG #11, 12 and 14 present at the discussion in Noler Char, for example, 6 had lost land to the embankment construction ranging from 25 decimals (0.1 hectares) to a massive 240 decimals (almost one hectare) out of a total holding of 300 decimals (1.2 hectares).[8]

The principle of Social Impact Assessment in relation to development projects is that such households affected by development / construction activities should be compensated if not in cash, then through livelihood development activities which help to restore their livelihood to its previous level. In the case of SFG under CDSP, the group members obtain benefits in the form of labor employment, as well as from use of the forest products (medicinal plants, fuel wood and fruits) planted. Ultimately, when the major timber trees are mature enough to be harvested (first rotation) they receive a share of the harvest ranging from 45-55% of the total return.[9] Of course, this major element of income may accrue to the SFG members only after a period of 5 -15 years.

From Footnote 4, it will be noted that 10% of the income from this harvest is deposited in the Tree Farming Fund (TFF). The TFF is to be managed by a fund Management Sub-Committee drawn from the members of the group, which is expected to set up a short-term deposit account with any scheduled local bank, with funds withdrawn for activities according to the resolution of the Management Committee. At present, however, in none of the SFG visited has such an account been established partly because the SFG as a group currently has no income stream and partly because the Forest Department appears to be reluctant to allow it to manage any such funds. This is unfortunate since it means that the SFG is not developing any financial management capacity in the way of the WMG and that it has no group funds available for investment.

In the discussions with the Field Level Institutions, the Consultant examined the possibility that development of the fisheries and livestock sub-sectors could play a role in improving and restoring the livelihood of the SFG members, specifically in relation to the possibility that the public land with the roadside and embankment plantations could be utilized for livestock fodder cultivation and that the borrow pits created by the construction activities might be developed for aquaculture. In the first case, it may be noted that technically there is no obvious restriction in the use the roadside and embankments for cultivation of fodder crops. The two types of plantation are designed according to models which modify those recommended in the CDSP IV feasibility

[8] The Social Forestry Expert of CDSP IV said that no overall census had been conducted on the loss of land in this way; this would appear to be a gap in planning.

[9] Apparently the road side and embankment plantations are seen as 'strip plantations' on lands owned by public bodies other than the Forest Department. Under this category, the Forest Department receives 10% of the income after the first thinning, the body owning the land 20%, the beneficiaries 55%, Local Government in the shape of the Union Parishad 5% and 10% goes to the Tree Farming Fund (for further development of the plantation following the first rotation (harvest)

studies and comprise species with three uses, medicinal plants, timber, including fuel wood, and fruits) These models are as follows:

For the Roadside Plantations

- At the boundary on both side of the road, Pigeon Pea (Arhar; *Cajanus cajan*) will be planted
- One metre down the slope, there will be a line of trees consisting of *Acacia auliculimormis* (Akashmoni), *Casuarina equisetifolia* (Jhau*), Swetenia microphyla* (Mahogany), *Albizia richardiana* (Rajkoroi), *Samanea saman* (Raintree), *Syzygium cumini* (Jam), Coconut, and *Terminalia arjuna* (Arjun)

For the Embankment Plantations

Outside Slope

- At the outer boundary of the Embankment, Pigeon Pea
- 1st Row: Jhau, Akashmoni, Mahogany,
- 2nd Row: Rajkoroi, Arjun
- 3rd Row: Jam
- Toe of the Embankment*: Sesbania sesban*(Dhaincha)

Inner Slope

- Inner boundary of the Embankment, Pigeon pea
- 1st Row: Jhau, Mahogany
- 2nd Row: Jam, Arjun, Guava and recommended *Leucaena leucocephala* (Ipil-ipil)

Besides their other uses, several of these species may be used as animal fodder, notably Pigeon Pea, Sesbania,[10] Ipil-ipil, Jam leaves and even Raintree pods and leaves. The first three rank highly in terms of palatability for cattle. Pigeon pea can be grazed as forage or used as hay and silage. Ipil-ipil has a reputation of being an invasive species and it is important that it is cut and pruned regularly. In these terms, the typical Social Forestry Model could be seen as offering four and not three uses and contributing at least to the secondary problem of livestock rearing in the area, namely lack of fodder.

It became clear that the potentials for this development in the case of the roadside plantations and the embankment plantations were quite different. The public land alongside is quite small

[10] Not for chickens

(5 feet on either side of the road), so that even if each household is responsible for maintenance of an 80-metre stretch of the roadside plantation (2 kilometers divided by 25 households) the fodder supply would be quite small and fodder production from this source can probably only be seen alongside production in the homestead. On the other hand, the embankment plantations cover a larger area[11]and include more species of fodders and thus may make a significant contribution to both cattle, goat (on a cut and carry basis) and even poultry nutrition.

Unfortunately, as the Consultant investigated this issue in detail it became apparent that the members of the Social Forestry groups were not familiar with the use of most of the above tree and legume species as fodders. Pigeon pea was known only as a pulse for human consumption for example. Training on the Social Forestry conducted by the Department of Forests appears not to emphasize it as a livelihood resource system, comprising the terrestrial and aquatic environment, beyond the pruning/thinning of the trees and the final harvest discussed above. The training conducted is only focused on Social Forestry for Mitigating Climate Change, useful but rather academic in focus. Arguably a wider training on Social Forestry on Embankments as a Livelihood System is required for the members of these groups.

The Embankment system also offers the scope for aquaculture in the borrow pits at the foot of the slope. Respondents reported that these borrow pits may hold water to a depth of 5-7 feet in the rainy season and at least three feet in the dry season, as long as down slope erosion and siltation is controlled. As described in Section 4.1.1, already individual households are beginning to develop these borrow pits as ponds and, since all households in the SFG are also members of the NGO Credit and Savings Groups, credit funds are available for this development (although see below, Section 4.3.3.4). It is unfortunate that the initiative taken in CDSP III to ensure the proper shaping of borrow pits along the main east-west road in Boyar Char with a view to facilitating development of fishponds was not extended to the contract for embankments in CDSP IV.[12]

The major constraint for the development of the embankment social forestry system would appear to be supply of inputs: alternative planting materials for fodder such as Ipil-ipil saplings and quality fish seed. The SFG could supply these inputs in the same way as the WMG, but it lacks capital since, as we have seen above, there is no provision at an early stage for an income stream to the Tree Farming Fund and this has not been established. SFG members are reluctant to use the borrow pits for group aquaculture activities because of perceived inter-household management problems and a proposal for the establishment of two such groups along the embankment in Caring Char made by the CDSP Area Coordinator, possibly with support from Shisuk, is estimated to require at least Tk100,000 in initial investment.

[11] Even though each household is responsible only for 60 metres)

[12] The District Livestock Officer of Noakhali mentioned a similar project in Chandpur based on provision of no interest loans, which had been successful, except for capture by some local elites.

4.2.2.4 Farmer Forums

The Farmer Forums established by the Department of Agricultural Extension under CDSP IV each comprise 30 households. A total of 90 FF have been established to date, thus covering a total of 2700 households. Of these, 40 had been established by June 2011 and the Department of Agricultural Extension pushed that all should be established by June 2012. This target was achieved so that, at the time of this study, all the Farmer Forums have gone through a full year of operation, covering all three seasons, Kharif 2 (coincident with the Aman rice crop), Rabi (dry foot crops in the winter and early spring) and Kharif 1 (coincident with the Aus rice crop).

The households of the FF are expected to be full-time famers, although it was stressed that this does not mean formal ownership of land since all the arable land under the Project is*khas* land share-croppers are not excluded from membership. Nevertheless it is a strong impression from interview that the members of these groups are the rather better-off households, with access to land of around 1.5 acres.

The main focus of the FF is improvements in paddy cultivation through the provision of improved varieties of T. Aman rice. In the initial year of operation, demonstration plots are established in some plots within the FF and the farmers given free HYV seed, fertilizer and pesticide. Some of these demonstration plots may act as seed multipliers to distribute to other farmers in the following season. From the various interviews in different chars, the most commonly mentioned variety distributed was BRRI Dhan #40, which is said to be intolerant of water logging conditions, although BRRI Dhan #52 was also tested here and it was the only demonstration in northern Nangulia where the land is medium to low lying.

The support offered by the DAE to the members of the Farmer Forums appears to be very uneven. Whereas in the Shahabuddin group in Char Ziauddin and the Miazigram group In Char Nangulia, 10-12 member households had received seed and inputs for demonstration plots in rice and vegetables, in the Mannan Nagar Samaj group in Noler Char only three households had been direct beneficiaries in the first two seasons of activity. There seemed to be almost no tangible benefit from the Farmer Forum for the members of this group, except that it held monthly meetings where the Sub-Assistant Agricultural Officer attended and offered advice on cropping options and plant protection. In northern Nangulia (Subornachar area), it was claimed that 46 demonstrations had been carried over 25 FF, which is less than two per FF. In the particular FF interviewed, only three demonstrations had been carried out, one on tomato, two on sweet gourd and one on Aman rice.

It was stated that there would be further demonstrations throughout the life of the Project, but if this is the case the members of the FF were unclear. At the interview in northern Char Nangulia, the group had no knowledge about what new demonstrations would be implemented in the coming *rabi* season or beyond. This was said to be in the hands of DAE. It appeared that in some cases, after the initial demonstration, the FF members are largely left to their own devices in seeking out agricultural inputs, although CDSP IV and DAE have identified input supply shops

in the various which are recommended as sources of quality seed and inputs. None of the groups appeared to purchase these inputs as a group, the decision to seek out the new varieties being left to individual initiative. Perhaps this is not surprising. Although the FF have a management committee of 11 persons, they have no bank account and no savings through which to accumulate capital. It may be suggested that the Famer Forums are simple extension groups to spread information on DAE promoted technologies along the lines stated above.

Almost all of the members of all the groups in Char Ziauddin and Char Nangulia had quite developed fish ponds and 60% were rearing cattle. However, the members did not come together as a group to obtain quality services for these enterprises. One or two farmers had taken initiatives to seek out vaccination services as individuals, but most appeared to be experiencing much the same problems as the poorer CSG groups in relation to livestock disease and even mortality. Although apparently better-off, most fish farmers were still stocking normal tilapia and complained about a lack of water as the dry season approached, a problem which faster growing SRT seed might help to address.

4.2.2.5 NGO Credit and Savings Groups

Much as in previous phases of CDSP, the NGO programme in CDSP IV constitutes a separate element of the Project, although in CDSP IV this programme termed the Social and Livelihood Support Programme is better integrated than in the previous phase. The NGOs have been selected by the Technical Assistance and the NGO agreements have been made with the Bangladesh Water Development Board. In CDSP IV, four NGOs have been selected to cover the whole Project area, as follows:

Table 7: Location of Activities of NGOs under CDSP IV

NGO	No Branches	Location of the Branches
BRAC	6	Char Nangulia, Noler Char, Caring Char, Char Ziauddin (Zia Bazar)
Sagorika Samaj Unnayan Sangstha (SSUS)	3	Char Nangulia, Noler Char (Al Amin Bazar), Caring Char
Dwip Unnayan Sangstha (DUS)	2	Char Nangulia, Noler Char
Society for Development Initiatives (SDI)	2	Urir Char, Char Nangulia

There are thus 13 NGO branch offices throughout the Project area, which offer an important potential for infrastructure.

The Social and Livelihood Component has six sub-components, namely

- Group Formation, Micro-Finance and Capacity Building
- Health and Family Planning

- Water and Sanitation
- Homestead Agriculture and Value Chain Development
- Legal and Human Rights
- Disaster Management and Climate Change

All female household members in CDSP IV Project area are meant to be members of the Savings and Credit Groups under the first sub-component. Thus there is a target of 1,120 groups of roughly 20-25 households. By June 2013, 952 groups[13] had been formed with a total membership of 24,323.

In the context of this study, it is the first and fourth of the above sub-components which are relevant, although, as we shall see, there may be an important interface between these and the Health and Family Planning sub-component in relation to animal health. In the NGO definition, homestead agriculture includes homestead gardening (vegetables and fruit), poultry rearing and goat and cattle rearing. It is important to note that it **does not** include aquaculture, even though the vast majority of fish ponds are in and around the homestead and many are managed by the women. Up to 50% of CSG households do have culture ponds and the lack of training available was subject to comment/complaint (but see below)

The development of the Savings and Credit Groups follow the conventional NGO model. After the group is finalized, its responsibilities are explained to the members and a Management Committee is formed. A group meeting takes place on a weekly basis and issues of interest discussed. The NGO credit officers collect savings from each member according to her capacity,[14] which are deposited in the NGO Bank Account. Members may withdraw part of these savings for emergency purposes and to make investments. After three weeks of member involvement, she becomes eligible for a loan which is given according to the beneficiaries choice and skills. The initial loan is typically between Tk5,000-10,000 and subsequent loans can be above Tk10,000. Micro-enterprise loans of Tk50,000-200,000 are available. The average size of loan given by June 2013 was Tk16,000, a dimension confirmed given by the Parul CSG in Al Amin Bazar, where the average was Tk18,000 and the largest loan Tk39,000. 56% of member households had borrowed by June 2013; it is clear that in some groups, the members already have access to microcredit from another organization and are thus not eligible. For example in the Majid Para Mosque CSG in Polder Samaj in Char Ziauddin, only 12 members had borrowed out of 22 because of the overlap with other NGO groups (Grameen Phone, DUS and Sagorika), while in the Parul Mohila Samiti at Al Amin Bazar in Noler Char, 19 members had borrowed out of 26.

[13] Some of these groups had already been formed as Microcredit Groups several years prior to the start-up of CDSP IV. Thus in Char Nangulia, out of 72 CSG already formed by DUS, 30 were pre-existing groups. The group interviewed near Bhumihin Bazar had been formed six years previously and some of the members had already borrowed 4-5 times.

[14] Actually there is a savings ceiling or each group and most members pay this amount.

Loans are given for a range of so-called income Generating Activities. In Polder Samaj, these involved investment in a grocery shop, in homestead gardening, in buying land, in cow rearing (3) and poultry rearing (2). In the Parul Mohila Samiti, the largest loan was for aluminum cooking ware and the smallest (Tk6,000) for a tailoring enterprise. Here it was stated that there was little interest in borrowing for poultry rearing since the amounts required were so small (around Tk1,000). In the groups at Char Haji Idris Bazar in northern Char Nangulia, no ladies had taken a loan for poultry because all had poultry already and presumably did not see any benefit in further investment.

The NGOs provide training in support of the loan funds with a view to ensuring proper use of the loans. However, it is not clear that there is congruence between the training and use of the loan funds. At Parul Mohila Samiti, training had been offered to 7 members for IGA activities other than homestead gardening, of which 6 cases had been for poultry rearing including ducks. At Jobar Mohila Unnayan Samiti in Char Nangulia, seven members had received training for poultry but their loans were for a much wider range of Income Generating Activities, such as trading in cows, rickshwa purchase, purchase of a small generator for use in the market, financing a son's overseas employment and coconut and betel nut trading. Leaving the choice of training to the individual members also means that there is patchy coverage of a particular training topic in each CSG. Although almost all women are rearing poultry, not all had received training in this activity at this stage; the question arises whether those trained pass on their experience.

It should be mentioned at this point that some CSG members, especially in Noler Char, but also in Char Nangulia, Caring Char and Char Ziauddin had already received training under the Farmer Field Schools previously run by RFLDC in this area. Some of the training was carried out under the co-operation between CDSP IV and RFLDC in 2012-13 when 25 Local Facilitators were trained and 100 FFS conducted. However, another 100 FFS were carried out separately in Noler Char and Caring Char by Sagorika SUS, which was also a partner of RFLDC and probably in certain parts of Char Ziauddin and Char Nangulia by CBOs located in these areas. The number of FFS conducted by these CBOs in total is given in Table 8. The FF training covered a number of modules, poultry rearing, goat rearing, cattle rearing (mainly fattening) and aquaculture and was highly practical so that many of the women involved should be resource persons for their groups.

The other problem with the conventional NGO model is that the demand for repayment of the loans within one week of taking out the loan does not lend itself for the agricultural cycle, especially for longer term enterprises like cattle fattening and especially aquaculture. While members may be able to repay limited investment easily for poultry rearing and they already have a milch cow, immediately in the case of cow rearing, returns are only forthcoming after several months in cattle fattening and aquaculture.There are credit lines within the NGO system such as

- PKSF RMC loans which are paid back over one year on weekly instalment;

- Micro enterprise loans which allow monthly payments;
- Seasonal loans, which require total repayment after six months. Apparently PKSF expects that loans for vegetable growing, cattle fattening and aquaculture would fall in this category and it seems that the NGO taking funds from PKSF follow this policy. However, this may not be true of BRAC, which has its own funds.
- Land leasing loans which are paid back in 6-monthly instalments over one year;

The training activities vary in length. Training in homestead gardening is for one day in different seasons. Training in poultry rearing, for goat rearing and for cow rearing is for three days, although in both cases the curricula include up to a day in total on general issues relating to micro-finance, CDSP as a project, concepts of income generating activities and group organization. Given that there is review of the training content at the end of each day and recap of the previous day's activities at the beginning of the next day, the effective technical training time may be as little as two days.

With the CDSP Deputy Team Leader for the Social and Livelihood Component, the Consultant reviewed the curricula for the poultry and cow rearing courses. The training curricula appear to be broad and not focused on any particular rearing system. They may differ slightly in the different NGOs, but appear to be a standard curriculum used by these organizations throughout the country regardless of context. They appear to be heavy in content for the two days available and delivery appears to be in a top-down lecture mode with limited practical application. There appears to be stress on regular repetition of content to aid memorization. Unlike the human nutrition course examined, there did not appear to be a flip chart, although some NGOs may use posters in illustration.

Part of the problem with the curriculum design is the propensity for the NGOs to hire in trainers for their farmer training activities. These are either 'professional' trainers with no particular knowledge of the subject matter and therefore reliant upon reading from a borrowed set curriculum or technical specialists who have a tendency to seek to cover a broad range of material without particular reference to context. A question arises in relation to the hire of trainers in general, namely whether this is more cost effective than hiring long-term specialists in the NGOs themselves just as in the case of the agriculture coordinators.

In the poultry curriculum, the broad focus is to increase productivity in the system and specific topics include general issues of poultry science and poultry rearing, introduction to different species of chickens, housing, rearing methods including the early separation of the broody hen from the chicks, feeding of chicks and mature birds and disease prevention and vaccination. There are also specific sessions on duck rearing.

The training curricula for cow rearing was rather similar. The training manual of SDI reviewed contained a general introduction to the suitability of cow rearing, types of cows and their characteristics, artificial insemination, cow management practices, apparently with an emphasis

on housing/stalls and the need for hygiene, feeding and feed preparation, treatment of milk, care of pregnant and lactating animals, cattle diseases and their prevention and treatment. The greater emphasis appears to be on milch cows, although the section on feeding does include the specific use of urea and molasses treated straw as a feed. By contrast, there was apparently no coverage of fodder cultivation.

At the time of writing, the Consultant has not seen the curriculum for goat rearing. This obviously exists since Progress Report #5 indicates that 926 beneficiaries had received training in 37 batches, second only to poultry rearing and as many as (milk) cow rearing and cattle fattening together. Curiously nobody in the CSG groups interviewed had taken training in goat rearing.

A curriculum for aquaculture has been developed by SDI and, apparently, by DUS, but has not yet been implemented by either organization. This is apparently because of lack of immediate demand. Demand for training in the NGOs has been determined according to Needs Assessment carried out with the targeted beneficiaries. If the target group are women, then it is likely that aquaculture training is indeed not a high priority compared to poultry, goat and cattle rearing, but it is certainly of interest to men and has considerable potentials. Perhaps the beneficiaries may request such a training later, but the lack of demand at present poses a significant dilemma for the NGOs and CDSP, whether to include aquaculture in the Social and Livelihood Component and whether to encourage beneficiaries to seek training in the sector. Interestingly, it has been proposed as an element in the NGO-based Social and Livelihood Component under the Feasibility Study for the Clusters of Chars under CDSP V.

The SDI curriculum reviewed was again. It was detailed, comprehensive and typical of the genre.[15] There are major sections on types of agriculture and fish species, including the six-species carp poly culture, on pond preparation, on stocking mix, on size of fingerlings and the need for nursing of fingerlngs, and pond fertilization and feeding, including amounts of feed according to bodyweight. Pond management, issues of water quality and fish disease are also discussed, as well as harvesting and marketing of fish. Separate sessions on Days 2 and 3 are dedicated to particular species such as Tilapia and Thai Sharputi. Much of content appears to be scientific and highly prescriptive and is certainly extremely heavy for the time available.

Given the nature of the training conducted by the NGOs, the Consultant asked the members of the Credit and Savings Groups about their recollection, mainly related to the poultry training.[16] Some members appeared to have absorbed knowledge and practice of low-cost improvements like improved nesting facilities and early separation of chicks from the broody hen. Some farmers in the Parul Mohilaand in Jobar Mohila Unnayan Samitis could recall the discussion on rearing hybrid chickens like Sonali and Fayoumi breeds and were keen to try these and were

[15] The Consultant would like to thank Mrs. Jesmin Akhter for help with translation of this curriculum.

[16] Few women had undergone training in cow rearing and, unfortunately, a group of five of these in Char Nangulia were actually away at the training venue at the time of the field visit.

unable to obtain these birds. Moreover, they were not clear of the need for restocking birds each year, the need for improved feed and the greater sensitivity to disease.

Indeed services in support of poultry rearing were largely absent and mortality rates were high, between 40% and 70% of each clutch of chicks in different households. The ladies were unanimous that the prime need for vaccination and/or general veterinary support, while secondary problems were the lack of access to improved breeds and availability of feed at the end of the dry season. With mortality rates of this level, questions may be raised about the wisdom of training in poultry rearing and especially any curriculum which encourages stocking of hybrid species.

Some participants specifically mentioned the need for vaccinators. There is no provision for training of Poultry Workers under the NGO Social and Livelihood Component in CDSP IV, which differs from the design of CDSP III, when 50 Poultry Workers were trained in Boyar Char. The DUS Area Manager in Char Nangulia said this was decided at management level. In Caring Char, Char Nangulia and Noler Char, 20 Poultry Workers had been trained in the Water Management Groups included in the cooperation on Farmer Field Schools between RFLDC and CDSP IV in 2012-13 and it was encouraging to see that quite a number of these were still working, mainly obtaining supplies of vaccine from the South Noakhali CBO Association; in the three WMG interviewed in Char Nangulia, three young women were active and one in particular was praised for energy in collecting vaccine early in the morning to ensure its effectiveness.

4.2.2.6 Special Project on Improvement of Buffalo Rearing in Urir Char

One of the CDSP IV Partner NGOs, SDI, is implementing a special project funded by PKSF for improving the productivity of buffalo rearing in their main focal area in Urir Char. This is not strictly a related to CDSP IV and so is discussed here under a separate head since it has some relevance to the development of the livestock extension system.

This pilot project was started on January 1, 2013 and has a duration of one year only. It employs a complement of 10 NGO staff, funded by PKSF and including one Project Technical, a trained DVM and 5 Community Livestock Workers from the local community in Urir Char. As stated, the objective is to improve the productivity of this important animal in the livelihood of households in Urir Char, raising annual yields to round 280-300 litres (an increase of 40-50% over the figure offered in the study by Shamim Ahmed and Zahidul Alam). The target of 200 beneficiaries have a total holding of almost 3,600 buffalos, an average of 18 per head and reflective of the large bathan-based buffalo holdings in Urir Char. Over 2200 head are mature animals over 2 years of age. The main qualifications for inclusion in the project is a holding of at least 4 head of buffalo, residence in Urir Char and that they are rearing themselves. This excludes absentee Bathan holders, but may include some households with very large holdings. A loan fund of some Tk2.5 million has been made available for purchase of animals, feed and improvement of housing and 67 beneficiaries have borrowed.

The project's main thrust is to reduce mortality and special arrangements have been made with the Noakhali DLO to obtain regular supplies of vaccine (FMD, Anthrax, Black Quarter and Haemorraghic Septicaemia) from the Livestock Research Institute at Mohakhali, which are transported to Subornachar by microbus and then to the SDI Office in Urir Char for storage in the refrigerator in the clinic. Milk is collected by a group of 11 collectors, who have also been trained and shipped to the local markets. There is thus no change in the marketing system from that recorded in the earlier feasibility study and the main thrust of the Project is to reduce mortality and thus increase the supply of milk.

The DVM and other senior staff will be laid off at the end of the year, but it is expected that the 5 CLWs will remain and carry out the veterinary services through maintaining the links to the ULO. It remains to be seen whether the special treatment offered during the Project period can be maintained.

4.2.2.7 Community-based Organizations

Although these organizations are not part of CDSP IV, as we have seen above, some of the Water Management Groups share an office with, are located in the same settlement as, or are located close to the network of Community-based Organizations (CBOS) established under the Regional Fisheries and Livestock Development Component. These CBOs have developed with largely the same objective as the WMG, to offer services to local resource-poor farmers and it was the objective of RFLDC to create sustainable farmer organizations to continue to serve the farmers in their service area after the end of the Project. As such, they represent a resource for CDSP IV in the chars which could take some pressure off the Water Management Groups.

The list and brief characteristics of the RFLDC CBOs within and close by the CDSP IV chars are given in Table 8. As many as 18 such organizations may have relevance to the area, not including the umbrella South Noakhali CBO Association in Khasherhat. There are no CBOs within Caring Char and Urir Char, although a number on the mainland adjacent to Urir Char. There is a fairly dense network in and adjacent to Char Ziauddin and Char Nangulia. Besides their service function, the RFLDC CBOs helped the project to organize the Farmer Field Schools, the mode of farmer training favored by Danida. That training was carried out by Local Facilitators, young people from the local community who were themselves trained in the experiential learning approach of the FFS through a highly practical four-month long training known as Season-long Learning. All LF were trained in 6 modules covering over 40 Learning Sessions in the fields of poultry rearing, small livestock rearing, cattle rearing, aquaculture, homestead gardening and nutrition. They themselves were expected to 'practise what they preached' in their own farms.

In total the CBOs in and around the CDSP IV chars conducted 210 Farmer Field Schools, each with 25 households and therefore covering around 5,000 households. As noted above, some of these will be members of the NGO groups and even the Famer Forums. By the end of RFLDC, some 37 young people had been trained in the CBOs listed as Local Facilitators. Although it is not expected that they will continue to operate as trainers, many of them will be resources within

their own communities and in the CBOs, they will able to offer advice in the technical modules mentioned and some of them have become leaders of so-called Producer and Marketing Groups to facilitate sale of the members products to market. In this role they also represent a resource to the community.

Apart from the LF, RFLDC trained other resource persons in the CBOs as Poultry Workers, to vaccinate poultry birds and offer advice to farmers, as Community Livestock Workers to play a similar role for ruminant livestock, and as Community Agriculture and Aquaculture Resource Persons. The latter group was involved in operating nurseries for fish, prawn, vegetables and fruit tree saplings. According to the CBO Profile Book for Noakhali District, 14 Poultry Workers and 11 Community Livestock Workers were operating in the listed CBOs at the middle of 2013. Table 8 also indicates the sort of services being offered by the CBOs. It will be seen that almost all the CBOs were offering vaccination services, most had developed producer groups in duck rearing and most have fish (either carp (5) or tilapia (3)) or prawn seed (5) nurseries. One CBO, Saikat BUS in East Char Bata, close to the central part of Char Nangulia, operates a duckling hatchery based upon rice-husk technology. One CBO, Satota BUS, close to Char Ziauddin, has a Red Chittagong breeding bull, obtained from Bangladesh Agricultural University. In this respect, it may be advantageous for the developing WMG or even specific Farmer Forums/CSG to forge linkages with some of these CBOs.[17]

As stated, the CBOs in Subornachar and mainland Hatiya are all members of the South Noakhali CBO Association, which coordinates activities and seeks to offer higher level activities. Thus the SNCA is a dealer for Nurani and/or Aftab Feed and East-West vegetable seeds, as well as operating a vaccine sub-centre and organizing the purchase of Day-old Ducklings.

[17] Not all of the CBO listed in Table 8 are fully operational or are facing problems of reduced demand for their services. A preliminary review was made by telephone, for which the Consultant must think Mr. Robiul Islam

Table 8: RFLDC-supported CBOs close to CDSP IV Chars[18]

Name	Location /Union	Date Founded	Char	#FFS	#LF	#PW	#CLW	#CAARP	#Cashier	Funds (Tk)	Main Activities	CDSP	Coop
Satota BUS	Pankher Bazar, Char Jubilee	Jan-04	Ziauddin	34	5	1	1	2		943,600	Vaccination, prawn nursery, carp nursery, seine net, duckling production, Red Chittagong Bull, milk PMG,		
Meghna BUS	Char Bagga, Char Jubilee	Jan-05	Ziauddin	26	3	1	1			302,480	Silver carp nursery, duck PMG, vegetable, banana, soya bean PMG		
Digonto BUS	Char Jabber. Char Jabber	July-04	Ziauddin	30	4	1	1	1		828,715	Vaccination and deworming, carp nursery, PL nursery, SRT nursery, vaccine sub-center, duckling production,		
Char Jubilee Upakulio Sommany Parishad	Uttar Kachapia, Char Jubilee	Apr-08	Ziauddin	8	1		1			106,564	Vaccination, Credit-in-kind to CV pond		SWD
Char Jabber Upakulio SK Parishad	Paschim Char Jabber, Char Jabber	Apr-08	Ziauddin							113,000	Duckling production,. Vaccination Support to fish farmers		
Char Lakshmi Jano Kalyan Sangstha	Char Laxmi, Mohammedpur	Nov-11	Nangulia	12	2	1	1			171,500	Ducklings, Vaccination		
Bangla Bazar Upakulio BUS	Keramatpur, Char Clerk	Jul-04	Nangulia	46	6	1	1	1		1,127,150	Fish Farming Group, Goat Kid, Duckling, Egg Marketing		
Saikat BUS	RenuMiah Bazar. East Char Bata	Jan-05	Nangulia	33	6	3	3			1,054,970	Community aquaculture, Juvenile PMG, Carp PMG, Cast net making, tilapia PMG, duckling production, chick production, vaccination, DOD via RHH		
Ashrayon BUS	Purba Char Majid, East Char	Nov-09	Nangulia	?	10	1	1			875,383	Community-based aquaculture. Net making,		

[18] It is assumed that all these CBOs remain operational, although the status of Meghna BUS and Jagarini SUS could not be confirmed in the telephone survey. One CBO, Boyar Char JUS, has closed and has been omitted.

	Bata										PL supply		
Bangla Bazar SUS	East Majlishpur, Chanandi	Feb-10				1	2			246,350	Vaccination, duckling production, SRT nursery, pigeon PMG		
Jagarini SUS	Hasina Nagar, Chanandi (eastern part)	Dec-12		None		2	1			123,600	Vaccination, Pigeon PMG, fish and cattle feed		
Janata SUS[19]	CharAzmal, Chanandi	Dec-08	Nangulia	29	4	1	1			520,540	Duckling production, goat kid production, milk and curd PMG, egg producer PMG,		
Progoti SUS[20]	Al Amin Bazar. Chanandi	Feb-10	Noler			1	1			241,290	Vaccination, duckling production, SRT nursery		
Karim Pani BSD Ltd	Akhter Miah Hat, Char Alauddin	Jun-07	Nangulia	20	3	2	1		2	778,596	Polyculture in CV, Carp nursery. PL nursery, Vaccination	Yes	Yes
Char Torab Ali MKUS	Char Torab Ali, Mohammedpur	Aug-06	Nangulia	28	4	2	1			578,578	Lamb production, Ducklings, Milk PMG, Polyculture in Ashrayon, Carp PMG, Beef Fattening		
Bamni No.1 WMCA	Char Elahi	Jan-06	Urir	10	2	1	1			147,026	Egg PMG	Yes	Yes
Char Elahi Nari Kalyan Sangshta	Char Elahi	Jun-06	Urir	20	2	1	1			517,967	Egg PMG		Yes
Char Kalmi Jubo US	Gangchil/Elahi	Dec-10	Urir	15	3	1	1		1	492,453	Day-old Ducklings, Papaya PMG, Ricksha Van; IDE Project		
				210	37	14	11	1	5	6270098		2	3

Notes: FFS = Farmer Field Schools, LF = Local Facilitators, PW =Poultry Workers; CLW = Community Livestock Workers; CAARP = Community Agriculture and Aquaculture Resources Persons; PMG = Producer and Marketing Groups; SRT = Sex-reversal Tilapia; RHH = Rice-husk duckling hatchery; DOD = Day-old Ducklings; PL = Prawn post-larvae; CV= Cluster Village, AI = Artificial Insemination

[19] Previously shared an office with Bhuiyar Khal Water Management Group, some common membership with Bhuiyar Khal and South Nangulia WMGs

[20] Shares an office with Al Amin Khal Water Management Group; some common membership. This CBO is a relatively recent foundation and should not be confused with the very active CBO of the same name in Char Majid.

4.2.3 Private Agribusiness

4.2.3.1 Input Supply

As mentioned in Section 4.2, there are two main priorities in input supply in the fisheries and livestock sectors in CDSP IV Project area: in the fisheries sector a supply of good quality fish seed of the species currently favoured in aquaculture; and in the livestock sector, reliable sources of quality vaccine for both poultry and ruminants. In Section 4.3.1 it has been observed that the services provided by the Department of Fisheries are extremely limited as a result of limited manpower and logistics'. To a lesser, this is also true of the Department of Livestock Services. Vaccines are available through the GOB system, but the availability of supplies is erratic, quality is uncertain and the cold chain has severe limitations. In this context, it is important to examine alternatives in the private sector.

Veterinary Services

(a) Local offices of national pharmaceutical companies

A number of private sector animal health care companies operate branches in Noakhali District. These include ACI, Renata and FnF. The Consultant spent a short time investigating the development of these service, starting with ACI which had been engaged in an initially productive dialogue with the Regional Fisheries and Livestock Development in 2010-11, in which the possibility of expanding the market share of the company by providing products suitable in demand amongst resource poor farmers was discussed. Unfortunately, in discussion with an area sales representative of ACI in Noakhali, it emerged that no obvious initiatives had been taken in this direction and the perceptions of the local staff at least were still narrow.

ACI has a dealer in Khasherhat market in Subornachar Upazila which takes the cold chain down to Upazila but its products remain oriented towards the more commercial farmers. ACI has a limited range of vaccines available, against Ranikhet (Newcastle) disease[21], gumbro and fowl pox, but does not produce vaccines for Duck Plague, PPR and any of the main cattle diseases. The area sales representative stressed that a major problem of serving small farmers was that the vials even of these vaccines were for 500 doses, which to him meant the need to concentrate on commercial farms with at least that number of birds. The need for vials of around 200 does had been recognized by ACI senior executives in the earlier dialogue with RFLDC but nothing has been done. The representative conceded that working with a project like RFLDC or CDSP could help to take the cold chain closer to the more isolated farmers (see Section on NGO facilities and that kit boxes with the necessary supplies of distilled water for dilution of the vaccine could be made available to Poultry Workers at the grass roots. Equally the price of the ACI Ranikhet vaccine at Tk155 for 500 doses is actually cheaper than the equivalent supplies (Tk35 per 100 doses) from the Department of Livestock Services, However, there remains a major issue about organizing vaccination for a large number of small-scale farmers on a regular

[21] For both adult birds and chicks.

basis. ACI admitted that one of their competitors, FnF, had a wider range of vaccines, including Duck Plague and Foot and Mouth Disease.[22]

Private Veterinarian in the Chars

One of the residual impacts of RFLDC's adaptive research programme was the presence of a young private veterinarian in Subornachar serving the more isolated areas of the Upazila from a base in Banglabazar,[23] Cher Clerk, just north of the interior dyke of Char Nangulia. This young man has now been recruited by Sagorika SUS under the pilot project with PKSF funds; in this respect he remains a resource for CDSP. On the other hand, his surgery at Banglabazar is closed and he is less able to offer services to areas like north Nangulia.

Quality Fish Seed

One of the features of the last three years of the Regional Fisheries and Livestock Development Component was its attempt to address the major problem of the declining quality of fish seed in Bangladesh caused by interbreeding and uncontrolled hybridization of the broodstock in the private fish hatcheries which supply around 98% of fish seed to grow-out farmers at the grass roots. In co-operation with the World Center, Bangladesh and South Asia Office, RFLDC built a network in the Noakhali region to introduce improved hatchery management practices to a number of private hatcheries. This started with improvements in physical infrastructure and broodstock management of Indian Major Carps and continued in 2012-13 with introduction of improved strains of mainly of Rohu and Silver Barb and the expansion of the breeding system/protocols for Tilapia hatcheries. A breeding nucleus for improved carp seed was established at the Karnafuly Hatchery in Raipur Upazila of Lakshmipur District and three other private hatcheries have obtained improved broodstock[24]. A similar system for tilapia is based around the Green Field Breeding Nucleus in Lakshmipur and improved broodstock of 14th Generation GIFT tilapia is available also at three other hatcheries.[25]

Given the major demand for tilapia seed in the CDSP IV Project area, the Consultant visited the improved hatchery nearest to the Noakhali chars at the Bismillah Agro Production (BAP) complex close to Noakhali Science and Technology University, to ascertain how supplies of quality seed could be distributed into the new chars. This hatchery is owned by a young agricultural graduate who won a national award in 2012 for his vision and success in developing his integrated. He has been trained at the Central Luzon State University in the Philippines and is well regarded by the World Fish Center experts for his willingness to adhere to the hatchery management protocols for tilapia. His farm was designated as a Satellite Centre under the RFLDC-WFC project of cooperation taking improved broodfish from the Breeding Nucleus at

[22] An interview was sought with the representative of FnF, but, because of the transport blockades, he was unable to travel from his base in Chaumohani, Begumgonj

[23] Under a Project called Community-based Animal Health Care Services.

[24] Global Hatchery in Sonaimuri, Kadirpur Hatchery in Begumgonj and Gopindapur Hatchery in Feni Sadar.

[25] Global, Bismillah Hatchery in Noakhali Sardar, close to Noakhali Science and Technology University and the Hi Tech Hatchery close to Jailashkara Market in Dagonbhuiyan in Feni.

Lakshmipur and multiplying these for sale of broodfish to other hatcheries as well fingerlings to grow-out farms. Having seen the operation of the Greenfield Hatchery in Lakshmipur, the owner has ambition to develop his hatchery as a Breeding Nucleus so that he will have several strings to his business bow and maintain the quality of his own broodstock.

In 2013, BAP produced 10 million tilapia fingerlings. 100,000 of these were sold as broodfish to other hatcheries, including at the Sylhet Agricultural University. The remainder were sold at 30 days old to other farmers in various parts of Bangladesh. At least 3.5 million fingerlings were sold in the Noakhali area, chiefly to a group of 500 farmers recruited by the hatchery itself, many of them in the Noakhali chars. A few went to selected Community-based Organizations, including 15,000 to the Tankhir Khal WMG/CBO in Boyar Char.[26] The hatchery offered training to these farmers, partly through a group of 4 'volunteers' operating on the basis of a lump sum honorarium a little like the Local Facilitators of RFLDC.

One month old sex-reversal tilapia under this private sector extension program were sold at Tk0.60 per piece, with a 5% discount being given to the volunteers/facilitators, so that they obtain a profit of Tk0.03 per piece. Delivery of 50,000 seed is free and an extra 5% of fingerlings is given against mortality. The hatchery says the experience has been positive so that his target production for 2014 is 25 million month-old fingerlings.

Most of the fingerlings sold were sex-reversal, but 500,000 (10 tonnes) were distributed as normal non-sex-reversal tilapia. These were sold at 1" size at 30-days for Tk0.40-45 per piece.

The hatchery owner showed positive interest in the possibility of expanding his market into the CDSP IV Project region as a contribution to marketing of his increased targeted production in 2014. He noted that there is another tilapia hatchery closer to the new chars in the area of Char Wapda, but this hatchery does not offer improved quality seed. And is perceived to be losing market. He would be willing to supply both normal (non-sex-reversal) and sex-reversal fry and offer training either through his own extension system or in co-operation with the Upazila Fisheries Office, with whom he has already been co-operating. Part of the training focus would be nurseries at the WMG/CBO level, since sale of one-month fingerlings would probably require a further 6 week nursing period before transfer to grow-out system.

The hatchery owner also has some stocks of some of the other species which are in increasing demand in the chars, such as grass carp and Thai Sharputi (silver barb). In 2013 he produced himself 150,000 Thai Sharputi from stock distributed in the RFLDC-WFC network. He is also the President of the newly formed Noakhali Agribusiness Association (NABA), presently a group of eight private sector agricultural entrepreneurs including the Upakul Prawn Hatchery. He feels that he facilitate the supply of quality seed of other species such as grass carp, rohu and Thai Sharputi either by drawing the other hatcheries in the World Fish Center network into NABA or simply by contacting those other hatcheries with whom he has close relations and acting a 'middleman' for the Noakhali char area.

[26] It seems that very few went to the former RFLDC CBOs, who apparently did not approach the hatchery.

4.2.3.2 Marketing

Part of the Social and Livelihood Component of CDSP IV involves the organization of the farmers in the Credit and Savings Groups to produce surplus of agricultural or non-farm products over their consumption needs for sale in the market. It is hoped that sale through the organized groups will offer improved marketing power and thus a higher share of the value added in the market chain. In the fisheries and livestock sector, several products have been identified which could help to improve livelihood, including fresh fish, meat, eggs and milk. One point in the Terms of Reference of the Consultant calls for an evaluation of the scope for marketing of such products through the Water Management Groups and other field level institutions.

In the last two-three years of the Regional Fisheries and Livestock Development Project, management perceived that increased production through the Farmer Feld Schools was offering a similar surplus and encouraged the formation of Producer and Marketing Groups from the FFS to market products through the CBOs. Latterly, RFLDC contracted the international NGO, International Development Enterprises (IDE) to support this effort in a project termed 'CBO Strengthening through Deeper Market Integration. This Project identified likely produce which could be sold to high level markets, promoted a dialogue with market actors and improved the capacity of the CBOs in business planning and development. Several 'quick win' enterprises were identified and linkages with markets forged, mainly in the crops sector (coconuts, soya bean, country bean, okra) and handicrafts like net making.

(a) Experience of egg marketing through CBOs

In the fisheries and livestock sectors, the most successful thrust was the marketing of eggs, linking producer groups mainly in Subornachar with District level buyers and it is possibly the one with greatest potential for the CDSP IV area if the problem of poultry mortality can be addressed. In 2011-12, many of the CBOs in Subornachar developed Producer and Marketing Groups for both chicken and duck egg production which were producing a surplus over household needs and in February 2013, through the South Noakhali CBO Association they sat down with a dealer based in Aktopalia Bazar to seek an agreement for bulk marketing. This dealer collects eggs from a wide area of Subornachar, including Horni and Chanandi Unions of Hatiya, and sells to Sonapur, Maijdee and Chaumohani. It is estimated that the daily demand in these markets is 15,000 eggs. In the discussion, the dealer agreed to collect eggs on certain days from the South Noakhali CBO Association with his own transport and also from individual CBOs if they accumulated more than 2,000 eggs in any one day. He undertook to pay cash at a price higher than that offered by the local traders, although lower than the price in Maijdee market (Tk905 per 100 eggs). Seven CBOs were involved in the arrangement, each of them offering funds to their market agents, former Local Facilitators of RFLDC, for purchase from the

farmers.[27] At the initial stage, the CBOs targeted collection of 3,700 eggs daily, but it may have increased to 5,000 eggs.

(b) Opportunity for milk marketing

Another commodity which has long been seen as having potentials for increased market orientation in the Noakhali chars has been milk and milk products. At an early stage of RFLDC, the Project contracted a team from Chittagong Veterinary and Animal Sciences University to conduct a study of the potential for establishing a milk chilling plant in the chars through the private sector, but any was preempted by the decision by the Bangladesh Milk Producers Co-operative, Milk Vita, to set up chillers in both Subornachar and Sonagazi in 2005(?). The Milk Vita chilling plant continues to operate a little north of the former Steamer Ghat near Khasherhat with a daily capacity of5,500 litres of fresh milk. A third plant has since opened in Ramgoti and Milk Vita has plans for a processing facility in Noakhali to take milk from four chillers, the three mentioned and an earlier foundation in Ramgonj.

The facility in Subornachar was perceived to offer some potentials for marketing of milk in improved markets for the farmers of the new chars who receiving training in cow rearing from the NGOs and the Consultant arranged to visit the plant to discuss its current status. Mr. Jahangir Alam of Quality Control Section hosted the visit.

As a Co-operative, Milk Vita is owned by its members. In the catchment area of the Subornachar chiller, the membership is organized into 40 Samiti each of between 20-30 members. There are thus around 1.000 milk producers selling their produce to the Subornachar chilling plant. Each Samiti is managed by a committee of 6, who appoint a Samiti manager for technical matters. Milk Vita organizes services for the various Samiti, including artificial insemination, deworming and vaccination. These primary services are carried out by a team of three veterinary assistants, backstopped by a qualified veterinarian (DVM) based at the chiller. The Samiti are registered by the Department of Co-operatives and registered Samiti are able to borrow funds for cow purchase. The typical loan is Tk75,000 which indicates that the cows are hybrids, normally of the Holstein-Friesian-Sahiwal cross and the purchase has to be approved by a technical committee to ensure the quality of the animal.

The Samiti send the milk to the chilling plant on a daily basis except where a quota is imposed at the peak production season (see below). The Samiti is paid an allowance for transport according to distance. The price of milk received depends on quality, which effectively means fat content. Milk with 3% fat receives Tk28.39 per litre and milk with 6% fat content or over Tk54.98 per litre. Typically the fat content is around 4.0-4.2 which offers a price of Tk37-39 per litre.There is a reduction of Tk0.40 per litre as compulsory share capital and Tk0.50 per litre for development expenses. This deduction of Tk0.90 per litre is paid in one account, partly controlled by Milk Vita; the net price is paid into another account managed only by the Samiti which is then responsible

[27] Including, of relevance to CDSP, Banglabazar UBUS (Char Clerk), Saikat BUS (East Char Bata), Tankhir Khal-2 Water Management Group (Boyar Char), Char Torab Ali MOKUS (Gangchil)

for paying individual members according to the amount of milk produced. Records of the amounts produced by the individual farmer are kept by the Samiti Manager and it is possible that he also makes an adjustment according to the fat content. However, the process of measurement is complicated and requires investment in expensive equipment.

Total production in the 40 Samiti served by the exceeds the capacity of chiller in the peak season, so that it is necessary to set a quota for each Samiti, which then must sell the surplus in open market. In the off-peak season, the amount of milk falls to just 600 litres per day (12,000 litres had been collected in the 20 days before team's visit), so that there would be massive scope for increased production if more milk could be produced at this time. However, due to the overall shortage of supply, the price of milk in the open market usually exceeds the median price offered by Milk Vita, so it is doubtful whether other farmers would be interested in joining the Milk Vita system.

It is noteworthy that cow milk and buffalo milk are mixed together at the Samiti. Buffalo milk tends to be higher in fat content and the modal grade is probably inflated by the fact that 70% of the milk collected in the peak season (February – July) in Subornachar is buffalo, a figure which rises to 80% in the off-peak season. Since the main buffalo rearing systems are extensive bathan systems (see Section 2) in the open chars, this confirms that the client group of this chilling plant are mainly large farmers. The Milk Vita representative confirmed this and noted that the plant did not arrange feed, since the system was mainly open grazing of these lands.

5. Summary of Findings and Conclusions

5.1 Role in Livelihood

The fisheries and livestock sectors constitute an important source of livelihood for the farmers in the CDSP IV chars.

5.1.1 In the livestock sector, most households (90%+) rear chickens and perhaps two-thirds have ducks; many (40-50%) households have cattle, either for milking or fattening for Eid-ul-Azha. Relatively few households keep goats because of their destructive habit during free range grazing.

5.1.2 Almost all livestock rearing systems are based on indigenous (*desi*) animals. During interviews almost no improved hybrids were found. Poultry are typically reared in scavenging and semi-scavenging systems and cattle in open grazing systems with almost no formulated feed or access to improved fodder. On average, larger holdings of livestock are found in Urir Char because of the *borga* and *bathan* systems in the extensive grazing land surrounding the central settled area. There appears to be little major change in livestock rearing systems since the time of the Feasibility Studies.

5.1.3 Almost all households have a fish pond. During the feasibility studies of the fisheries sector for CDSP IV in Char Nangulia, Noler Char and Caring Char, the fish catch was often through capture in interior *khals*or trapping of both freshwater and marine fish (brought in through tidal surge) in open ponds/ditches. Over the last 6-7 years, these catches have declined due to blockage of the drainage (in the Hatiya river and by road construction), siltation of the khals and greater pressure on the fishery from population growth. This trend is likely to continue, especially in Char Nangulia and Noler Char, as a result of the embankments already constructed under CDSP IV. Thus there is a marked shift in these areas towards development of ponds for stocking of fish, i.e. aquaculture.

5.1.4 Unlike the conventional aquaculture systems in Bangladesh, centered on a poly culture of Indian Major Carps (IMC), the aquaculture systems being adopted in the chars are extremely low input (low feed or no feed). Tilapia appears to be the most popular species, followed by grass carp, silver carp, Thai Sharputi and common carp. Grass carp and Thai Sharputi are typically reared through inputs of cut grass. Farmers are generally reluctant to invest because of the risk of flood/tidal surge in the monsoon season and the rapid decline of water levels in the dry season.

5.1.5 In the case of Tilapia, two sub-systems are operating: stocking of swim-up fry of 'normal' Tilapia, obtained from neighbors' ponds, with almost no feed (80% of the systems and common in resource-poor households); and stocking of sex-reversal tilapia (perhaps 20% of systems) with some inputs of feed and even fertilizer. In the latter case, SRT fry are obtained from *patilwala* from Comilla.

5.2 Problems leading to low productivity

Productivity of both the livestock and aquaculture systems is generally very low and is constrained by a combination of the high risk environment, limited knowledge of appropriate technical options and lack of access to inputs, especially quality inputs.

Input Supplies

5.2.1 In the case of livestock, productivity is affected by mainly high levels of mortality, especially amongst chicks and ducklings. Typically between 50-70% of each clutch of chicks/ducklings is lost by disease (probably Newcastle / Ranikhet disease and Duck Plague). Investments in cattle are also set back through mortality, causing loss of profit of up to Tk15-20,000, as well as by both external and internal parasites which reduces the impact of any feed given.

5.2.2 Almost no vaccination services are available to offset the spread of either poultry disease and neither vaccination nor deworming services are available for ruminants, except in parts of Char Ziauddin, Noler Char, southern Char Nangulia and certain communities in Caring Char, close to Community-based Organizations promoted by RFLDC or as part of the cooperation between CDSP IV and RFLDC in 2012-13 when a Poultry Worker was trained in each Water Management Group. Not all of these trained Poultry Workers continue to operate and the scattered population in the chars means that the radius served by these Poultry Workers is limited.

5.2.3 Shortage of vaccines may also be a constraint. Vaccines are available from both Government and private sector sources. However, the supplies of vaccine from Government sources (DLS) are irregular/ inadequate for demand and quality may be affected by deficiencies in the cold chain to the grass roots level. Although the cold chain for vaccine from the private sector does extend down to agents at the Upazila level, vaccine supplies are limited to certain types: Ranikhet and Baby Ranikhet Disease, Fowl Pox and, in the case of FnF, Foot and Mouth and Duck Plague. Although prices are similar between the Government and the private sector, vaccines available from the private sector are usually in large vials of 500 doses and thus essentially oriented to medium-large scale commercial producers. Use of such supplies for small-scale farmers would require a major organizational effort by field level organizations. Even the 100 dose vials available from the Department of Livestock Services are subject to considerable waste in the absence of a number of livestock brought to a central location.

5.2.4 There are no major disease problems in the fisheries sector, largely because the aquaculture systems being practiced are so low input. The main constraint to increasing productivity in aquaculture in the short-term appears to be fish seed quality. In the case of the swim-up fry system of tilapia culture, many farmers are obtaining supplies from neighbors or local institutional ponds, but it is likely that seed quality in these ponds is deteriorating in the absence of regular stocking of new brood fish. Sex-reversal tilapia and other preferred species is obtained either from *patilwala* from Comilla or from local hatcheries in Noakhali. The brood fish in these hatcheries may also have deteriorated and, to date, the farmer groups have not yet plugged into the improved quality seed being produced from the hatchery network developed by RFLDC and the World Fish Centre. This offers the best tilapia strains available as well as improved stock of Thai Sharputi and some Indian Major Carps (notably Rohu).

5.2.5 There is a need also to ensure stocking of large fingerlings since many of the ponds in the CDSP IV chars are still partly open to the surrounding hydrological system or vulnerable to flooding, This leaves small fry open to predation by the remaining wild fish and demands nursing of fry to large fingerlings at the grass roots level.

5.3 Limited knowledge of appropriate technologies

There are three sets of Field Level Institutions involved in training to increase productivity under the CDSP IV Project: Farmer Forums, organized by the Department of Agricultural Extension; Credit and Savings Groups under the various NGOs; and Social Forestry Groups established by the Department of Forests.

5.3.1 Farmer Forums

5.3.1.1 Farmer Forums are limited in coverage. The Project target is establishment of 90 such groups each with 30 member households, for a total of 2,700 households, only 10% of the CDSP target population. Most members appear to be somewhat better-off households. The Department of Agricultural Extension organizes training and demonstration plots of new rice and vegetables varieties broadly speaking in line with production potentials of each areas. Inputs of seed, fertilizer and pesticides for these initial demonstrations are given free. The number of demonstrations in each FF appears to vary, probably according to the energy and commitment of the local SAAO. After the demonstrations, members may distribute seed of the improved varieties to others from the demonstration plots or obtain further supplies from designated dealers in the market. Thereafter follow-up/group activity appears to be limited to monthly meetings at which farmers discuss their problems.

5.3.1.2 Members of the Farmer Forums may discuss needs in the fisheries and livestock sectors in such meetings, but there appears to be no guidance on where to receive advice and inputs in these sectors. In rare cases, the FF may include a former Local Facilitator from RFLDC able to offer some technical guidance. From the interviews, there appeared to be minimal interaction with either the Water Management Groups or the former RFLDC CBOs; however, the Agriculture Specialist of CDSP IV claimed that there was already some dialogue between DAE staff and their fisheries and livestock counterparts. It is noted that CDSP has developed a Guideline for Participatory Farmers' Organizations in line with the 'New Agricultural Extension Policy' of 1996. According to CDSP Progress Report #5, this was completed in 2013 and it would be interesting to know whether these issues are covered in the Guideline.[28]

5.3.2 Credit and Savings Groups of Partner NGOs

5.3.2.1 The groups operate a Homestead Agriculture and Value Chain sub-component. This offers training in Homestead Gardening, Poultry Rearing, Goat Rearing and Cattle Rearing, but not so far in aquaculture, although training manuals have been developed. The training for these agricultural enterprises varies between one and three days, although considerably time is taken up with general administrative issues, review and recapitulation; effectively the training period is two days or slightly less. The training is given in a rather top-down mode and uses a heavy, technical and standardized curricula not obviously oriented towards the resource-poor target group and context of the CDSP IV

[28] The DAE Agricultural Extension Policy is being revised. From a previous study, this Consultant was advised that there was minimal attention in the NAEP of 1996 to participation and farmers organizations, but that this was being addressed in the revision.

chars. Despite the constant review and recap, the absorptive capacity of the farmers in this type of training must be doubted and their application of the training even more so.

5.3.2.2 This concern appears to be at least partly substantiated by the findings of the Knowledge Attitude Practice (KAP) survey carried out with 320 households in January-February 2013 and reported in Progress Report #5. This shows that, although up to half of respondents claim moderate or good knowledge of poultry, goat and cow rearing, only between 18-25% actually practiced the technologies covered (Table 9). The commentary on this result focuses on the selection of members for the training (avoiding those women who don't have such animals) and recommends that a refresher training should be organized. Here, our concern is the appropriateness of the training content in a high risk environment.

Table 9: Results of KAP Survey with Reference to Livestock Rearing (% of responses)

	Knowledge			Attitude			Practice		
	Poor	Medium	Good	Not Good	Positive	No Answer	Practice	No Practice	No Response
Poultry	50	47	3	8	92	0	25	67	8
Goat	53	45	2	1	99	0	19	67	14
Cow	46	50	4	1	99	1	18	74	8

5.3.2.3 Households interested in one of the enterprises may also obtain credit from the NGOs. However, although there is some flexibility in the credit packages offered towards monthly or even half-yearly repayment, in some cases, these may not be available for fishery and livestock enterprises,[29] for which the conventional repayment schedule of weekly payments with only one week's grace applies.

5.3.2.4 Again there is minimal linkage between the NGO Credit and Savings Groups and the other organizations which might offer services in support of the training. The model of CDSP III, where the NGOs in Boyar Char trained 50 Poultry Workers has not been continued in CDSP IV.

5.3.3. Social Forestry Groups

5.3.3.1 The Social Forestry Groups established by the Department of Forests are mainly engaged in maintenance of the forest plantations on the roadsides and the Embankments. It is recognized in the Social Forestry Model that these groups should be compensated by income or products from the model, especially where they have lost land during construction of the large embankments. However, initially income derives from laboring, from pruning, thinning of the trees and from fruits/medicinal plants. The main income from system only merges in the medium to long term from the (55%) share of the timber harvest. There appears to have been little consideration in the model that, in particular, the Embankment resource system (embankment and adjacent borrow pit) could be developed as an integrated livelihood system for the livestock and fisheries sectors, respectively. In relation to aquaculture, this is despite the obvious interest in development of the borrow pits as fish ponds. There

[29] It is apparently PKSF policy that seasonal loans should be offered for cattle fattening, goat rearing and aquaculture and those NGOs utilizing PKSF funds should follow this policy.

has been no training of the concerned groups in this concept, only in the issue of social forestry as a mitigation measure for climate change. At the presentation of this report to the local team in Noakhali, the representative of the Forest Department said that other trainings were planned.

5.4 Organizations for Service Provision

Under the Regional Fisheries and Livestock Development Component provision of services to resource poor farmers at the grass roots was organized through Community-based (Farmers) Organizations (CBOs). From the outset, these organizations were designed with sustainability in mind, generating income through acting as commission agents for private sector input suppliers and charging a small mark-up on other services. The CBOs had a formal constitution, an elected management committee and opened a bank account in which to deposit. Starting with provision of prawn post-larvae and feed under the Greater Noakhali Aquaculture Extension Project, CBOs gradually expanded their service provision to other sectors. Of the Field Level Institutions in CDSP IV, it is only the Water Management Groups which have a similar structure and function.

5.4.1 It is only the WMG which therefore have scope to organize the grass roots services in input supply and marketing needed by the farmers in the CDSP chars. Most of the WMG have begun to take steps in such directions, accumulating capital for investment through monthly savings, share capital and income generating activities such as sale of fish seed (nursery development). Some also offer organizational support to Poultry Workers. It is through these institutions and the RFLDC CBOs also located in or close by Char Nangulia, Char Ziauddin and Noler Char that CDSP IV can make good the gaps in service provision – initially mainly the vaccination and other primary veterinary services, fodder tree saplings and fodder cuttings, quality fish fry and fingerlings identified above - and eventually organize marketing of the farmers' products. Current levels of capital accumulation in the WMG are quite small (around Tk40-70,000) and where possible association / amalgamation with the older RFLDC CBOs with their larger funds from Block Grants would be beneficial in enabling them to expand.

5.4.2 At this stage in the development of the production systems in the CDSP IV chars, the demand for other inputs such as inputs for pond preparation such as lime, fertilizer for fish ponds, feed for fish and poultry, planting materials for fodder, artificial insemination and feed additives for livestock, will be quite limited to the minority of larger farmers. The most promising demand for these inputs is in the growing culture of Sex-Reversal Tilapia.

5.4.3 In developing these services, it will be important that there are clearly defined forward linkages between the WMG (and CBOs) and the production groups described earlier, the Social Forestry Groups, Farmer Forums and the NGO Credit and Savings Groups. In each WMG zone, the numbers and locations of these production groups need to be clarified and ideally a representative of each of these production groups should be a member of the WMG (or CBO). These representatives can then assist the WMG to identify the services required and, through expansion of the membership of the WMG (CBO) also increase the capital stock for investment.

5.4.4 The WMG will also need to forge all backward linkages with higher level service providers, Government of Bangladesh Departments, NGOs and private agribusiness. At present it would appear

that the key linkages for vaccine and veterinary services are the Department of Livestock Services, certain private sector animal health care companies, the partner NGOs able to support qualified veterinarians and, in the case of BRAC, train Community Livestock Workers/Paravets, and the South Noakhali CBO Association. In the fisheries sector, the best sources of improved seed will come from the hatcheries within the network created under the RFLDC - World Fish Center cooperation project

5.5 Given the low productivity systems prevailing in the area and the lack of strong organization of the scattered population into production groups, there is limited scope for group marketing of agricultural products through the field level institutions. If basic veterinary services can be established for poultry, the marketing of duck and chicken eggs seems to have the greatest potential, mainly oriented towards District markets on the model of the egg marketing network developed by the South Noakhali CBO Association. Groups of larger pond holders may also be able to organize joint marketing of tilapia in local markets. Given the low productivity of milk cows and the small numbers per household, it will be difficult in the short term to consider marketing of milk except through local traders for the informal market. Despite the apparent opportunity for sale to the formal system through the Milk Vita chiller and planned processing plant, this is currently oriented towards larger farms, including bathans, and has complex quality control regulations little understood by small-scale farmers.

6. Recommendations

6.1 General Recommendation

CDSP IV should view the development of an extension system for the fisheries and livestock sector in the chars as a staged development. There are potentials for development of the sub-sectors, especially in tilapia-based aquaculture systems, in indigenous poultry systems and in cattle rearing. However, the area is presently characterized by low input and low productivity systems, initial development of which requires key adjustments in the agricultural information systems and basic development of the still rudimentary input supply systems.

6.2 Improvement of Agricultural Knowledge and Information Systems

6.2.1 CDSP IV offers training in poultry and cow rearing through the CBO Credit and Savings Groups and in crop cultivation (rice and vegetables) through the DAE Farmer Forums. However, in the first case, this lacks specific focus on the needs of the char context and in the second case does not extend to the aquaculture and livestock sectors. There is a good case for revision of the training curricula for both groups.

6.2.2 In the case of the NGO training, it is suggested that

- If training in poultry, goat rearing and cow rearing is limited by budget considerations to three days, the basic training in group organization, importance of IGA and background to CDSP should be removed from the curriculum, offering more scope for a more measured and context specific training in technical issues.
- In all cases, a more practical orientation to the training should be considered
- In the case of poultry rearing, the emphasis at this stage should be firmly upon improving the productivity of semi-scavenging indigenous poultry, with only limited mention of improved breeds and then only to emphasize the technical and economic constraints in obtaining the necessary services of day-old chicks and improved feeds and the increased susceptibility to disease. The basic need is to build up the confidence of resource-poor farmers in indigenous chicken and duck rearing and reduce the risks from the system. Thus the curriculum should stress
    - Improve poultry housing allowing for improved ventilation and hygiene;
    - Improved nesting of the broody hen through a mud ‘hazal’, with layered bedding, precautions against parasites and feeding and drinking cups to maintain the nutritional status of broody hen;
    - Separation of the broody hen from the chicks at an early stage with a view to encouraging more brooding cycles;

- Limited early feeding of chicks and protection from predation;
- Feeding with locally available materials where possible with only necessary minerals purchased from the market;
- Information on common diseases and the need for vaccination and control of external parasites; sources of vaccinations services (see below)

and where possible contain practical demonstration, examples of these techniques

- In the case of cow rearing, the stress should be upon indigenous breeds and constraints involved in upgrading of stock through artificial insemination should be explained. Thus the content should emphasize
  - Encouragement of a best-to-best mating system within the community or possible services from improved local strains (Red Chittagong);
  - Orientation and hygiene of the cattle stall;
  - Improved feeding, through cut and carry methods, utilizing local materials including homestead produced fodder (the technique of urea and molasses treated straw may be introduced, but not as the only option). The special needs of pregnant and lactating animals may be mentioned.
  - The need for deworming;
  - Cattle diseases and prevention, including sources of vaccination (see below);
  - Milk hygiene;

  Again, ideally the trainers should seek out cases where farmers have made such improvements as a demonstration

  The specific curriculum for goat rearing should be along similar lines as for cattle, but with the following variations
  - Emphasis on the need to maintain the best animals (Black Bengal Goat) as breeding stock or where locally these may be accessed;
  - Need for weather proof housing, especially for kids to guard against pneumonia and mortality;
  - Emphasis on a cut and carry stall feeding system, based on the homestead, to overcome the damage caused by free-range grazing of goats. This would include incorporation of tree fodders preferred by goats (ipil-ipil, jackfruit) in the homestead agriculture curriculum;

- Similar needs of pregnant and lactating animals to ensure adequate nutrition for the kids;
- Monitoring of animal health and deworming; vaccination against PPR and possible sources

- It should be emphasized that in all of the three curricula for the livestock sector, it is not proposed to add new content, but to simplify, add practical content and focus on elements more relevant to the current context of the chars.

- An appropriate curriculum should be developed for aquaculture, focusing on the systems current in the chars, and group members or their male counterparts encouraged to enrol. The curriculum should this emphasize the following
    - Knowledge of suitable ponds for aquaculture and pond preparation, including the need for dikes high enough to withstand flood or tidal surge, sealing and base fertilization through animal manure, liming to ensure water quality (sources of supply);
    - Aquaculture systems suitable to the chars, with emphasis on low inputs systems of quick growing species such as tilapia, grass carp, Thai Sharputi, common carp and their feeding habits, playing down the conventional polyculture of Indian and exotic carps;
    - Importance of seed quality (good seed will grow better) and sources of quality seed, including discouragement of sourcing from *patil walas* and encouragement of sourcing from 'certified nurseries' (see below);
    - Concepts of stocking mix and stocking density according to availability of inputs (not prescriptive numbers);
    - Need for large fingerlings from nurseries (and sources of nurseries);
    - Fertilization of ponds through manures and supplementary fertilizer (for tilapia);
    - Concepts of water quality (possible over-feeding) and testing by simple means

  Numbers of trainees will depend upon demand. The training will be held over a maximum of three-four days at the NGO's training centres, but with field visits arranged to ponds of more advanced farmers/Local Facilitators.

- Adjustment to the curricula will depend upon the identity of the trainers. Ideally the NGOs should have their own trainers in the fisheries (aquaculture) and livestock sectors so that curricula may be developed which are appropriate to context (under the guidance of specialists with CDSP). In the case of aquaculture, the former Aquaculture and Fisheries Coordinator of RFLDC is resident in Noakhali and would probably be available to support this process under the strong guidance of this Consultant.

Support could also be sought enlist from former Local Facilitators of RFLDC who continue to work in the area and whose training in Farmer Field Schools should enable them to offer guidance / training which is both practical and technically relevant. These young people could also assist in arranging cross visits for the training groups.

- Once again, it is emphasized that, where possible, these curricula should include at the least pictorial material, classroom or field demonstrations and visits to local farms, including to the farmers of members previously trained under the RFLDC Farmer Field Schools whomay have already developed their systems. Here opportunity should be given to discuss the economics of the operation.

6.2.3 In the case of the Social Forestry Groups, since all the members are likely to be members of the NGO Credit and Savings Groups and are of an appropriate size, the modified NGO curricula may be applied to them also. However, in the training for poultry and livestock, greater emphasis may be placed upon discussing the availability of the use of fodders (suitability for different animals, processing) from the Embankment Social Forestry system, such as pigeon pea, sesbania, Jam Leaves and Raintree leaves and pods. Given the likelihood that the borrow pits lend themselves to development of larger, more commercially-oriented ponds, it may be also that there will be need for some emphasis in the aquaculture training module on the culture of sex-reversal tilapia or even carp-based systems.

Given the novelty of this livelihood system, it may be appropriate to begin the training on a pilot basis with those groups in which the planting process is more advanced. This may be particularly the case if Ipil-ipil (*Leucaena leucocephala*) is introduced into the system. While there is no doubt of the nutritional value of this tree legume for livestock, during interviews, some farmers apparently familiar with the tree made suggestions that this tree legume had the effect of desiccating the soil beneath it (like Eucalyptus). The general descriptions do not seem to support this view and it may be that desiccation has been confused with the tendency to shade out other species if not regularly cut. More important in terms of trials is to make sure that the leaf meal is not fed in excess since it has some toxic properties. Nor should Ipil-ipil be cultivated as a single crop. In this context, the training and trials will need to be carefully focused.

6.2.4 In the case of Farmer Forums, CDSP should make sure that the Department of Agricultural Extension understands the importance of the aquaculture and livestock systems to char livelihood and encourages the use of the Farmer Forums to access information on these topics and necessary inputs. Thus, although it is not expected that the initial demonstrations can include these topics, the monthly meetings should offer scope for discussion and, if the group so decides, the SAAO should invite resource persons to join subsequent meetings, or to offer special training sessions to the group. These resource persons may be the Local Facilitators attached to the WMG or GOB officers. The advantage of the Local Facilitators is that their training will have emphasized low inputs systems suitable for the chars, whereas the GOB officers may offer information/training of a more general and too technical nature.

6.3 Improvements in service provision

6.3.1 Key Role of WMG

The provision of the necessary services for the aquaculture and livestock sub-systems in the CDSP IV chars at the grass roots level will be based upon the Water Management Groups. The organizational structure of these groups with their formal constitutions, management committees and bank accounts lends itself to the necessary investments in services like vaccination and animal health care, input provision (improved fish and poultry seed, breeding services for ruminants, feed and fertilizer supplies, planting materials for homesteads and embankments. The WMG are also in a position to facilitate the work of Poultry Workers and Community Livestock Workers (Paravets) through organization of campaigns for vaccination and deworming, as well as disseminating information of availability of fish seed.

6.3.2 Links to Production Groups

The WMG hold regular meetings and, apart from the discussion of support to infrastructure development, these meetings should cover the development needs of their potential client populations as a guide to developing investment plans and prioritizing the use of funds collected or earned. As stated above the investment capacity of the WMG will be enhanced by two developments

- Where there is already an association with a former RFLDC CBO, formal amalgamation of these groups into a single Water Management Organization; and
- Increasing the membership of the WMG itself whereby every production group (FF, CSG and SFG/CSG) will be affiliated / have members (representatives) in a particular WMG. These members will help to emphasize the particular interests of their groups and according to savings ability may increase the capital stock of the WMG
- It will be important to ensure that increasing the investment capacity of the WMG will be monitored carefully by the Project Area Coordinators to ensure that financial irregularities do not emerge and consequent elite capture does not affect group solidarity.

6.3.3 Links to CBOs

At present there are only 19 WMG under CDSP IV (Ziauddin 2, Noler 6 including one in Caring Char, Nangulia 11), but 90 FF and many more CSG (890, including around 28 Embankment SFG). This will mean that each WMG could have around 50 (890/19 =47) members from the CSG and 4-5 from local Farmer Forums. The total numbers of households under each WMG is estimated at somewhere between 900 and 1700. Table 10 gives the details of the specific groups under each WMG. In Urir Char, there are no WMG and in Caring Char only one, so it is assumed that the LADC will play a similar role. In Char Nangulia, Char Ziauddin and Noler Char, in some case it may be appropriate to affiliate the production groups to the nearby CBOs of the former RFLDC,

which have already developed services for the fishery and livestock sectors. Particular attention may be drawn in this respect to supplies of day-old and month-old ducklings in some CBOs.

Table 10: Number of Production Groups and Resource Persons by WMG

Name of Area/ Polder: Char Nangulia **Upto 28.11.2013**

SL	Name of WMG	No of FF	No of SFG	No of NGO group	No of TUG	No of LCS	No of poultry worker/ LF	Remarks
1	Char Azmal Dorbesh- WMG	4	5	46	28	2	2	
2	North Nangulia- WMG	3	4	37	27	1	2	
3	South Nangulia-WMG	5	5	42	26	0	2	
4	Char Jamil Bhuiyan-WMG	3	4	38	35	2	2	
5	Char Bashar-WMG	3	4	30	34	0	2	
6	North Katakhali-01, WMG	3	4	35	28	0	2	
7	South Khatkhali-01, WMG	3	4	36	35	3	2	
8	North Katakhali-02, WMG	4	5	47	37	0	2	
9	South Khatkhali-02, WMG	3	4	32	30	0	2	
10	Char Noman, WMG	3	4	30	22	0	2	
11	Char Lakshmi- WMG	3	4	31	20	0	2	
	Total	**37**	**47**	**404**	**322**	**8**	**22**	
	Name of Area/ Polder: Noler char							
1	Howar Khal-01, WMG	3	4	42	36	1	2	
2	Rahamatpur Khal, WMG	7	5	39	42	1	2	
3	Chanandi Khal- WMG	5	3	45	35	1	2	
4	Milon Khal- WMG	5	4	37	31	1	2	
5	Al Amin Khal WMG	5	3	45	38	1	2	
	Total	**25**	**19**	**208**	**182**	**5**	**10**	
	Name of Area/ Polder: Caring Char							
1	Bathankhali LADC	3	0	43	55	1	2	
2	Shahabani Bazar- LADC	5	0	48	25	1	2	
3	Mujib Bazar- LADC	3	0	38	24	1	2	
4	Caring Khal WMG	4	0	49	58	2	2	
	Total	**15**	**0**	**178**	**162**	**5**	**8**	
	Name of Area/ Polder: Char Ziauddin							
1	Char Bagga Khal -WMG	4	1	45	13	1	2	
2	Motobi Khal- WMG	3	4	34	32	1	2	
	Total	**7**	**5**	**79**	**45**	**2**	**4**	
	Name of Area/ Polder: Urir Char							

1	LADC-01	2	0	28	14	0	2	
2	LADC-02	2	0	26	22	0	2	
3	LADC-03	2	0	30	14	0	2	
	Total	**6**	**0**	**84**	**50**	**0**	**6**	
	Grand Total	**90**	**71**	**953**	**761**	**20**	**50**	

Note: Number of Poultry Workers (PW) trained under CDSP-RFLDC Cooperation. May be not all will be operating; this be checked in the inventory recommended.

6.3.4 Specific Priority Services

With regard to specific services, in their initial stages of their development and given the limited budgets available at this stage,[30] the WMG will be likely to concentrate on the provision of veterinary services for livestock and on the supply of quality fish seed. Some limited amounts of lime for pond preparation, urea for pond fertilization, feed ingredients for broody hens and chicks to encourage more frequent brooding and fodder planting materials for homestead and embankment cultivation may also be stocked. Setting of plans and priorities for provision of these services should be decided in the monthly meetings or preferably the Annual General Meeting of the WMG.

6.3.5 Cross-visits

As a stimulus to what could be done, members of the executive of the WMG should make cross visits to CDSP II and CDSP III WMG in the area and to CBOs developed under RFLDC. It is felt that the following will offer good perspective in this regard:

- Karim Pani BSD Ltd
- Tankhir Khal WMG (Boyar Char)
- Saikat BUS (East Char Bata)
- Banglabazar UBUS (Char Clerk)
- Satota BUS (Char Jubilee)
- Digonto BUS (Char Jabber)

[30] It is unlikely that CDSP IV has any budget to replicate the Block Grant facility offered by RFLDC, so that a stepwise development of services based upon savings, limited special levies from members and re-invested earnings will be required.

6.3.6 Training of Resource Persons

Although the actual activities of each WMG should depend on their respective planning meetings, it is perceived that to provide the services identified above as priorities, CDSP IV needs to organize the following training events

- Training of Poultry Workers. It is estimated that at least one Poultry Worker should be trained for every 500 households in the service area of each WMG, so that a total of up to 50 of these PW (all women) may be required, less those already trained under the previous RFLDC - CDSP co-operation who are still active[31] and those already operating from RFLDC CBOs.[32] This is the equivalent of 2-3 PW in each WMG. Specific numbers will be derived from an inventory of these resource persons recommended in Section 6.5 below. The training will be a three-four day practical training in which the PW will get experience in vaccinating live birds/chicks. The curriculum will also cover basic techniques (especially mixing of small amounts of feed based upon locally available materials) of semi-scavenging poultry rearing so that the Poultry Worker can also offer advice to her clients.

  It is anticipated that the training of Poultry Workers can be offered by and at the Upazila Livestock Office (Upazila Livestock Development Center) at Subornachar, although an alternative may the NGO veterinarian recruited already by Sagorika SUS with PKSF support.

- A similar training programme may be arranged for Community Livestock Workers, with a view to offering vaccination and basic health care services for ruminant livestock. It is anticipated that a cadre of around 10-12 young men should be recruited for this - training. Again the training should be practice-oriented and may be arranged through the ULDC or the Sagorika veterinarian. The experience of RFLDC may be instructive in this regard; a two-week training was arranged for the CLW at the Chittagong Veterinary and Animal Sciences University divided into two separate courses on animal health and animal husbandry. The latter module should include issues of homestead fodder cultivation and other low cost sources of feed. This is perceived to have adequate to purpose and it did not include training in artificial insemination, which is perceived to be marginal to the needs of the char population at this stage and in any case could be provided by the qualified veterinarian. The 45-90 day training courses through the Department of Youth Development and BRAC seem excessive.

[31] One young PW met in Haji Idris Bazar had been prevented by her husband from carrying out her activities.

[32] It was stated by the BRAC Project Officer in this same location that BRAC had another pro-poor project in the area which did indeed have facility for training of poultry workers. This seems to be a classic case of the right hand not knowing what the left hand is doing. At the very least, CDSP should check to see whether these PW overlap with the CDSP Project area and could provide services.

- Kit boxes should be provided for each of these groups in advance of the trainings; the Sagorika SUS veterinarian may be enlisted to organize the procurement from suppliers in Dhaka.

- While the District Livestock Office has agreed in principle that the ULO should be involved in these training activities and others, a dialogue should be initiated with the Upazila Livestock Office for this purpose to ensure common understanding of needs and the scope for the ULDC to offer the training required.[33] Ideally this dialogue should be facilitated by the present consultant if he is available in Bangladesh.

- There is a need for a further group of technical resource persons attached to the WMG to assist in the management of fish seed nurseries (both tilapia and other species). These new resource persons may be members of the WMG management committee with a particular interest in aquaculture. A specific training may be arranged on nursery management for this group through the District / Upazila Fisheries Office in co-operation with the private sector BAP tilapia hatchery. The Acting District Fisheries indicated his understanding of the specific needs and his support in principle for this training. Given the potentials for aquaculture development, the ideal would be to train one person in each WMG.

6.3.7 Backward Linkages to Service Providers

In support of the above activities and to ensure the inputs of vaccine and veterinary medicines to the PW and CLW, of fish seed to the nurseries and other inputs in line with the initial limited demand, it will be necessary for CDSP to facilitate linkages between the WMG and the quality input suppliers.

- In regard to vaccines and veterinary medicines, as well as certain agricultural inputs, there is an existing supply chain down to Khasherhat operating through the South Noakhali CBO Association, which has upward linkages to both Department of Livestock Services and the private pharmaceutical companies. CDSP IV may plug into this system. To get the cold chain down to the grass roots level, the vaccines may be sent to the NGO Offices in the different chars and collected from there by the Poultry Workers. The WMG will need to support the Poultry Workers in organizing vaccination campaigns with the various groups in their service areas to bring their birds to convenient central places in numbers sufficient to maximize the efficient of the service (at least 100 birds if DLs supplies are available).

- In the case of fish seed, CDSP IV should make contact with the tilapia hatchery at Bismillah Agro Production (BAP) farm in Dharmapur, Noakhali, as the nearest source of top quality tilapia seed and as a member of the World FishCenter network in Noakhali. Informal agreements should be made for BAP to

[33] The current ULO is Dr. Ziaur Rahman (Telephone 01726-403722)

- Arrange an initial orientation workshop with the WMG management committees to explain the background of the fish seed available through the WFC network (in cooperation with WFC staff);
- Coordinate and arrange the training of the Aquaculture Resource Persons;
- Supply the required number of 30-day old sex-reversal and 'normal' tilapia seed to the respective WMG/LADC, based upon an assessment by the trained aquaculture resource person;
- Facilitate supplies of other fish seed such as Thai sharputi according to demand in the respective WMG/LADC areas from the WFC network

Agreement with BAP may facilitate free transport and a 5% commission for the WMGs.

- As in the case of the Upazila Livestock Office, it will be necessary to hold a meeting between the Managing Director of BAP (and possibly other hatchery representatives and CDSP management to further clarify the needs and the operational details of any agreement. Ideally this meeting should be facilitated by the present consultant if he is available in Bangladesh.
- In the case of planting materials for homestead fodder (improved grasses) and for the social forestry groups (Ipil-ipil saplings), the Upazila Livestock Offices may offer assistance.

6.4 Coordination within CDSP IV.

Establishment of the initial steps within the fisheries and livestock extension system will require a strong coordination mechanism with CDSP. In the framework proposed, Project management must ensure that

- The Department of Agricultural Extension facilitates discussion on non-crop agriculture in the Farmer Forums and these appoint a member to be the liaison with and at least be an affiliated member of the WMG;
- The Forest Department facilitates training of the Embankment SFG in an integrated livelihood system, incorporating aquaculture and livestock and including the introduction of the key fodder legume 'Ipil-ipil' into the model;
- The Partner NGOs
  - appoint livestock and aquaculture coordinators as the focal point for training in these sectors instead of hiring in trainers;
  - modify their poultry and cattle rearing curriculum to better fit with the specific development needs of the chars;

- modify and offer a new curriculum on aquaculture;
- discuss arrangements for offering seasonal loans for cattle fattening and aquaculture;
- allow the use of the refrigeration facilities in their offices for animal vaccines;

Internally CDSP IV should construct a basic GIS system, building on Table 10, which shows clearly the WMG network in each of the chars, including the locations of the CSG and FF under each WMG. Base Maps from which such a system could be constructed are presented in Annex 4; the details should show at least the location of the WMG, NGO Offices and FF.

6.5 Immediate Activities

In implementation of the above recommendations, it is proposed by CDSP IV management organizes the following activities:

6.5.1 Conduct an immediate inventory of the number and location/affiliation of resource persons currently operating in and adjacent to the CDSP IV. Thisinventory should include Poultry Workers trained under the co-operation between CDSP and RFLDC in 2012-13 and the Poultry Workers, Community Livestock Workers, Community-based Agriculture and Aquaculture Resource Persons and Local Facilitators trained in the nearby RFLDC CBOs. In the case of the WMG/CBOs, this inventory should extend to information on the location of Farmer Field Schools already conducted by the WMG, Sagorika SUS as a partner of RFLDC and the CBOs within Char Ziauddin.[34]

6.5.2 Elaborate Table 10 to list all Farmer Forums, NGO Credit and Savings Groups and Social Forestry Groups in the service area of each WMG with a view to developing the service network in each area. Both of these activities should be coordinated by the Deputy Team Leader, with support from the Monitoring, Evaluation and Knowledge Management Advisor.

6.5.3 Arrange cross-visits for WMG Executive Committee to CDSP II/III WMG and RFLDC CBOS; widen scope of planning meetings in WMG

6.5.4 Appoint Fisheries and Livestock Specialists in the CDSP Technical Assistance Team to support activities in the two sub-sectors for a period of one year. As mentioned above, in the fisheries sector, the former Aquaculture and Fisheries Coordinator of RFLDC may be a suitable candidate. In the case of the livestock sector, the Sagorika SUS Veterinarian may play a similar coordinating role. In both cases, the appointees should maintain close links with this Consultant.

[34] The Executive Committee and Local Facilitators of the WMG/CBOs should have a list of the FFS and their location.

6.5.5 Conduct a series of planning dialogues/workshops with key stakeholders related to each sub-sector in order to set up the recommended service delivery systems in fisheries and livestock and livestock. It is anticipated the stakeholders involved will be as follows:

a) Fisheries Sector: District Fisheries Officer, Upazila Fisheries Officers, Subornachar and Companiganj, Managing Director, Bismillah Agricultural Production, other hatcheries owners under the World Fish Network in Noakhali (Global Hatchery, Sonaimuri; Kadirpur Hatchery, Begumgonj; Gobindapur Hatchery, Feni), South Noakhali CBO Association, existing nursery operators under the former RFLDC CBOs identified under 6.5.1.

b) Livestock Sector: District Livestock Officer, Upazila Livestock Officers, Subornachar, Companiganj and Noakhali Sadar Upazilas, private sector animal health care companies (FnF, ACI), Sagorika SUS Veterinarian, South Noakhali CBO Association, representatives of former RFLDC CBOs engaged in activities relating to livestock service provision (Saikat BUS, Satota BUS), CLWs, Partner NGOs (relating to use of refrigeration facilities).

In both cases, the objective of the workshops will be the establishment of backward linkages for the service provision networks of the WMG. If it is convenient for his schedule, this Consultant is willing to play a coordinating role in the workshop as part of a follow-up mission.

6.5.6 Conductmeetings **/** workshops between CDSP partner organizations and TA specialists to discuss and hopefully agree upon the changes in the activities / curriculum revision of the production level organizations. The respective foci of these meetings will be

a) Farmer Forums (DAE). Encourage collaboration with the UFO/ULO in supporting follow-up sessions for the Farmer Forums. This meeting will be coordinated by the Agriculture Specialist of CDSP
b) Social Forestry Groups (FD). Development of a curriculum and training activities for SFG in the Embankment Resource System SFG. This meeting will be coordinated by the Social Forestry Specialist
c) In both cases above, the proposed training may be accommodated within the planning training of DAE and FD, which has been proposed in the Revision Development Project Proforma,
d) Credit and Savings Groups (NGOs). The focus will be on the following items:
    - Discuss a shift from hired in trainers for fisheries and livestock to appointment of in-house coordinators.
    - Modification of the curricula in the farmer training in line with the context of the chars. The meeting should involve detailed analysis of the KAP survey.
    - How to encourage demand for training in aquaculture
    - Provision of seasonal loans for goat and cow rearing and aquaculture

    This meeting will be coordinated by the Deputy Team Leader, Social and Livelihood Component

6.6 Financial Implications

It was stressed from the outset of this study that development of F and L extension should utilize as far as possible existing structures and budgets in CDSP. In this regard,

- It is felt that the above recommendations reflect that constraint and largely involve adjustments in existing programmes
- Extra training costs may be involved in training of PW, CLW and Aquaculture Resource Persons, including the provision of kit boxes, but these are minor
- Demands for investment are centered on the WMG and are set in an incremental framework with a gradual increase in the scope of services as capital increases over time. All investment projects in WMG must be designed to yield a profit, however modest.

Annex I

Terms of Reference for the International Consultant on the Development of the Fisheries and Livestock Extension System in the Chars of CDSP IV

1. Introduction

In the chars covered by Char Development and Settlement Project, Phase IV (CDSP IV), Caring Char, Char Nangulia, Noler Char, Urir Char and Char Ziauddin, the fisheries and livestock sub-sectors are widely recognized as forming an important part of livelihood of the settlers. Especially during the early stages of settlement, capture fisheries and extensive grazing of ruminant livestock (cattle, buffalo and sheep) may be a more important source of income than crop agriculture, while backyard rearing of poultry (chickens, ducks and pigeons) are an important source of subsistence. With empolderization and more secure settlement, there is likely to be a shift towards aquaculture and more intensive forms of animal husbandry.

In the design of CDSP IV, it was assumed that the development of the fisheries and livestock sectors would be covered by the Regional Fisheries and Livestock Development Component (RFLDC) of Danida's Agricultural Sector Programme Support Phase II (ASPS-II). RFLDC had long been an unofficial partner of CDSP, especially seeking to add value by stocking fish in community ponds and taking up several of the Water Management Groups as Community-based Organizations to provide services to the community. In CDSP IV, since mid-2012, RFLDC has supported the development of Farmer Field Schools as a participatory training approach in the new chars, training Local Facilitators nominated by the Water Management Groups. Unfortunately, in the next phase of its support to the agricultural sector in Bangladesh, Danida has changed its orientation towards a national programme implemented by the Department of Agricultural Extension. The coverage of that project will be uncertain; it will certainly be less intensive in and possible even absent from the area covered by CDSP IV. Thus, although the CDSP-contracted NGOs do have some role in the promotion of backyard poultry, there will be a gap in the scope of fisheries and livestock development activities in CDSP.

In the fisheries and livestock extension system developed by RFLDC, the training of farmers in Farmer Field Schools and the development of Community-based Organizations are complementary. The Community-based Organizations provide services such as distribution of quality fish seed and rearing stock such as day-old ducklings, and provision of quality feed and vaccination services to their members and clients and link the farmer producers to local and regional markets so as to obtain a better price for their produce. The individual CBOs are clustered together into District CBO Association, one of which operates in Subornachar Upazila of Noakhali. Some existing CBOs are located in or are on the fringes of the new chars of CDSP IV, especially in Char Nangulia and Noler Char.

It is not expected that the resources available to CDSP IV will enable it to replicate the fisheries and livestock extension model developed by RFLDC. However, as the sub-sectors develop in the new chars, there will be a need for similar services and the challenge is to construct a practical extension system

working with the CDSP institutions (Water Management Groups, FFs, Non-governmental Organizations) and linking them to the higher level services providers (Upazila and District Fisheries and Livestock Offices and private agribusiness).

2. Objectives of the Consultancy

The objective of the consultancy is thus to assist in building an appropriate fisheries and livestock extension system in the chars of CDSP IV to ensure that the necessary services reach the isolated communities. Specifically the Consultant will

- Review the current status of the fisheries and livestock sector in the chars under CDSP IV;
- Identify the main development needs in the sector;
- Review the existing service provision in both the public and private sector (Upazila Fisheries and Livestock Offices, Non-governmental Organizations, including those contracted to CDSP IV, Community-based Organizations, FF and Water Management Groups, private agribusiness);
- Assess how the existing field level institutions of CDSP-III and CDSP-IV can be involved in fisheries and livestock extension services;
- Assess and propose how the Department of Fisheries can extend its extension activities in the CDSP area working with these CDSP institutions;
- Assess and propose how the Department of Livestock Services can extend their extension activities in the CDSP under the NGO component and budget, based upon a joint implementation and monitoring plan;
- Evaluate the scope for development of marketing opportunities for fisheries and livestock products (fish, milk, eggs and meat) through Water Management Groups, so as to offer an improved share of the end market price to the producers;
- Advise on the implementation modalities of the system and its further guidance by the TA team;
- Identify the need for possible further national consultant inputs in capacity building of the key actors in such a system and in implementation of the system.

3. Tasks to be Performed

In this Mission, the Consultant will

1. Revisit the existing baseline studies in the sector conducted previously by an RFLDC team on behalf of CDSP and carry out field reconnaissance in the communities in the different chars;
2. Visit and hold discussions with the key institutional actors in the sector at local and sub-regional levels;
3. Make extensive field visits to the existing community organizations in the chars (CDSP III and CDSP IV Water Management Groups, NGOs, CBOs developed by RFLDC) ;
4. Present his findings and draft report in a workshop in Noakhali with all relevant stakeholders.

4. Organization, Timing, Reporting

The assignment will be carried out by Dr. Harvey Demaine, until recently the Advisor of the RFLDC in Noakhali. He will report to the Project Coordinating Director and the Team Leader, CDSP-IV, and discuss his findings with the Project Directors of the implementing agencies as far as possible. The assignment will be for a period of four weeks, beginning half November 2013 when it is anticipated that travel in the char areas will become more feasible. The mission report will be submitted before completion of the mission. Dr. Harvey Demaine will debrief to PCD and EKN at the end of his assignment.

Annex II: Detailed Program, including schedule of Field Visits in Noakhali

Date	Activity	Location	Remarks
Friday, November 15	Travel to Dhaka		Check in Aristocrat Inn
Saturday, November 16			Personal Business
Sunday, November 17	Travel to Noakhali		Check in Nice Guest House
Monday, November 18	Review of Documents, Planning Meeting with CDSP Team	CDSP Office, Noakhali	
Tuesday, November 19	Meeting, Credit and Savings Group	Polder Samaj, Char Ziauddin	BRAC
	Meeting, Char Bagga Khal Water Management Group	Polder Samaj, Char Ziauddin	
	Meeting,Shahabuddin Farmers Forum	Polder Samaj, Char Ziauddin	
	Meeting, Social Forestry Group	Zia Bazar, Char Ziauddin	
	Meeting BRAC Field Staff	BRAC Field Office, Zia Bazar, Char Ziauddin	
Wednesday, November 20	Meeting, Parul Credit and Savings Group	Al Amin Bazar, Noler Char	Sagorika SUS
	Meeting, Al Amin Khal Water Management Group	Premises of Progoti CBO, Al Amin Bazar Al Amin Bazar, Noler Char	
	Meeting, Mannan Nagar Samaj Farmer Forum	Sagorika SUS Office, Al Amin Bazar, Noler Char	
	Meeting, Embankment Social Forestry Groups 11, 12, 14	CDSP Site Office, Saddam Bazar, Noler Char	
Thursday, November 21	Initial Briefing Meeting with CDSP IV Team Leader	CDSP IV Office	Re-planning of program in relation to rumored hartals
	Meeting, Mr. Robiul Islam, Social Forestry Expert on Design of Social Forestry System	CDSP IV Office	Based on Feasibility Study of Char Nangulia, Noler Char and Caring Char
	Meeting, Mr. Shafiqul Islam, Area Sales Executive of ACI Animal Health Care	ACI Office, Maijdee Bazar	
Friday, November 22	Initial Report Drafting based on field notes and secondary materials	Guest House, Maijdee	
Saturday, November 23	Meeting, Mr. Shahadur	Dharmapur,	Source of quality tilapia

	Rahman Shahed, Managing Director, Bismillah Agro Products	Noakhali	seed under World Fish Centre Project
	Meeting, Mr. Jahangir Alam, Quality Control Officer, Milk Vita	Milk Vita Chilling Centre, Khasherhat, Subornachar	Prospects for Milk Marketing from CDSP area
	Meeting, Mr. Zakir Hossain, Community Livestock Worker, Saikat CBO	Livestock Service Centre, Zubayer Bazar, Char Majid	
Sunday, November 24	Brief Update Meeting with CDSP IV Team Leader		
	Meeting, Chamber Plot/Miazigram Farmer Forum	Miazigram School, Bhumihin Bazar, Char Nangulia	
	Meeting, Jobar Mohila Unnayan Samiti, Credit and Saving Group	Bhumihin Bazar, Char Nangulia	DUS Group
	Meeting with Representatives of Embankment Social Forestry Groups #3, 11, 17,18	Sagorika SUS Field Office, Janata Bazar, Char Nangulia	
	Meeting with Representatives of Bhuiyar Khal, Nonar Khal and South Nangulia Water Management Groups	CDSP IV Site Office, Kaludar Bazar, Char Nangulia	
Monday, November 25	Planning Meeting with CDSP IV team	CDSP, Noakhali	
	Meeting with Mr. Sadequl Islam, Deputy Team Leader, Social and Livelihood Component		
Tuesday, November 26	Work at Guest House	Maijdee	Transport Blockade
Wednesday, November 27	Brief replanning meeting with Mr. Zainal Abedin, Deputy Team Leader, and Work at Guest House	Maijdee	Transport Blockade
Thursday, November28	Work at Guest House	Maijdee	Transport Blockade
Friday, November 29	Meeting, Members of Idris Samaj Bazar E and Idris Samaj Bazar W Credit and Savings Groups	BRAC Office, Haji Idris Bazar. Char Nangulia	BRAC
	Meeting, Haji Idris 50 Acre Samaj Farmer Forum	BRAC Training Room, Haji Idris Bazar, Char Nangulia	

	Meeting with Representatives of North Katakhali 1 and North Katakhali 2 WMG	BRAC Office, Haji Idris Bazar, Char Nangulia	
	Brief Meeting with Secretary, South Noakhali CBO Association and Secretary Banglabazar Upakulio Bahumukhi Unnayan Sangstha	Banglabazar, Char Clerk	
	Meeting with Ms. Jesmin Akhter, RFLDC Fisheries Upazila Coordinator	Nice Guest House	For translation of aquaculture curriculum
	Meeting with Dr. Abul Khair, District Livestock Officer, Noakhali, and Dr. Abul Kalam Azad, Upazila Livestock Officer, Noakhali Sadar	Nice Guest House, Noakhali	
Saturday, November 30	Work at Guest House	Noakhali	Political Blockade
Sunday, December 1	Work at Guest House. Telephone Review of Status of RFLDC CBOs	Noakhali	Political Blockade
Monday, December 2	Meeting with Mr. AKM Shafiuzzaman, Project Coordinator, SDI Buffalo Project Work at Guest House on Presentation	Nice Guest House, Noakhali	Political Blockade
Tuesday, December 3	Work at Guest House; Meeting with Mr. Sadhan Chandra Sarker, Acting District Fisheries Officer (Senior Upazila Fisheries Officer, Sadar). Receipt of Translation and Review of SDI Aqua Training Curriculum	Nice Guest House, Noakhali	Political Blockade
Wednesday, December 4	Comments on Fisheries and Livestock Sections of FS for CDSP V Cluster of Chars Presentation of Findings and Recommendations to	Noakhali	Political Blockade; Travel by Ricksha

	CDSP Team, NGOs, ACF, Senior UFO/ Acting DFO and others		
Thursday, December 5			Computer Problem
Friday, December 6	Travel to Dhaka		
Saturday, December 7	Revision of Report	Dhaka	Political Blockade
Sunday, December 8	Finalization of Report	Dhaka	Political Blockade; Hartal in Dhaka
Monday, December 9	Finalization of Shortened Presentation	Dhaka	
Tuesday, December 10	Presentation to Mr. Md. Mahfuzur Rahman, Project Coordinating Director; Mr. Nicolas Syed, IFAD Country Project Officer and Members of Project Management Committee	Dhaka,CDSP Office, Banani	
Wednesday, December 11	Minor Changes to Report	Hotel, Dhaka	Personal Business
Thursday, December 12	Presentation to Mr.Jan Willem Nibbering, First Secretary, Food Security; Ms. Arman Akbary Khan, Advisor, Food Security; and Ms. Judith Neijzen, Intern	Dhaka, Embassy of the Netherland	
Friday, December 13	Meeting with Team Leader on Administrative Issues	Hotel, Dhaka	Personal Business
Saturday, December 14	Travel to Bangkok		

Annex III: References

CDSP IV (2011) Progress Report No.1, March-June 2011

CDSP IV (2012a) Progress Report No, 2, July – December 2011

CDSP IV (2012b) Baseline Survey 2011, Draft, February 2012

CDSP IV (2012c) Progress Report No.3, January – June 2012

CDSP IV (2012) Agriculture Bench Mark Survey. Technical Report, No.2

CDSP IV (2012d) Agricultural Productivity Zones (PDZ), Technical Report No.3

CDSP IV (2013a) Progress Report No.4, July-December 2012

CDSP IV (2013b) Annual Outcome Survey 2012, Technical Report No. 5

CDSP IV (2013c) Base Line Survey of the Social and Livelihood Component, Technical Report No.6

CDSP IV (2013d) Progress Report No. 5, January-June 2013

Center for Environmental and Geographic Information Systems and Design, Planning and Management Consultants Ltd., (2009) Feasibility Study on the Development and Settlement of the New Chars, Char Nangulia, Noler Char and Caring Char. Final Report, Dhaka, Appendix 4, Forestry

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Ministry of Environment and Forest (revised version 2011), Social Forestry Rules, 2004.

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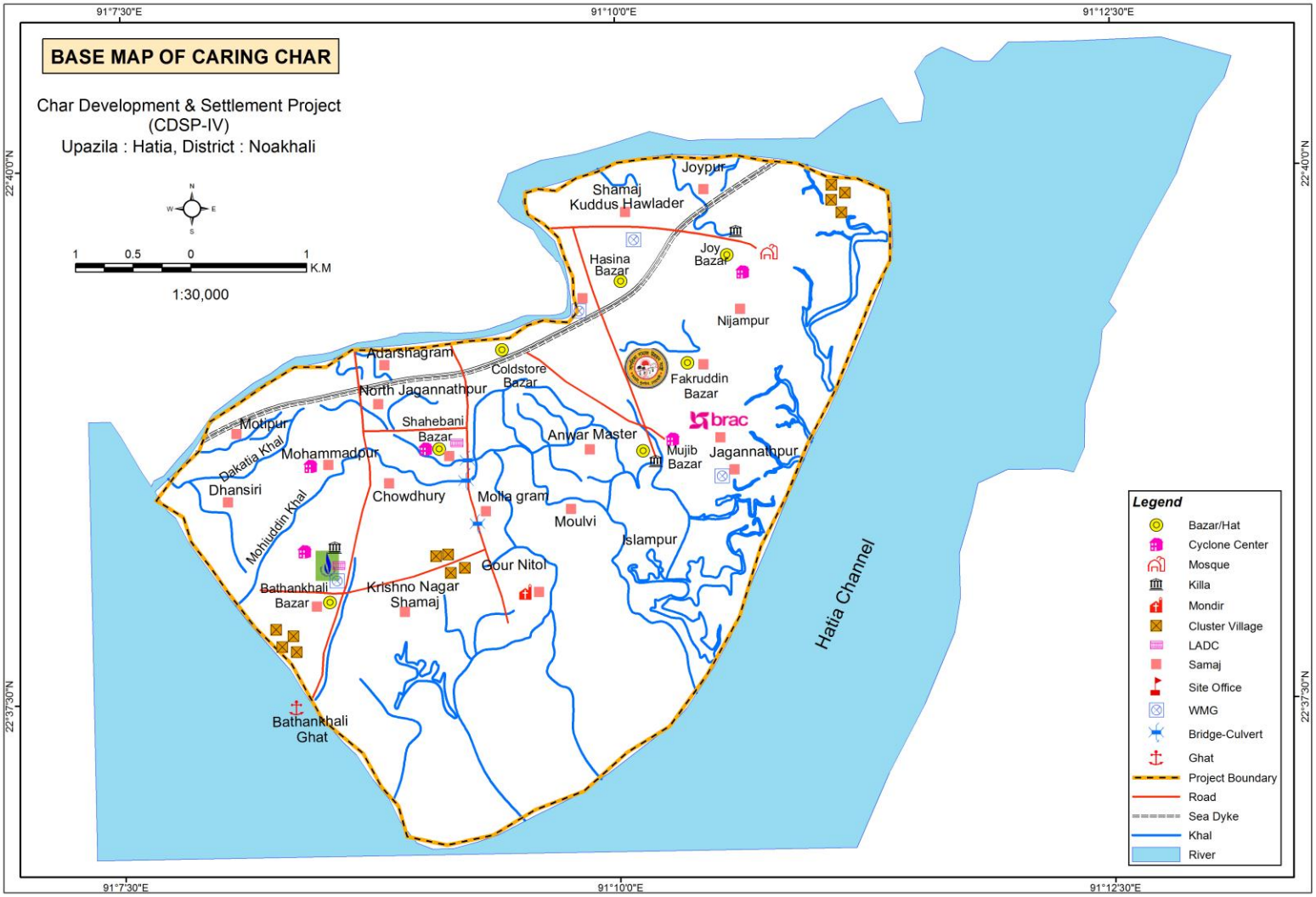
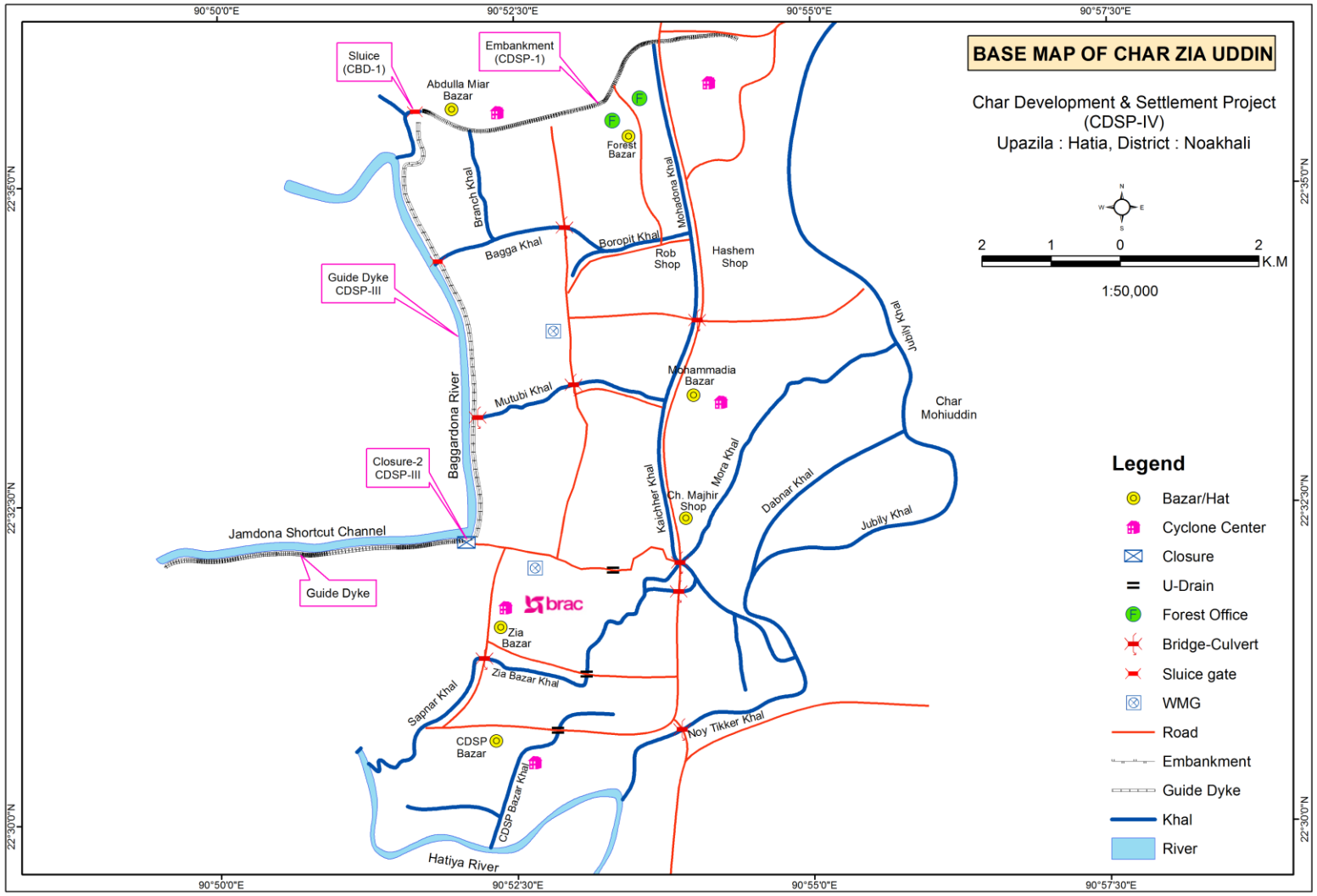
Annex IV: Base Maps of the CDSP IV Chars


BASE MAP OF CARING CHAR
Char Development & Settlement Project
(CDSP-IV)
Upazila : Hatia, District : Noakhali
1 0.5 0 1 K.M
1:30,000
91°7'30"E
91°10'0"E
91°12'30"E
22°40'0"N
22°37'30"N
Joypur
Shamaj
Kuddus Hawlader
Hasina
Bazar
Joy
Bazar
Nijampur
Adarshagram
Coldstore
Bazar
North Jagannathpur
Fakruddin
Bazar
brac
Motipur
Shahebani
Bazar
Anwar Master
Mujib
Bazar
Jagannathpur
Dakatia Khal
Mohammadpur
Dhansiri
Chowdhury
Molla gram
Moulvi
Islampur
Mohiuddin Khal
Gour Nitol
Bathankhali
Bazar
Krishno Nagar
Shamaj
Bathankhali
Ghat
Hatia Channel
Legend
Bazar/Hat
Cyclone Center
Mosque
Killa
Mondir
Cluster Village
LADC
Samaj
Site Office
WMG
Bridge-Culvert
Ghat
Project Boundary
Road
Sea Dyke
Khal
River


BASE MAP OF CHAR NANGULIA
Char Development & Settlement Project
(CDSP-IV)
Upazila : Hatia, District : Noakhali
1:60,000
2 1 0 2 K.M
91°7'30"E
91°10'0"E
91°12'30"E
91°15'0"E
91°17'30"E
22°37'30"N
22°35'0"N
22°32'30"N
CERP Embankment
Akhter Miar Hat
Rob Bazar
CHAR LAKSHMI
Kamolar Shop
CHAR CLERK
Kerani Bazar
Noyapara
Kazir Shop
CHAR URIA
Naby Chowdhury Bazar
Lakshmir Khal
Meghna Sluice
Interior Dyke
Hasan Raja Khal
Fish Farm
CHAR NOMAN
Khal
Baro Khal
CHAR BAYEJID
Ekram Bazar
PURBA CHAR BATA
Abu Taher Miar Bazar
Kalakhali Khal-2
CHAR MAJID
CHAR MORADOA
Nangulia Khal
Selim Bazar
Sulaiman Bazar
Police Camp
Belal Bazar
brac
To Ansarpar
Kazir Shop
Banshkhali Sluice
Kalakhali Khal-1
CDSP-IV Project Office
Kaladur Bazar
Sayedpur
DS-2
Hemayetpur
Hatiya River Closure
CHAR RASHID
Darbesh Khal
Bhumihin Bazar
CHAR AMANA
Darbesh Bazar
Hatiya Khal
Mamur Khal Closure-1
CHAR AZMAL
Nangulia Khal
Bunyar Khal
Masjid Market
Nonar Khal
Mehaw Khal
Bashar Bazar
Janata Bazar
Mamur Khal
Hatiya Channel
Adarshagram
Mamur Khal
Mamur Khal Closure-2
Legend
Bazar/Hat
Cyclone Center
C-Centre Proposed
Closure
Cluster Village
Forest Office
Mosque
Police Station
Site Office
Bridge-Culvert (Existing)
BridgeCulvert (Proposed)
Sluice gate(Proposed)
Road
Embankment
Interior Dyke
Sea Dyke
Khal
Beel
Cluster Village
Forest
River


BASE MAP OF CHAR ZIA UDDIN
Char Development & Settlement Project
(CDSP-IV)
Upazila : Hatia, District : Noakhali
2 1 0 2 K.M
1:50,000
Legend
Bazar/Hat
Cyclone Center
Closure
U-Drain
Forest Office
Bridge-Culvert
Sluice gate
WMG
Road
Embankment
Guide Dyke
Khal
River
Sluice (CBD-1)
Embankment (CDSP-1)
Abdulla Miar Bazar
Forest Bazar
Branch Khal
Mohadona Khal
Bagga Khal
Boropit Khal
Rob Shop
Hashem Shop
Guide Dyke CDSP-III
Jubily Khal
Mohammadia Bazar
Mutubi Khal
Baggardona River
Char Mohiuddin
Closure-2 CDSP-III
Kaichher Khal
Ch. Majhir Shop
Mora Khal
Dabnar Khal
Jamdona Shortcut Channel
Jubily Khal
Guide Dyke
brac
Zia Bazar
Zia Bazar Khal
Sapnar Khal
Noy Tikker Khal
CDSP Bazar
CDSP Bazar Khal
Hatiya River
90°50'0"E
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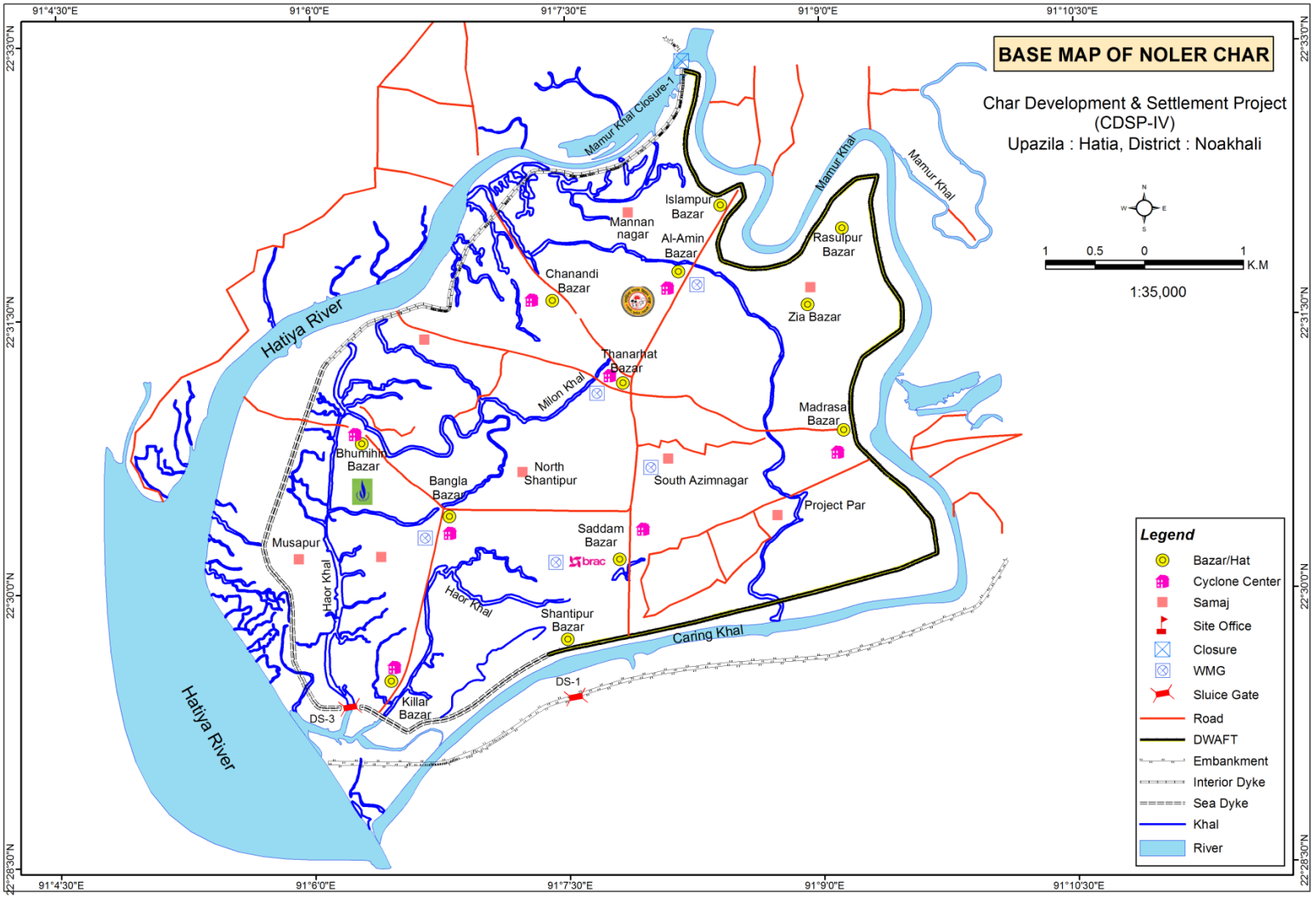
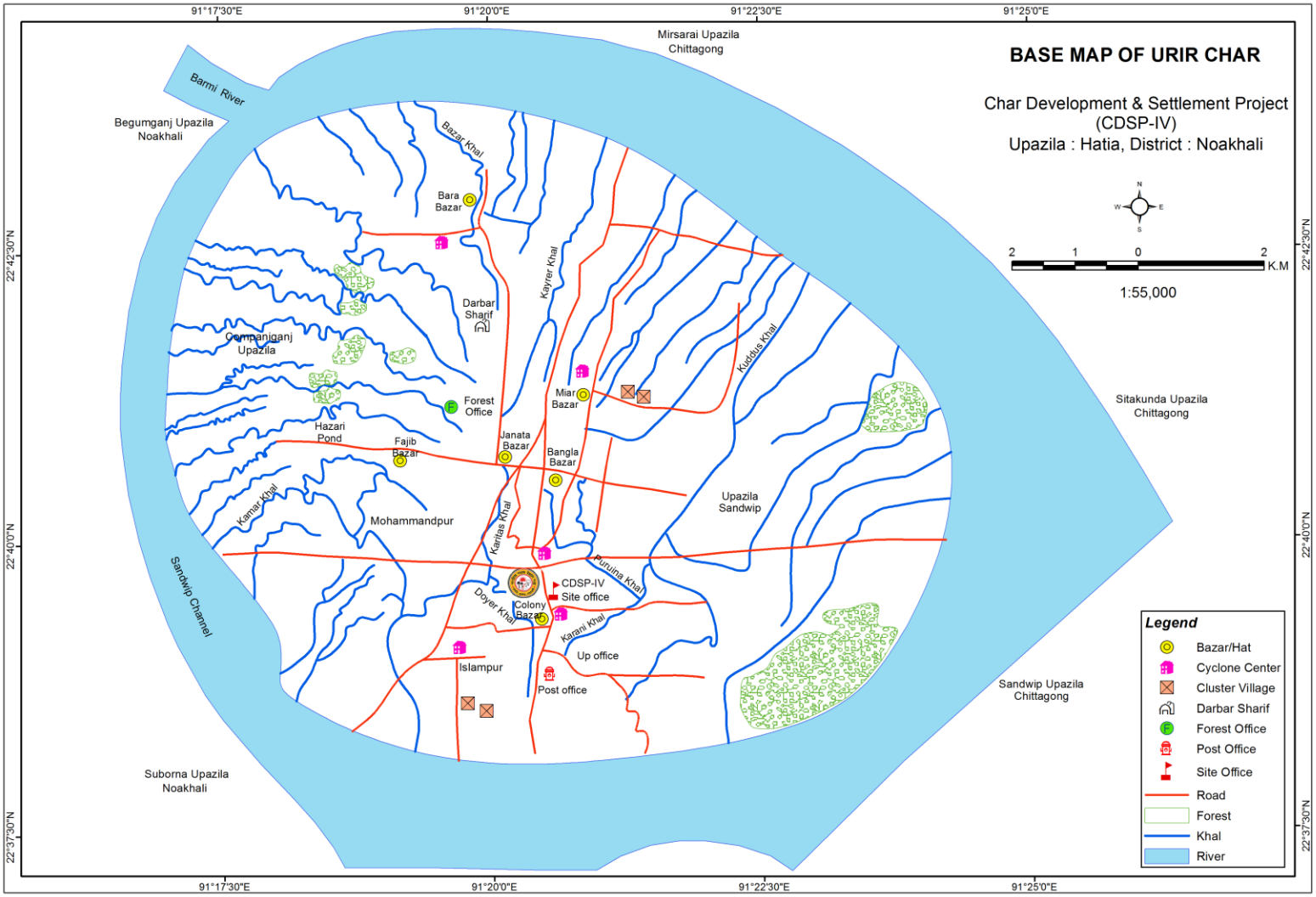
90°55'0"E
90°57'30"E
22°35'0"N
22°32'30"N
22°30'0"N


BASE MAP OF NOLER CHAR
Char Development & Settlement Project
(CDSP-IV)
Upazila : Hatia, District : Noakhali
1 0.5 0 1 K.M
1:35,000
91°4'30"E
91°6'0"E
91°7'30"E
91°9'0"E
91°10'30"E
22°33'0"N
22°31'30"N
22°30'0"N
22°28'30"N
Hatiya River
Mamur Khal Closure-A
Mamur Khal
Islampur Bazar
Mannan nagar
Al-Amin Bazar
Rasulpur Bazar
Chanandi Bazar
Zia Bazar
Thanarhat Bazar
Milon Khal
Madrasa Bazar
Bhumihin Bazar
Bangla Bazar
North Shantipur
South Azimnagar
Project Par
Saddam Bazar
brac
Musapur
Haor Khal
Shantipur Bazar
Caring Khal
DS-1
DS-3
Killar Bazar
Legend
Bazar/Hat
Cyclone Center
Samaj
Site Office
Closure
WMG
Sluice Gate
Road
DWAFT
Embankment
Interior Dyke
Sea Dyke
Khal
River


BASE MAP OF URIR CHAR
Char Development & Settlement Project
(CDSP-IV)
Upazila : Hatia, District : Noakhali
1:55,000
2 1 0 2 K.M
91°17'30"E
91°20'0"E
91°22'30"E
91°25'0"E
22°42'30"N
22°40'0"N
22°37'30"N
Mirsarai Upazila
Chittagong
Barmi River
Begumganj Upazila
Noakhali
Bazar Khal
Bara Bazar
Darbar Sharif
Kayrer Khal
Kuddus Khal
Companiganj Upazila
Forest Office
Hazari Pond
Fajib Bazar
Janata Bazar
Miar Bazar
Bangla Bazar
Sitakunda Upazila
Chittagong
Upazila Sandwip
Kamar Khal
Mohammandpur
Kartias Khal
Sandwip Channel
Punjina Khal
CDSP-IV
Site office
Colony Bazar
Doyer Khal
Karani Khal
Up office
Islampur
Post office
Sandwip Upazila
Chittagong
Suborna Upazila
Noakhali
Legend
Bazar/Hat
Cyclone Center
Cluster Village
Darbar Sharif
Forest Office
Post Office
Site Office
Road
Forest
Khal
River