Char Development and Settlement Project Phase IV
Bangladesh

Agricultural Productivity Zones (PDZ)
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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 Agriculture Extension (DAE)**
- **Forest Department (FD)**
  and NGOs

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

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1. Introduction

Char Development and Settlement Project (CDSP) started from the mid nineteen nineties with the objective of improving the land, providing safety to the dwellers along with improvement of their socio-economic and agricultural conditions and various other developments. The project has entered into its fourth phase from 2011, CDSP IV, which is being financed by the Royal Netherlands Government, IFAD and GOB and implemented by 6 government agencies, namely Bangladesh Water Development Board (BWDB), Department of Agricultural Extension (DAE), Local Government and Engineering Department (LGED), Forest Department (FD), Ministry of Land (MoL) and the Department of Public Health Engineering (DPHE), with the support of the Technical Assistance team.e focus of the present phase IV is on 5 new chars, namely:

1. Char Nangulia
2. Char Ziauddin
3. Noler Char
4. Caring Char and
5. Urir Char.

The above chars have accreted in between 20-40 years, except Urir Char, which is comparatively older. Mainly people who suffered from river erosion have settled in the four chars (1-4) about 12 years back, whereas settling in Urir Char started before 1990.

Since the project areas are newly accreted lands, they acquire a unique agro-ecosystem, quite different from the main lands of the country, having several limitations for general agricultural crop production, although the cultivators are quite innovative. Depth and duration of flooding and salinity are the two major factors responsible for dictating the agricultural crop productivity, although several other factors exist, limiting the agricultural production of the char areas, affecting the poor farmers, who dominate the population of char areas. Crop damage is quite frequent, which leaves the farmers disappointed, but they seldom have any alternatives.

Zoning of land on the basis of agricultural productivity will provide a guideline for crop production of suitable crops in various land areas, increasing production and reducing crop damage, which would help improving the socio-economic conditions of the vulnerable dwellers.

Thus, reports on agricultural productivity zones were prepared in CDSP-II (technical report no. 5, February 19, 2002) and CDSP-III (technical report no. 1, June, 2006). DAE is responsible to train, motivate and transfer the PDZ information to the farmers of the char areas in collaboration with CDSP TA team to improve the crop production and avoiding crop damage and losses to the extent possible. The present report on PDZ has been formulated in a simple format, so that it can be followed and used by the target users (farmers) easily, which is the main objective.

2. PDZ concept and objective

It is well known that agricultural eco-systems of the newly accreted char lands are wide open and the crops grown in the area suffer from various problems, damaging crop productivity, leading to vulnerability of farmers. The Zoning of Agricultural Productivity (PDZ) provides a guideline for

practicing of suitable crops in various zones, classified depending on various physical and chemical characteristics, influencing crop productivity. The PDZ provides classification of the land depending on productivity which will help the growers to cultivate suitable crops in the classified homogenous areas. It is considered that mere drafting of a PDZ of the char areas will not bring the desired objective. Rather the local farmers, who are involved in the agricultural practices in the area directly, need to understand it through training, motivation and required technical support and implement the PDZ in practice. Moreover, adoption of modern and high yielding varieties of crops is part of the concept of PDZ, which will reduce the vulnerability of poor farmers of the char areas. These concepts are agreed upon by the related field level agricultural extension workers at district and Upazila level.

3. Methodology

After discussion with CDSP's expertise and using existing reports on PDZ, a questionnaire was drafted for collection of various primary agricultural data from the 5 char areas. The questionnaire was taken to the field for pre-testing and discussion with farmers for field trials. The data/ information were collected following the Focus Group Discussion (FGD) procedure. The draft questionnaire was finalized with the revisions and supplements as felt required for the purpose.

FGDs were conducted in all the 5 char areas on various sample locations, representing the whole char areas, with the assistance of CDSP's concerned personnel. Representatives of the Farmers Forums (Farmers groups) including both male and female members were the main resource persons for agricultural data collection, although farmers from outside the forum were also present during the conduct of FGD. The field work started on 08-05-2012 and was completed on 18-06-2012. Secondary, related information/ data were collected from various sources, including reports and journals available in CDSP library and from concerned personnel of the TA team.

A draft classification of productivity zones for land areas of different chars was prepared based on depth of flooding and salinity level, the two major limitations of crop productivity, as shown in Table-5.2. The classification was finalized with recommendations of the district level soil and agricultural experts gathered in the workshop held on 2nd July, 2012.

Soils of the chars are saline to various levels, which negatively affects the crops and crop production. Moreover, intrusion of saline water from the rivers/ khals is a common characteristic of the area, as the area is still open, provision of embankment, although started, still has to be completed. The soil salinity is dynamic in nature: it increases with the drying of the soil. The maximum soil salinity is generally observed in the dry months of April/ May, depending on rainfall. It is also observed that if there is no rainfall (even during monsoon) for more than 7-10 days, the salinity-resistant crops also suffer from growth and yield reduction.

Salinity of soils affects growth of Aus, T.Aman seedlings, T.Aman crops, Rabi crops and is thus enhancing the economic vulnerability of the poor people of the char areas.

In the above workshop a discussion was also held on crops (paddy and non-paddy) presently grown in the project char areas at different flood depths, along with various problems concerning their cultivation. The experts recommended suitable crops that could be grown in those areas, including high yielding varieties.

In addition for each char a map was produced, combining information from the FGDs, salinity test results and satellite images, indicating the proposed zoning.

4. Present agricultural situation

In the present situation various agricultural crops are grown in the area throughout the three cropping seasons (Kharif-1, Kharif-II and Rabi), with flooding of the land to different depths and soil salinity are the predominant limiting factors for crop production and crop yield. Flooding affects crop growth during monsoon and salinity affects the crops during the dry period mainly. Drought also causes crop damage and production loss, as there is virtually no irrigation facility in the area. Drought also accelerates the effect of salinity in the area. Moreover, intrusion of salinity through tidal flow and sea/ river water intrusion through cyclones and storm surges cause severe crop damage (e.g. Aila in 2009).

Aila occurred on 25-05-2009, which caused intrusion of severe saline water along with damage of crops, trees, wild live, human lives and affecting the agro-environment to a tremendous extent instantaneously. The soil salinity increased by the intrusion of sea water to such an extent that the after effects are still continuing. For example, Aus and many other Rabi crops could be successfully grown in many areas of the 5 chars (especially in Urir Char, Char Nangulia and Char Ziauddin) before Aila. But these can still not be grown till now, although soil salinity has a gradual decreasing trend during the last 3 years (people's view).

Other limiting factors of crop production in the char areas are:

- Lack of availability of suitable seeds (specially salinity tolerant HYV varieties) and fertilizers
- Lack of technical knowledge/ information for production of high yielding crops
- High price of inputs and low price of crops produced (mainly due to lack of communication and poor market facilities); hence cost of production exceeds the value of crops produced
- Poor law and order situation (worst in Urir Char and Caring Char).

5. Agricultural productivity zoning

It has already been mentioned that depth and duration of flooding and extent of soil salinity are the two major parameters restricting crop growth, although drought and intrusion of river saline water also affect the crop productivity of the char areas. Drought and intrusion of river saline water are not regular features like depth and duration of flooding and soil salinity. According to the farmers of the char areas, soil qualities do not pose any critical situation for crop productivity; although according to them some chars have a decreasing trend in productivity with passage of time. Thus, depth and duration of flooding and soil salinity have been considered as criteria for agricultural productivity zoning (PDZ). Below table indicates the classification of salinity, based on ECe values.

Table 5.1 Soil salinity classification

ECe Value	Salinity class
0-2	Non-saline
2-4	Slightly saline
4-8	Saline
8-16	Strongly saline
>16	Extremely saline

Agricultural productivity zoning of the char areas of CDSP-IV is done with the objective of using it as a guideline for the farmers for enhancement of agricultural development and increasing production in the area as a whole. A simple classification of PDZ has been proposed and forwarded to the agricultural experts attending the PDZ workshop held on 2nd of July, 2012 in CDSP conference in Noakhali.

Some of the agricultural experts opined to have 3 PDZ classes, instead of 4. However, finally it was agreed to establish 4 classes of PDZ lands in the char areas, with PDZ-4 designated for those areas, where it is not possible to grow a crop round the whole crop year. The proposed classes of PDZ are as follows:

Table 5.2 Classification of char areas in agriculture productivity zones (PDZ)

Depth of flooding	**Soil Salinity ECe (ds/m)**		
	0-8	**8-16**	**>16**
0-30 cms (0-12 inches)	PDZ-1	PDZ-1	PDZ-2
30-60 cms (13 inches -2 feet) inches	PDZ-1	PDZ-2	PDZ-3
60-137 cms (2 feet- 4.5 feet)	PDZ-3	PDZ-4	PDZ-4

The evaluation by the 5 teams of evaluators expressed some variation in the PDZ classification. However, the proposed PDZ classification has been agreed. The PDZ classification will be revised in future in Char Nangulia, Char Ziauddin and Noler Char, since these areas will be protected by embankments along with khal re-excavation for drainage development, to be completed within the period of CDSP-IV. Areas under different productivity zones are shown in the maps in the relevant chapter of each char.

Table 5.3 Classification of PDZ of chars in CDSP-IV

PDZ-1	**PDZ-2**	**PDZ-3**	**PDZ-4**	**Remarks**
This zone covers high lands	This zone covers high lands	This zone covers medium land	This zone covers low land (flooded	There is no PDZ-4 area in

(flooded from 0-30 cm, 0-12 inches) with ECe values ranging from 0-8 and from 8-16 ds/m and some medium land (flooded from 13-24 inches) with ECe values ranging from 0-8 ds/m (See Table: 5.2). The areas are suitable for 2-3 crops (along with some HYV crops) with moderate to high yields, having chances of crop damage by natural hazards.*	(flooded from 0-30 cm) and some medium land (flooded from 31-60cm) with ECe values > 16 and ranging from 8-16 ds/m respectively (see Table: 5.1). The areas are generally suitable and restricted to 2 crops with moderate to high yields.	(flooded from 13-24 inches) and low land (flooded from 25-54 inches) with ECe values >16 ds/m and ranging from 0-8 ds/m respectively (see Table: 5.2). The areas are generally suitable for 1 crop (usually local T.Aman) with moderate yield, having chances of crop failure/ damage. Although some specific Rabi crops like Batishak, Sweet potato, Felon and Tishi are recommended for growing	from 25-54 inches) with ECe values 8-16 and >16 ds/m (see Table: 5.2). The areas are seldom suitable for successful production of single crop. The only crop, local T.Aman, tried in the area, faces frequent failure/ damage. In some areas of Char Nangulia, Bontil is practiced.	Char Ziauddin and Noler Char PDZ-4 areas existing in Char Nangulia will improve after provision of embankments and re-excavation of khals

*Natural hazards include tidal bore, storm surges and cyclones

According to the agriculture specialists present in the workshop, intensive cultivation of high yielding varieties (HYV), replacing the low yielding local varieties would benefit farmers. Imparting the required training, easy and regular availability of seed and other inputs, improving marketing facilities and the law and order situation would further help the production of HYV crops, which can make agriculture profitable and reduce the vulnerability of farmers of the char areas.

6. Char wise present cropping system and proposed productivity zoning

Agricultural data/ information were collected through FGD on the five chars of CDSP-IV areas for understanding the agricultural situation there. The present agricultural situation of the char areas is presented char-wise below. In addition areas under different productivity zones are shown in the maps in the relevant chapter of each char.

6.1 Char Nangulia

Char Nangulia occupies part of Hatiya upazila and part of Subarnachar upazila of Noakhali district. It has a gross area of 8990 hectares (22,000 acres) with about 67,000 population, who started inhabitation since 1998-1999.

Data/ information on the present agricultural situation of Char Nangulia have been collected from different representative areas through FGD. In total 16 FGDs have been carried out between 24-5-12 and 12-6-2012. Construction of embankment for protection of the areas from onrush of river water along with salinity intrusion has been started, efforts for drainage development of the area (including khal re-excavation) is yet to be started. The agricultural data collected are presented in the following table:

Table 6.1 (A) Char Nangulia Agricultural data collected through FGD

(1) Land type *	(2) Mean depth of flooding	(3) Duration of flooding	(4) Crops grown	(5) Problem of flooding/ lack of moisture with period	(6) Soil Texture (top soil; hand feeling)
Uchu zami (High land)	4 inches to 3 feet	3.5 months from Ashar to mid-Ashwin (mid-June to September)	T. Aus (LV): Shaita Aus (HYV): China, Chandina T. Aman (LV): Rajashail, Beti chikon T.Aman (HYV): BR-1,11, 22; BRRIdhan40, 41, 49; Rabi crops: Khesari, S. potato, Chili, Groundnut, Felon, Garlic, Maize etc. Summer vegetables like Tomato, Sosha (Cucumber) , Corolla (bitter gourd) etc.	T. Aman seedlings affected by inundation (July); T. Aus (HYV)suffers from excessive rain/ drought (May/June); Rabi crops suffer from lack of moisture (January to March); T.Aman (LV/HYV) suffers inundation by excessive rain (July to August), plant decomposes, requires re-plantation	Silt loam to loam
Majhari zami (Medium land)	7 inches to 4 feet	4.5 months from Ashar to mid-Kartic (mid-June to October)	T.Aman (LV): Rajashail, Kajalshail, Agunshail, Nonashail, Latishail ; T. Aman (HYV): BR-11, 23, BRRIdhan40;	T. Aman (LV) get inundated and decomposed (August-mid September) requires re-plantation T. Aman (LV) yield suffers due to waterlogging, if survived	Silt loam to silty clay loam[Type a quote from the document or the summary

			Rabi crops: Khesari, Tishi, Methi, Mustard etc. Boro (Hybrid): Heera-1, 2 (irrigated by pond water or water of fish project)	(August-September)	of an interesting point. You can position the text box anywhere in the document. Use the Drawing Tools tab to change the formatting of the pull quote text box.]
Nichu zami (Low land)	1.5 to 5 feet	7 months from Mid-Jaistha to mid- Poush (June to December)	T.Aman(LV): Kajalshail, Ghikoj, Dhola mota, Lal mota, Bazal; Other crops: Bontil (Tal makhna) in case of failure of T. Aman (LV)	All T. Aman (LV) get submerged and decomposed because of water logging due to poor drainage (August-September); Very poor yield of T. Aman (LV), if survives; Bontil is practiced (in mid-September) after the failure of T. Aman (LV)	Loam to Silty clay loam

*Locally lands are mainly grouped into 3 classes by farmers: uchu (high land), majhari (medium land) and nichu (lowland)

Table 6.1 (B) Char Nangulia Agricultural data collected through FGD

(7) Land types	(8) Effect of salinity	(9) Period of salinity	(10) Most suitable crops**	(11) Period/ duration land remains dry	(12) Percent of land type based on

					FGD
Uchu zami (High land)	Aus (LV/HYV) gets burnt due to excessive salinity caused by drought (Mid April to May) T. Aman (LV/HYV) yield gets reduced when there is 7-10 days' drought (mid-August to Sept) All rabi crops along with seedlings suffer from salinity (Feb to March); Kajalshail (T. Aman -LV) suffers from salinity by drought (October-November) , unfilled grain(chita)	8 months from October to May	T. Aus (HYV): China; T. Aman (LV): Rajashail, Laldhan, Betichikan Rabi crops : Sweet potato, Chili	Kartic to Ashar (mid- October to mid- June)	30
Majhari zami (Medium land)		7.5 months from Mid-October to May	T. Aman (LV): Rajashail; T. Aman (HYV): BRRIdhan, 40 Rabi crops: Khesari, Methi, Mustard etc.	Mid-Kartic to mid- Jaistha (November to May)	28
Nichu zami (Low land)	Kazalshail suffers from salinity (Oct-Nov, less rainfall) paddy becomes unsubstantial.	7 months from November to May	T. Aman (LV): Kajalshail Rabi crops: Tishi and Mustard	Agrahayan to Boishakh (mid-November to mid-May)	42

*land types as classified by local farmers; **Farmers' choice of crops

6.1.1 Crop production

As in the other chars, in Char Nangulia the crop production is quite different from the areas within the main land of country, as various limiting factors control the diversity of crops along with their yield potentials. Soil salinity and water logging caused by rainfall in the area (as drainage conditions have deteriorated due to heavy siltation in the khals requiring re-excavation) and drought (as there is no irrigation facility), are the major limiting factors of crop production. Moreover, non availability of suitable and improved seeds, high price of agricultural inputs (mainly chemical fertilizers), low price of produced crops (due mainly to poor communication and marketing facility), lack of modern agricultural technology also hinder the agricultural practices and productivity of the area. It is also stated by the local farmers that agricultural productivity was quite satisfactory in the initial years of

habitation, but it is now declining gradually. Crops presently grown in the char areas and their average productivity are provided in the following table:

Table 6.1.1 Crops grown in Char Nangulia with their yields

Crops	Average yield (ton/hectare)	Average yield (maund/ acre	Remarks
Shaita	2.16	21 -22	
T.Aus (HYV)	4.32	43-44	Usually China and Chandina are practiced
T. Aman (LV)	1.98	19-20	Usually Rajashail and Kajalshail are practiced
T. Aman (HYV)	4.20	42-43	Usually BRRIdhan-27 and 40 are practiced
Khesari (Green gram)	0.80	8-9	
Misti Alu (Sweet potato)	8.50	85-86	
Morich (Chili)	0.83	8-9	
Tishi (Lin seed)	0.25	2-3	Broadcasted in T. Aman as relay crop
Roshun (Garlic)	2.07	20-21	
China badam (Ground nut)	1.24	12-13	
Sorisha (Mustard)	0.25	2-3	Broadcasted in T.Aman as relay crop
Felon	0.46	4-5	
Methi	0.40	4-5	
Bontil (Tal makhna)	0.43	4-5	

6.1.2 Salinity

Soil samples were collected from various areas of Char Nangulia by SRDI, Noakhali, to analyze the salinity level in 2 occasions, during December 2011 and April 2012. The results are as follows:

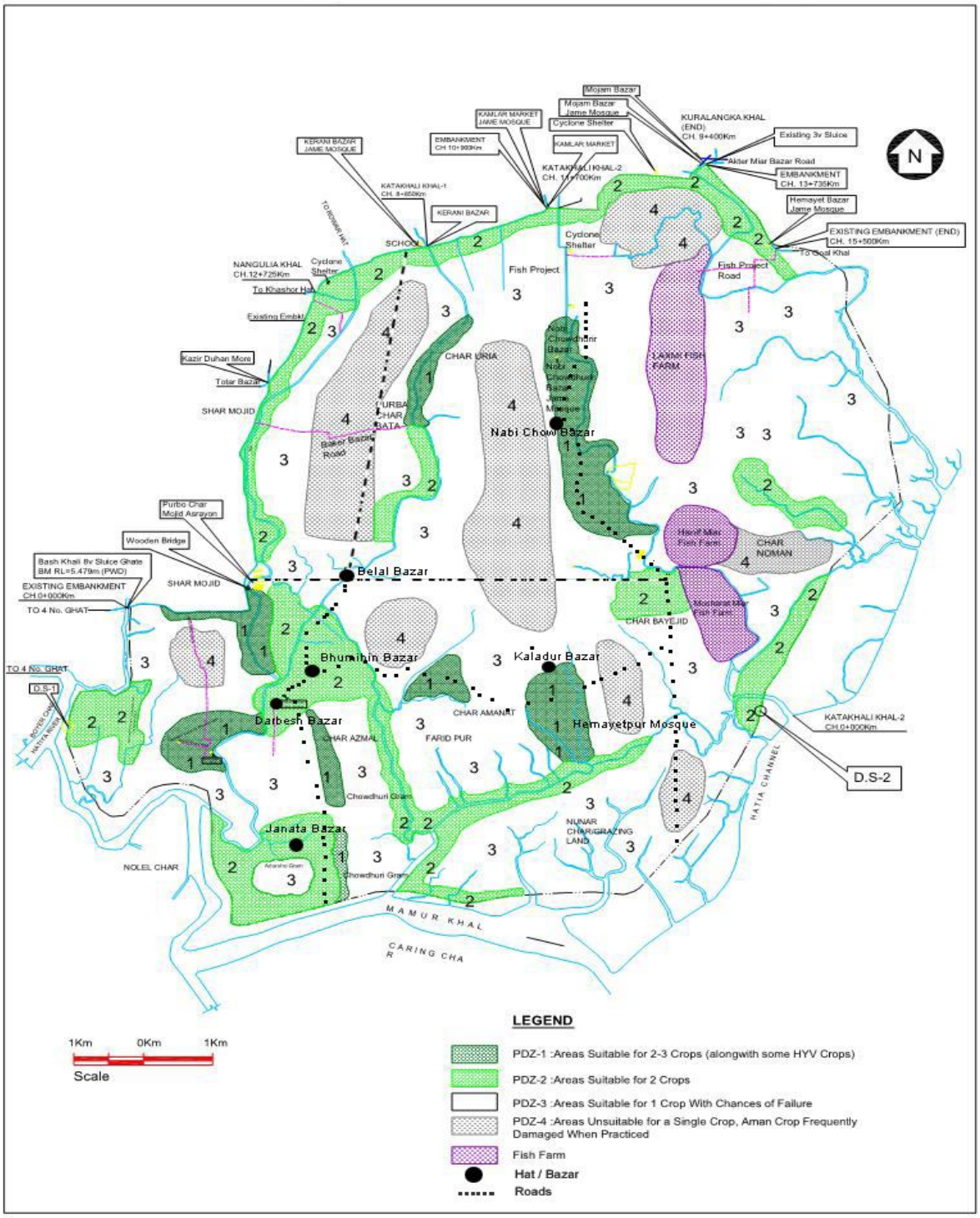
Table 6.1.2 Salinity results of laboratory analyses of soil samples of Char Nangulia

Location (land owner)	Top soil		Sub-soil		Remarks
	ECe* of soils taken in December, 2011	ECe of soils taken in April, 2012	ECe of soils taken in December, 2011	ECe of soils taken in April, 2012	
Md. Arif, son of Hanif Mistri	3.6	5.9	1.6	2.7	
Mostafa Swarnaker, son of Late Entaz	3.0	33.2	2.0	9.2	Top-soil and sub-soil are extremely saline in April

Anwar Ahmed, son of Ali Mia	8.5	14.4	2.4	5.9	Top-soil is extremely saline in April
Sanaullah Master, son of Late Haji Bashirullh	8.0	16.0	1.8	5.4	Top-soil is extremely saline in April
Abdul kader, son of Sona Mia	-	2.3	-	1.6	
Nabi ullah, son of Anwar Hossain	-	7.9	-	3.0	
Abul Kalam, son of Hakim Box, Vill.- Paschim Char Uria	-	12.0	-	4.6	Top-soil is extremely saline in April
0.5 km north of Haji Idris Bazar, Vill.- Mohammadpur	-	12.6	-	3.3	Top-soil is extremely saline in April
Sheikh Ahmed, son of Ansar Ali, vill.- Dakkhin Char clerk	-	5.7	-	4.9	
Ahmedul Hoque, son of Masumullah, Vill.- West Char Nangulia	-	2.8	-	2.5	

- The soil salinity results were calculated in EC, which has been converted to ECe

PDZ MAP OF CHAR NANGULIA



6.2 Char Ziauddin

Char Ziauddin is situated in Subarnachar upazila of Noakhali district and has an area of about 4,800 acres (1,920 hectares). It has a population of about 12,000, who started inhabitation since 2001-2002, coming from different eroded surrounding areas.

Following are the agricultural data/ information collected from the areas through FGD. In total 5 FGDs have been carried out between 13-6-12 and 18-6-12. It is found that Char Ziauddin is protected from onrush of river saline water by embankments, although measures for drainage improvement of the area, mainly by khal re-excavation, are yet to be completed. Crop damage by flooding by rain water, creating water logging is quite common in the low-lying areas of the char. Data collected are presented in the following table:

Table 6.2 (A) Agricultural data collected through FGD in Char Ziauddin

(1) **Land type ***	(2) **Mean depth of flooding**	(3) **Duration of flooding**	(4) **Crops grown**	(5) **Problem of flooding/ lack of moisture with period**	(6) **Soil texture (top soil)**
Uchu zami (high land)	6 inches to 1.5 feet	3 months during Ashar to Bhadra (mid-June to mid-September)	T. Aus (LV): Shaita; Aus (HYV): China, BRRIdhan-27; T. Aman (LV): Rajashail, Beti chikon, Laldhan ; T.Aman (HYV): BR-11, 21, 23, ; BRRIdhan- 27, 41; Rabi crops: Khesari, S. potato, Chili, Soy bean, groundnut, Garlic etc. Summer vegetables like Tomato, Korola (bitter gourd), Vendi (okra) etc.	T. Aus seedlings affected by drought (March-April), T. Aus (HYV)suffers from excessive rain/drought (May/June) Rabi crops suffer from lack of moisture (January to March)	Silt loam to loam
Majhari zami (medium) land	1 to 2 feet	4.5 months from Ashar to mid-Kartic (mid-June to	T.Aus (LV): Shaita, T.Aman (LV): Rajashail, Kajalshail; T. Aman	Generally no damage of crops due to shortage of soil moisture or excess	Silt loam to silty clay loam

		October)	(HYV): BR- 11, 23 and BRRI dhan27, 39, 40; Rabi crops: Khesari, Tishi, Mustard etc.	of water	
Nichu zami (low land)	2 to 3 feet	6.5 months from mid-Jaistha to Agrhayan (June to mid-December	T.Aman(LV): Kajalshail, Ghikoj	Tidal water intrusion along with sand particles damage T.Aman (LV), Kajalshail just after transplantation (mid-August-mid Sept), requiring re-plantation frequently	Loam to Silty clay loam

*Locally lands are mainly grouped into 3 classes by farmers: uchu (high land), majhari (medium land) and nichu (lowland)

Table 6.2 (B) Agricultural data collected through FGD in Char Ziauddin

(7) Land types	(8) Effect of salinity	(9) Period of salinity	(10) Most suitable crops**	(11) Period/ duration land remains dry	(12) Percent of land type based on FGD
Uchu zami (high land)	Aus (LV/HYV) get burnt due to excessive salinity as caused by drought (Mid-April to May) T. Aman (LV/HYV) yield gets reduced when there is 7-10 days' drought (between mid-August and mid-September) All rabi crops along with seedlings suffer from salinity (February to -March); Kajalshail (T. Aman -LV) suffers from	October to May	T. Aus (HYV): China; T. Aman (LV): Rajashail, Laldhan, Betichikan Rabi : S. potato, Chili	Mid October to mid June	30
Majhari zami (medium land)		Mid- October to May	T. Aman (LV): Rajashail; T. Aman (HYV): BRIIdhan27, 40 Rabi crops: Khesari, Methi, Mustard etc.	November to May	28

	salinity by drought (October-November) , unfilled grain (chita)				
Nichu zami (low land)	Kajalshail suffers from salinity (October-November, less rainfall) paddy becomes unfilled grain.	November to May	T. Aman (LV): Kajalshail Rabi crops: Tishi and Mustard	Mid December to mid May	42

*land types as classified by local farmers; **Farmers' choice of crops

6.2.1 Crop Production Char Ziauddin

Also in Char Ziauddin uncontrolled flooding (mainly due to rainfall), soil salinity and drought are the major limiting factors for production of agricultural crops. Poor drainage (mainly caused by siltation of existing khals) affects the crop production of comparatively low lands, although intrusion of saline tidal water is restricted by embankments.

Also here, non availability of suitable and improved seeds, high price of agricultural inputs (mainly chemical fertilizers), low price of produced crops (mainly due to poor communication and marketing facilities) and lack of modern agricultural technology hinder agricultural practices and productivity of the area. Crops grown presently in the char areas and their average productivity are provided in the following table:

Table 6.2.1 Agricultural crops and yields in Char Ziauddin

Crops	**Average yield (ton/hectare)**	**Average yield (maund/ acre)**	**Remarks**
T.Aus (LV)	1.95	19-20	Usually Shaita variety is practiced
T.Aus (HYV)	3.25	32-33	Usually China is practiced
T. Aman (LV)	2.00	20-21	Usually Rajashail and Kajalshail are practiced
T. Aman (HYV)	3.40	34-35	Usually BRRI dhan 27 and 40 are practiced
Khesari (Green gram)	1.54	15-16	
Misti Alu (Sweet potato)	8.64	87-88	
Morich (Chili)	0.83	8-9	

Soybean	2.32	10-11	
Tishi (Lin seed)	0.56	5-6	Broadcasted in T. Aman field like Khesari as relay crop that resulted in reduction of yield, although it involves less cost of cultivation
Roshun (Garlic)	2.06	20-21	
China badam (Ground nut)	1.24	12-13	
Sorisha (Mustard)	0.33	3-4	Broadcasted in T.Aman as relay crop field like Khesari
Felon	1.40	14-15	
Mung	1.02	10-11	

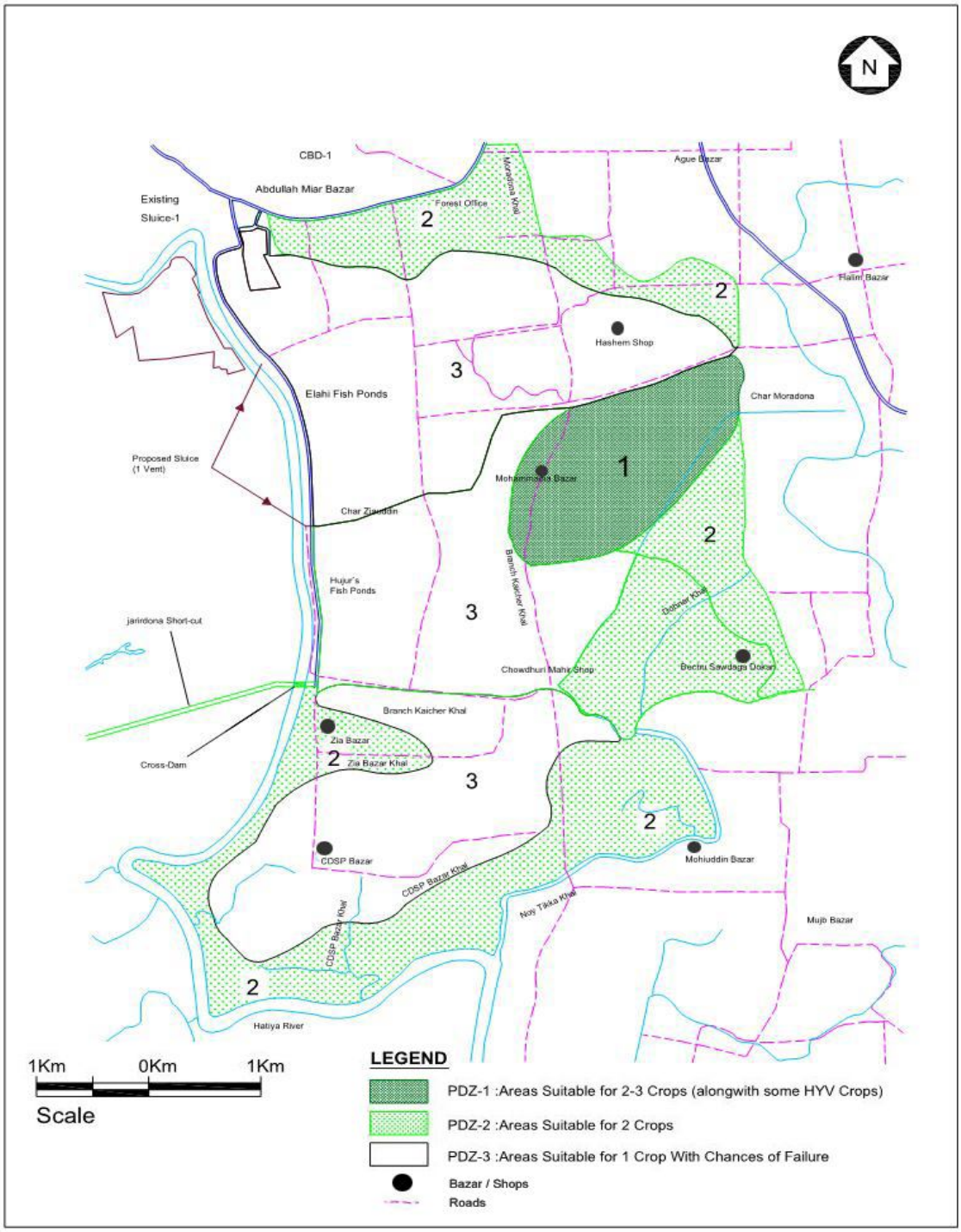
6.2.2 Salinity

Soil samples were collected from various areas of Char Ziauddin to analyze the salinity level in 2 occasions, during December 2011 and April 2012. The results are as follows:

Table 6.2.2 Results of laboratory analyses of soil samples in Char Ziauddin

Location (Plot owner)	**Top soil**		**Sub-soil**		**Remarks**
	ECe of soils taken in December, 2011	**ECe of soils taken in April, 2012**	**ECe of soils taken in December, 2011**	**ECe of soils taken in April, 2012**	
Char Mohiudddin Bazar, at the northern side connecting the road	5.9	12.6	1.8	3.1	The salinity of sub-soils are non-saline to saline
Nur Alam, son of Monsur Ali	7.2	13.6	2.3	3.1	
Zainal, son of Monu Mia	3.5	21.1	1.8	3.5	
Ruhul Amin, son of Abdur Razzak	-	0.9	-	0.6	
Abu Taher, son of Khurshid Mia	-	7.5	-	3.9	
Road junction at Kachhapia moving from Mohiuddin Bazar	-	4.0	-	1.2	

PDZ MAP OF CHAR ZIAUDDIN



6.3 Caring Char

Caring Char is located in Hatiya upazila of Noakhali district. It has a gross area of 16,920 acres (6,850 hectares) with a population of 33,000, who have inhabited the area since 2000. Caring Char is unprotected (although the under construction embankment of neighboring Char Nangulia passes through one side of Caring Char, protecting a small part) and open to seasonal flooding and tidal inundation, which has influence on the agricultural practices in the area. The area was visited for observation and collection of agricultural data through Focal Group Discussion (FGD). In total 5 FGDs have been carried out between 16-5-12 to 23-5-12. Data/ information collected are presented in the following table:

Table 6.3 (A) Agricultural data collected through FGD in Caring Char

(1) Land type *	(2) Mean depth of flooding	(3) Duration of flooding	(4) Crops grown	(5) Problem of flooding/ lack of moisture with period	(6) Soil Texture (top soil; hand feeling)
Uchu jami (high land)	6 to 12 inches	3.5 months from Ashar to mid-Aswin (Mid-June to September)	T. Aus (LV): Shaita; T. Aus (HYV)- China, Chandina; T.Aman (LV): Rajashail; T.Aman (HYV): BR11, 22; BRRIdhan28,29,40,41; Rabi crops: Khesari, S.potato, Chili, Methi, Tishi, Garlic, potato, Groundnut etc.	Aman seedlings suffer from lack of water (mid-July to mid-August); Chili and Groundnut suffer from lack of moisture (February to April)	Fine sandy loam to silt loam
Majhari jami (medium land)	7 inches to 2 feet	4 months from Ashar – to Aswin (Mid-June to mid-October)	T.Aus (LV): Shaita; T.Aus (HYV): China, Chandina; T.Aman (LV): Rajashail, Kajalshail, Kalamota; T. Aman (HYV)- BR11, 22; BRRI dhan28,29; Rabi crops- Khesari, S.potato, Chili, Methi, Tishi, Mustard etc.	T.Aman plants get decomposed after transplantation (mid-August to mid-September)	Silt loam to silty clay loam

Nichu jami (low land)	13 inches to 4 feet	7 months from Mid-Jaista to mid-Poush (June to December)	T.Aman(LV)- Kajalshail, Kalamota, Rabi crops- Mustard, Tishi	Tidal water intrusion along with sand particles damage T.Aman (LV) (August-mid Sept), requires re-plantation (involving expenses and affects yield)	Silty clay loam to clay loam

*Locally lands are mainly classified into 3 classes by farmers: uchu (high land), majhari (medium land) and nichu (lowland)

Table 6.3 (B) Agricultural data collected through FGD in Caring Char

(7) **Land types**	(8) **Effect of salinity**	(9) **Period of salinity**	(10) **Most suitable crops****	(11) **Period/ duration land remains dry**	(12) **Percent of land type based on FGD**
High land	All rabi crops suffer from salinity; (light textured soils beside the river bank suffer less from salinity). Kajalshail suffer from salinity (October-November) T. Aus (HYV) seedlings suffer (March-April) from salinity HYV paddy (both Aus and Aman) burn and die frequently (light textured soils beside the river bank suffer less from salinity).	Mid-Ashwin to mid-Jaistha (October to May)	T.Aman (LV): Rajashail, T.Aus(HYV): Chandina T. Aman (HYV): BR11, BRRIdhan41 Rabi crops:, Misti alu (S. potato), Roshun (Garlic) , Tishi (lin seed), Methi etc.	Mid-Kartic to mid-Jaistha (November to May)	28
Medium land		Mid-October to May	T.Aman (LV): Rajashail, Kajalshail T. Aman (HYV): BR11, BRRIdhan41, Rabi crops: Khesari (Green gram), Garlic (Rashun) , Tishi (Lin seed), Methi, Sorisha (Mustard)	Kartic to mid-Jaistha (Mid-November to May)	45

			etc.		
Low land	Kajalshail suffers from salinity (October-November, less rainfall) paddy becomes unsubstantial	Mid-September to May	Kajalshail	Mid- Poush to mid-Jaistha (December to May)	27

**Farmers' choice of crops

6.3.1 Crop Production

Also in Caring Char soil salinity, inundation by rain and tidal intrusion of saline water are the major limiting factors of crop production. Moreover, unavailability of suitable and improved seeds, high price of inputs, mainly chemical fertilizers, low price of produced crops (mainly due to poor communication and marketing facility) and lack of modern agricultural technology also hamper agricultural practices and productivity of the area. Crops grown and their average productivity are provided in the following table:

Table 6.3.1 Crop yields in Caring Char

Crops	**Average Yield (ton/hectare)**	**Average yield (Maund/ acre)**	**Remarks**
T.Aus (LV)	2.00	20-21	Usually Shaita variety is practiced
T.Aus (HYV)	4.32	43- 43	Usually Chandina and China are practiced
T. Aman (LV)	2.15	21-22	Usually Rajashail and Kajalshail are practiced
T. Aman (HYV)	4.35	44	Usually BR11, BRRIdhan28,29, 40 and 41 are practiced
Khesari (Green gram)	0.76	7-8	Broadcasted in T.Aman field
Misti Alu (Sweet potato)	12.81	129-130	
Morich (Chili)	0.94	9-10	
Methi	1.01	10-11	Broadcasted in T.Aman field like Khesari (relay cropping) that results in reduction of yield, although it involves less cost of cultivation as well
Tishi (Lin	0.51	5-6	Broadcasted in T. Aman field like Khesari (that

seed)			results reduction of yield, although it involves less cost of cultivation
Roshun (Garlic)	2.06	20-21	
Gol alu (Potato)	9.26	93-94	
China badam (Ground nut)	1.85	18-19	
Sorisha (Mustard)	0.33	3-4	Broadcasted in T.Aman field like Khesari (relay cropping)
Motor	0.62	6-7	

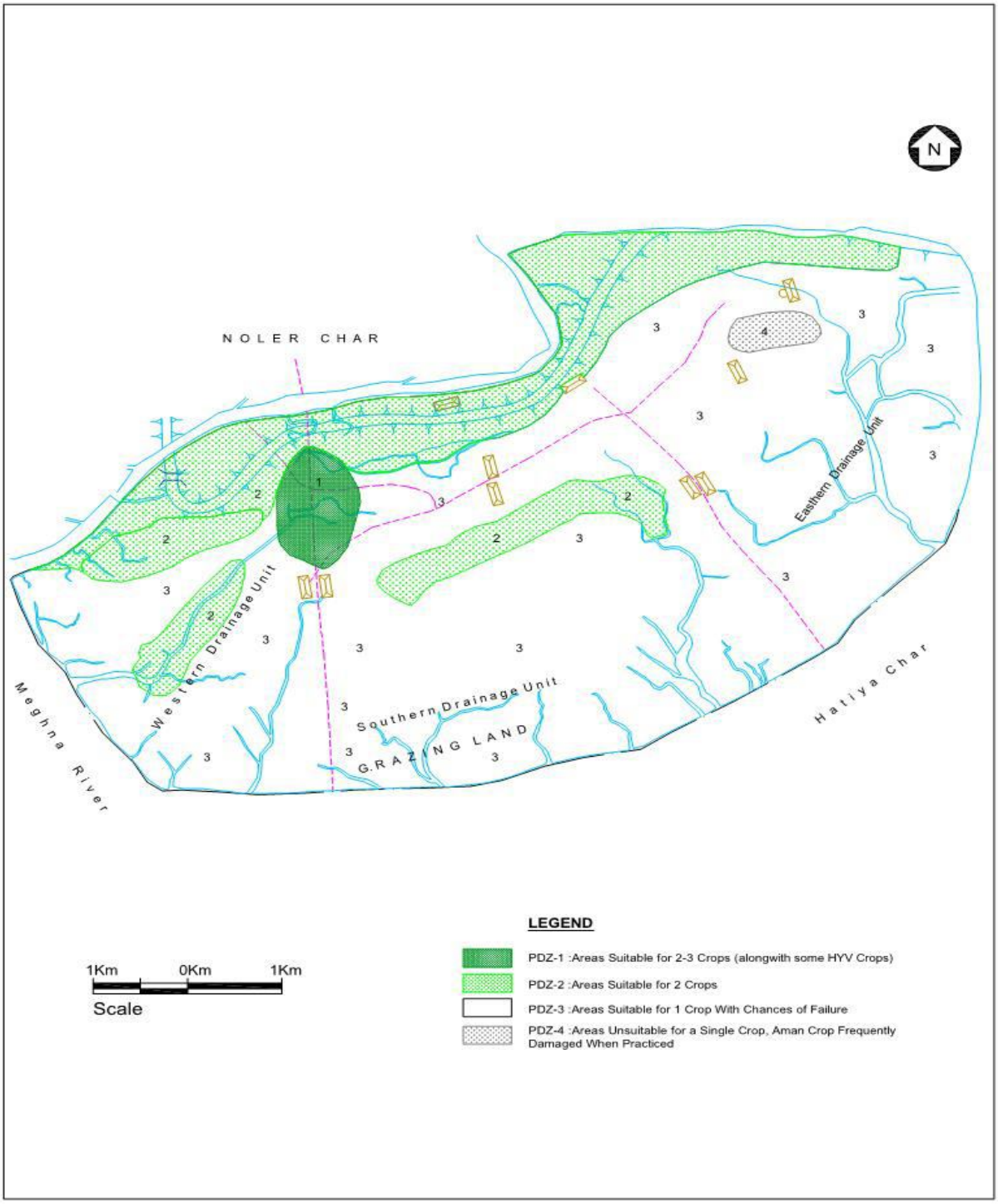
6.3.2 Salinity

Soil samples were collected from various areas of Caring Char to analyze the salinity level in 2 occasions, first during December 2011 and next during April 2012. The results are as follows:

Table 6.3.2 Results of laboratory analyses of soil samples of Caring Char

Location (Plot owner)	**Top soil**		**Sub-soil**		**Remarks**
	ECe of soils taken in December, 2011	**ECe of soils taken in April, 2012**	**ECe of soils taken in December, 2011**	**ECe of soils taken in April, 2012**	
Mohiudddin , Vill.- Mohammadpur	2.2	10.2	1.7	3.0	
Menu Mistry, Vill.- Sahebani bazar	4.8	30.9	2.3	3.4	
Zamaluddin, son of Nurul Islam, Vill.- Hazipur	3.5	20.4	2.4	3.9	
Abul Khair, son of Late Mohammad Mia	-	1.1	-	0.5	
Belayet Hossain, son of Delwar Hossain, Vill.- Chowdhury Gram	-	18.7	-	4.9	
Abul Kalam, son of Lokman Hossain, Vill- Hajipur	-	20.8	-	4.0	

PDZ MAP OF CARING CHAR



6.4 Noler Char

Noler Char is a newly accreted char, where habitation has started since 2000 and present population is about 33,000. It has an area of 6,650 acres (2,692 hectares) and is located in Hatiya upazila of Noakhali district.

Data/ information on agricultural aspects were collected through FGD and physical observation. In total 5 FGDs have been carried out between 8-5-12 and 10-5-12. Noler Char is still open to river flooding and salinity intrusion, but the area is being empoldered for protection from flooding and salinity intrusion. At present the soils are saline and susceptible to flooding as stated by the FGD respondents. Agricultural crops are susceptible to damage by flooding, soil salinity, intrusion of saline river water and drought. Data collected are presented in the following table:

Table 6.4 (A) Agricultural data of Noler Char collected by FGD

(1) Land type *	(2) Mean depth of flooding	(3) Duration of flooding	(4) Crops grown	(5) Problem of flooding/ lack of moisture with period	(6) Soil Texture (top soil; hand feeling)
Uchu jami (high land)	6-12 inches to 1 foot	4.5 months from Mid-June to October	Aus (LV)-: Shaita; T.Aman (LV)-: Rajashail T.Aman (HYV): BR11, 22; BRRIdhan28,29,40,41; Rabi crops- Khesari, Sweet potato, Chili, Methi, Tishi, Garlic, potato, Groundnut, summer vegetables etc.	Drying of land affects Rabi crops (mid-November to March) Aman seedlings suffers from lack of water (mid-July to mid-August) Shortage of water (drought) (mid-Sept to October)	Top- soil texture varies from very fine sandy loam to silt loam and sub-soil texture is loam mainly
Majhari jami (medium land)	7 inches to 2 feet	Early June to November	T.Aman (LV): Rajashail, Kajalshail, Kalamota; T. Aman (HYV): BR11, 22; BRRIdhan28,29; Rabi crops: Khesari, S.potato, Chili, Methi, Tishi, Mustard etc.	Drying of land affects Growth of Rabi crops (Mid-February to mid-April) Sand particles enter crop land during high tide damage T. Aman in flowering stage (2^{nd} week to 4^{th} week of October) Sweet Potato get damaged by tidal effects (Mid- March to mid-April)	Top soil texture varies from silt loam to loam with sub-soil texture varying from loam to silty clay loam
Nich jami (low land)	1 foot to 3 feet	Early June to mid-December	T.Aman(LV)- Kajalshail, Kalamota, Rabi crops- Khesari	Tidal water intrusion along with sand particles damage/ decomposes	Top soil texture varies from loam to

				Kajalshail, T.Aman (LV) ((Mid-July to mid September), requires re-plantation, involving cost and affecting yield	clay loam with sub-soil texture varying from silt loam to loam

*Locally lands are classified into 3 classes: uchu (high land), majhari (medium land) and nichu (lowland)

Table 6.4 (B) Agricultural data of Noler Char collected by FGD

(7) Land types	(8) Effect of salinity	(9) Period of salinity	(10) Most suitable crops**	(11) Period/ duration land remains dry	(12) Percent of land type based on FGD
High land	All Rabi crops (except Tishi) suffer from salinity. Yield suffers and crop fails.	Mid-February to mid-April	Rajashail, BR11, BRRIdhan40, IR8, Chandina, S. potato, Garlic, Felon, Tishi, Methi etc.	November to mid-June	25
Medium land	Seedlings of T. Aus (LV), Shaita turns yellow/brown and die (Mid-march to mid-April). T. Aus (LV) crop also gets damaged (burnt) during May- June (lack of rainfall). T. Aman (both LV and HYV) suffer from salinity (especially during drought, September to October). Affects crop yield	May-June	BR23, BRRIdhan39, 40, Chandina, S. potato, Khesari, Garlic, Tishi, Methi, Mustard etc.	Mid-November to May	39
Low land	Kajalshail (T. Aman, LV) suffers from salinity) yield affected and paddy becomes unsubstantial	October-November, during drought	Kajalshail, Ghikoj, Lati shail, Khesari, Mustard, Tishi	December to – mid May	36

**Farmers' choice

6.4.1 Crop Production of Noler Char

Also in Noler Char soil salinity, inundation by rain and tidal intrusion of saline water are the major limiting factors of crop production. Unavailability of suitable and improved seeds, high price of inputs, mainly chemical fertilizers, less price of produced crops, mainly due to poor communication and marketing facilities, lack of modern agricultural technology also hamper agricultural practices and productivity of the area. Crops grown and their productivity are provided in the following table:

Table 6.4.1 Crop yields of Noler Char

Crops	**Average Yield (ton/hectare)**	**Average yield (Maund/ acre**	**Remarks**
T.Aus (LV)	2.38	24-25	Usually Shaita variety is practiced
T. Aus (HYV)	3.7	37-38	Usually Chandina variety is practiced
T. Aman (LV)	3.58	36-37	Usually Rajashail and Kajalshail are practiced
T. Aman (HYV)	4.00	40-41	Usually IR8, BR11, BRRIdhan 40 are practiced
Khesari (Green gram)	1.46	14-15	
Misti alu (Sweet potato)	10.70	110-111	
Gol alu (Potato)	9.88	100	
Morich (Chili)	0.94	10-11	
Methi	1.01	10-11	Broadcasted in T.Aman field like Khesari that resulted reduction of yield, although it involves less cost of cultivation
Tishi (Lin seed)	0.62	6-7	Broadcasted in T. Aman field like Khesari that resulted reduction of yield, although it involves less cost of cultivation
Roshun (Garlic)	5.52	20-21	
China badam (Ground nut)	1.85	18-19	

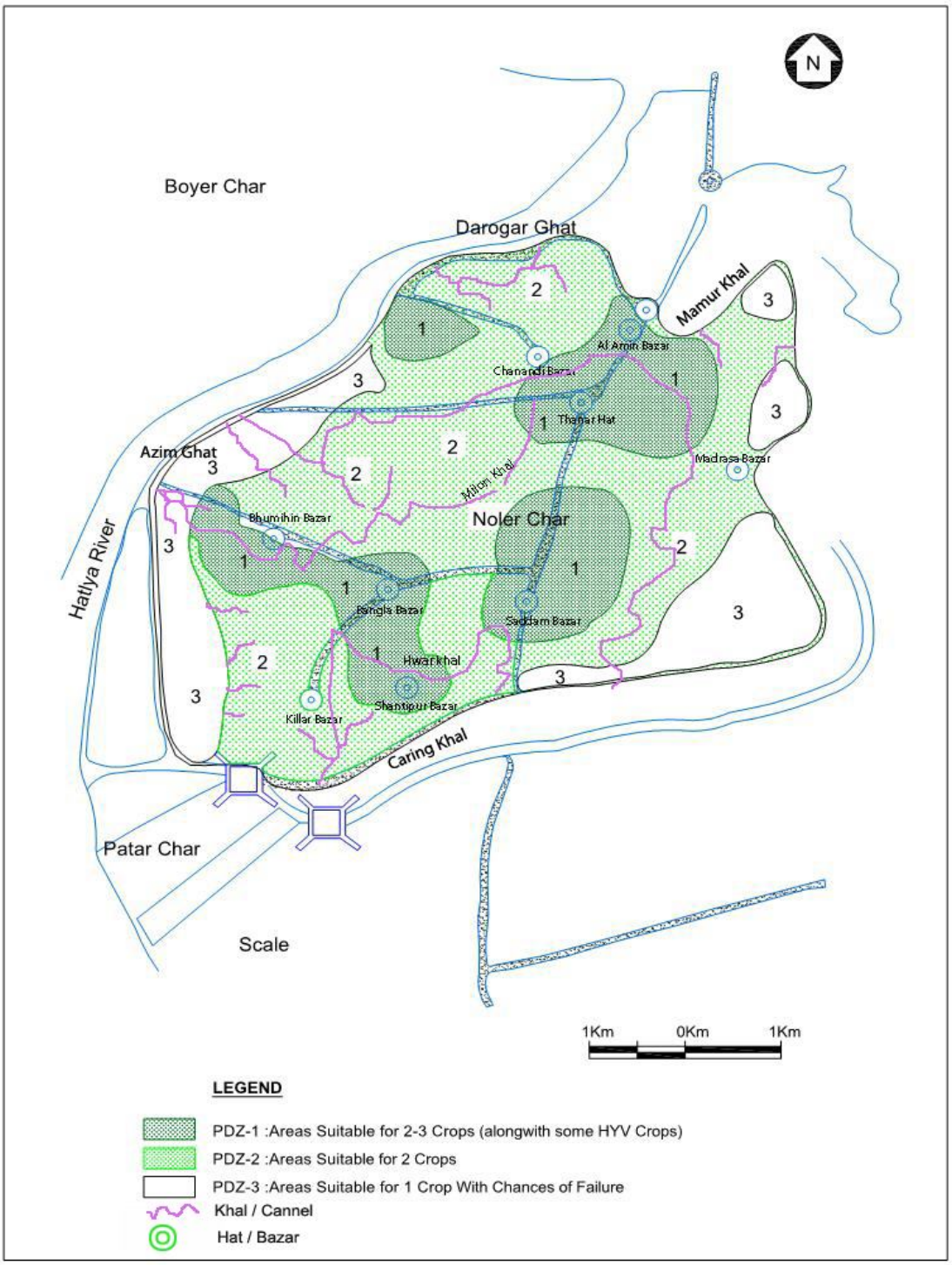
6.4.2 Salinity

Soil samples were collected from various areas of Noler Char to analyze the salinity level in 2 occasions, December 2011 and April 2012. The results are as follows:

Table 6.4.2 Results of laboratory analyses of soil samples in Noler Char

Location (Plot owner)	**Top soils**		**Sub-soil**		**Remarks**
	ECe of soils taken in December, 2011	**ECe of soils taken in April, 2012**	**ECe of soils taken in December, 2011**	**ECe of soils taken in April, 2012**	
Champa ghat	2.9	5.5	1.7	1.1	
Md. Asgar Mia, son of Md. Shafiul Alam, Vill.-Purba Azim nagar	3.3	18.1	2.8	2.3	
Hossain, son of Abdur Rashid, Vill.-Rahmatpur	1.6	2.8	0.7	0.9	
Gopal Chandra Shil, son of Milon Chandra Shil, Vill.- Adarsha gram (Das para)	-	19.0	-	2.0	
Abul Hossain, son of Momtazul Karim, Vill. Adarsha para (Purba para)	-	23.3	-	1.5	
Hamidullah, son of Abul Kalam, Vill.-Dakkhin Azimput	-	19.2	-	1.5	

PDZ MAP OF NOLER CHAR



6.5 Urir Char

According to the people of Urir Char "Urir *Char is Allahar Niamat*" (Urir Char is a gift of the Almighty). People of Urir Char have the experience and belief that its soils have high productivity potentials.

Urir Char is the oldest char among the 5 chars under CDSP-IV. It has accreted about 40 years back and settling of population started before 1990, while land accretion is still continuing along all sides except the south-east, where erosion is occurring. The major part of Urir Char falls under Sandwip upazila of Chittagong district and the rest belongs to Companyganj upazila of Noakhali district. According to the latest survey its present area is 25,440 acres (10,300 hectares) with a population of about 11,000. Both its area and its population have an increasing trend at present.

The area was visited between 11-5-2012 to 14-5-2012 for physical observation of the char and to carry out agricultural data/ information collection for PDZ. In total 6 FGDs have been carried out in different parts of the char. The char is almost a saucer shaped area with a comparatively depressed area at the centre that affects drainage of the area, influencing agricultural practices and crop production. It is found that Urir Char is wide open to river flooding and salinity intrusion, as there is no embankment. The soils are moderately to highly saline and susceptible to flooding as stated by the FGD respondents. The area has suffered cyclones and storm surges on several occasions, (e.g. Nov. 1970, April 1985 and May 25 of 2009), causing loss of life, livestock, plant and trees, houses and damaging agricultural crops and soil qualities. According to the people, salinity intrusion during **aila** (on 25-5-2009) has deteriorated the soil productivity, which is yet to be reclaimed. Thus, Aus crops that could be grown widely before **aila** can be practiced only in insignificant areas at present. In general, the agricultural crops are susceptible to damage by various reasons, mainly inundation/ waterlogging (mainly caused by rainfall), soil salinity, intrusion of saline river water and drought. But, according to the local people, general crop productivity of the soils of the char is quite satisfactory. Data collected through FGD are presented in the following table:

Table 6.5 (A) Agricultural data of Urir Char collected by FGD

(1) Land type *	(2) Mean depth of flooding	(3) Duration of flooding	(4) Crops grown	(5) Problem of flooding/ lack of moisture with period	(6) Soil Texture (top soil; hand feeling)
Medium land	1.5 feet to 4 feet	Mid-Jaistha to Agrahayan (June to mid-December)	T.Aman (LV): Rajashail, Kajalshail, Rabi crops: Khesari, Tishi, Mustard etc.	T. Aman seedlings get submersed and decomposed (Mid-June to July Young plants of T. Aman (LV) crops flooded and decomposed immediate after transplantation by tidal water (August- mid-September) need re-plantation	Top soil is silty clay loam to clay loam with sub-soil texture varying from loam to silty clay loam

Low land	2 feet to 6 feet	Jaistha to mid- Poush (Mid-May to December)	T.Aman(LV): Kajalshail	Young plants of T. Aman (LV) crops flooded and decomposed immediate after transplantation by tidal water (August- mid-September)): need re-plantation (involve additional cost and yield affected) ; Tidal sediments enter T. Aman (LV) paddy field at flowering stage affects yield (September)	Top soil texture varies from loam to clay loam with sub-soil texture varying from Clay loam to Silty clay

*Locally lands are classified into 3 classes: uchu (high land), majhari (medium land) and nichu (lowland)

Table 6.5 (B) Agricultural data of Urir Char collected by FGD

(7) **Land types**	(8) **Effect of salinity**	(9) **Period of salinity**	(10) **Most suitable crops****	(11) **Period/ duration land remains dry**	(12) **Percent of land type based on FGD**
High land	Rabi crops suffer from saline water intrusion, yield suffers / crop fails (mid-February to /mid-April) If no rain for 5-7 days T. Aman (LV/HYV) salinity damages the crops (mid-August to September) Kajalshail (T.Aman, LV) suffers crop yield (October)	Kartic to mid- Jaistha (Mid-October to May)	T. Aman (LV): Rajashail, T. Aman (HYV): BR11 and 22 BRRIdhan40, Rabi: Khesari, Chili, Sweet potato, Mustard, Tishi, Lentil etc.	Mid- October to mid-June	26
Medium land		Mid- Kartic to mid-Jaistha (November to May)	T. Aman (LV): Rajashail, Kajalshail T. Aman (HYV): BRRIdhan40 Rabi: Khesari, Tishi, and Mustard.	Mid-November to May	29
Low land	• Kajalshail suffers from salinity, yield affected and paddy becomes unsubstantial (October- November, during drought)	Mid-Agrahayan to mid-Baishakh (December to April	T. Aman (LV): Rajashail and Kajalshail	Mid-December to – mid May	45

**Farmers' choice

6.5.1 Crop Production on Urir Char

Also on Urir Char soil salinity, inundation by rain and tidal intrusion of saline water are the major limiting factors of crop production. And also here non availability of suitable and improved seeds, high price of inputs, mainly chemical fertilizers, less price of produced crops (due mainly to poor communication and marketing facilities), and lack of modern agricultural technology also negatively influence the agricultural practices and productivity of the area. Cultivation of high yielding varieties of crops is quite less due to many of above reasons.

However, in Urir Char a popular practice of producing various vegetable crops has developed. Most households provide an earthen bund around their pond areas and keep some agricultural land within the bund, beside the pond. The area beside the pond is raised with the earth of the excavated pond and various winter and summer vegetables like Cucumber, Kakrol, Jhinga, Chili, Brinjal, Misti kumra, Chal kumra, Dhundul, Korola, Pui shak and Data shak are successfully grown here. These meet the family consumption and a part of the produce can be sold. Provision of earthen bund around the plot restricts intrusion of saline water and it also protects the fish produced in the pond (image in Appendix 1). If this example is replicated in other char areas, more farmers would benefit. Crops grown and their productivity are provided in the following table:

Table 6.5.1 Crop yields of Urir Char

Crops	**Average Yield (ton/hectare)**	**Average yield (Maund/ acre**	**Remarks**
T.Aus (LV)	2.38	24-25	Usually Saita variety is practiced
T. Aus (HYV)	3.7	37-38	Usually Chandina variety is practiced
T. Aman (LV)	3.58	36-37	Usually Rajashail and Kazalshail are practiced
T. Aman (HYV)	4.00	40-41	Usually IR8, BR11, BRRI40 are practiced
Khesari (Green gram)	1.46	14-15	
Misti alu (Sweet potato)	10.70	110-111	
Gol alu (Potato)	9.88	100	
Morich (Chili)	0.94	10-11	
Methi	1.01	10-11	Broadcasted in T.Aman field like Khesari that resulted reduction of yield, although it involves less cost of cultivation
Tishi (Lin seed)	0.62	6-7	Broadcasted in T. Aman field like Khesari that resulted reduction of yield, although it involves less cost of cultivation
Roshun (Garlic)	5.52	20-21	
China badam (Ground nut)	1.85	18-19	

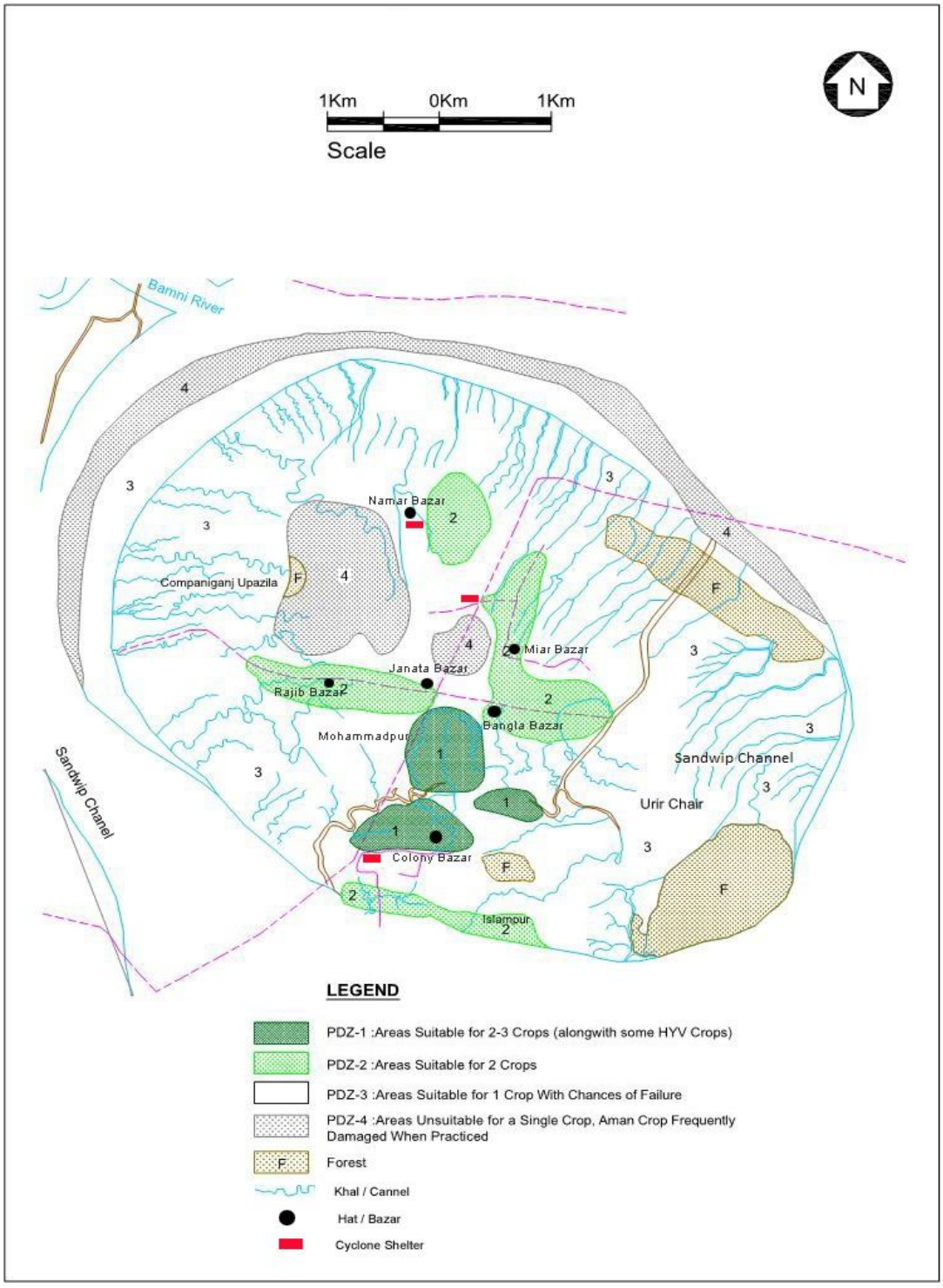
6.5.2 Salinity

Soil samples were collected from various areas of Urir Char to analyze the salinity level in 2 occasions, first during December 2011 and then in April 2012. The results are as follows:

Table 6.5.2 Results of laboratory analyses of collected soil samples

Location (Plot owner)	Top soils		Sub-soil	
	ECe of soils taken in December, 2011	ECe of soils taken in April, 2012	ECe of soils taken in December, 2011	ECe of soils taken in April, 2012
Md. Mono, southern side of saw mill (beside High school)	8.0	11.9	2.5	5.0
Ohid Mia, Vill.- Miar bazar (Sandwip part)	2.5	9.0	1.5	4.1
Md. Nabi, son of Shah Alam, road junction, eastern part of darber.	4.2	9.7	2.5	4.5
Md. Dulal, son of Amirul Hoque, Namar bazar(CDSP bazar)	2.4	7.8	1.6	5.0
Md. Zakir Hossain, son of Zainal Abedin, Dakkhin Urir Char	-	7.7	-	2.9
Kislu Chowdhury, Vill. Uttar Urir Char	-	5.3	-	3.5
Killa samaj, 2 km east of Bangla bazar	-	8.0	-	3.4
Moktab of Nazim baba	-	6.6	-	4.6

PDZ MAP OF URIR CHAR



7. Recommendations

7.1 Workshop on PDZ

A workshop was organized on 2nd July 2012 in CDSP conference room at Noakhali, where concerned district DAE officials, including Project Director, District Training Officer, Crop Production Specialist, Upazila Agriculture Officers, Sub-Assistant Agricultural Officers of DAE, Senior Scientific Officers, SRDI, Principal Scientific Officer, BARI and concerned CDSP TA Team members were present.

The objective of the workshop was to appraise the participants about the findings of data collection for PDZ on the crops presently grown and to hear from these experts their suggestions for the crops to grow in the existing ecological situation. Their suggestions for classification of the areas into agricultural productivity zoning were also sought through group discussion.

Their suggestions for the various crops to grow in different agricultural zones are compiled and presented below.

Table 7.1 List of paddy crops presently grown along with recommended crops

Depth of flooding	Paddy crops presently grown***/** ***additional paddy crops recommended to be grown*****
3-12 inches	T. Aus (LV): Shaita***, Boilam***
	T.Aus (HYV): Chandina, China, *BR26,34* ***BRRIDhan27,42,43.48, BR1***
	T. Aman (LV): Rajashail, Kajalshail, Beti chikan, Lal dhan, Ghikaz, Dhola mota, ***Kalijira***
	T. Aman (HYV): BR11, 22,23, ***BRRIdhan39,40,41,42, 49, 51,52,54, 56, 657***
12-24 inches	T. Aus (LV): ***Shaita***
	T.Aus (HYV): Chandina, ***BR-26, BRRIdhan***27, ***48, BR-14***
	T.Aman (LV): Rajashail, Kajalshail, Latishail, ***Dhola mota, kala mota, Beti chikan***
	T.Aman (HYV): BR11, *22*, 23, ***BRRIdhan39,40,41, 42, 49, 51,52, 54, 56, 57***
	Boro: Heera, ***BRRIdhan27,28,48***
24-54 inches	T. Aus (LV): Nil
	T. Aus (HYV): ***BRRIdhan27***
	T. Aman (LV): Kazal shail, Ghikoz, Lati shail, Dhola mota, ***Bazal, Kalamota***
	T. Aman (HYV): ***BRRIdhan40,41,48,52***
	Bontil (Tal makhna)

*Varieties being cultivated by the local farmers; ** Additional varieties suggested by the experts in the workshop **(*in italic & bold*)**

Table 7.2 List of Rabi crops presently grown along with recommended crops

Depth of flooding	Crops presently grown***/** ***Additional crops recommended to be grown*****
3-12 inches	Khesari (green gram)*****, Morich (chili), Misti alu (sweet potato), China badam (groundnut), Roshun (garlic), Gol alu (potato), Felon, Moshur (lentil), Mug (mung bean), Bhutta (maize), Tishi (lin seed), ***Surja mukhi*** ****(Sun flower), Soybean**, Methi, ***Tormuz (water melon)*** and summer vegetables like Sosha (cucumber), Begun (brinjal), Dherosh (okra), Mula (radish), Lal shak (spinach), Seem (bean), Lau (gourd), Kumra (sweet gourd), Tomato, ***Gazar (carrot), Borboti (Yard long bean***, Phul kopi (cauli flower), Pata kopi (cabbage), Korola (bitter gourd),
12-24	Khesari (green gram), Morich (chili), Roshun (garlic), Gol alu (potato), Felon, Moshuri (lentil), Mug (mung bean), Bhutta (maize), Tishi (lin seed), ***Surja mukhi , Soybean, , Tormuz (water melon)*** and summer vegetables like Sosha (cucumber), Begun (brinjal), Dherosh (okra), Mula (radish), Lal shak (spinach), Seem (bean), Lau (gourd), Kumra (sweet gourd), Tomato, ***Gazar (carrot)***, ***Borboti (Yard long bean)*** Phul kopi (cauli flower), Pata kopi (cabbage), Korola (bitter gourd), Methi
24-54	***Khesari (green gram), Felon, Mug (mung bean)***, Tishi (lin seed), Sorisha (mustard), ***Soybean***, ***Boro (HYV/Hybrid)***, Bon til, ***Misti Alu (Sweet potato), Bati shak***

* Varieties being cultivated by the local farmers, ** Additional varieties suggested by the experts in the workshop (*in **bold & italic)***

7.2 General Recommendations

The prime objective for formulation of PDZ is to increase agricultural productivity and reduce crop damage of CDSP-IV areas, where many types of limitations are affecting crop production. Although various efforts are being taken by the project authorities to improve the agricultural productivity, adoption of some measures may help to attain the objective.

- Motivate farmers through training on PDZ (preferably by preparing a short simple handbook on PDZ in Bangla), indicating the suitable crops to be grown in different zones
- Farmers to be trained and motivated to grow various suitable crops in the light of recommendations of the workshop, especially adoption of HYV crops
- Improving the drainage condition of the char areas by canal re-excavation, especially in Char Nangulia, Char Ziauddin and Urir Char
- Imparting training on preparation of farm manure/ compost, which would reduce salinity and improve soil quality/ productivity
- Imparting training on cultivation of salinity tolerant HYV paddy crops (instead of presently grown LVs) along with supply of improved seeds and other required inputs

- Cultivation of various rabi/vegetable crops, including high value crops can be practiced on raised land beside ponds with provision of surrounding bund (as practiced in Urir Char at present; reference to image 1)
- Provision of mulching can be practiced for rabi crops to reduce the salinity hazard
- Provision for availability of chemical fertilizers at appropriate price will increase the cultivation of HYV crops
- Cultivation of BARI Sorisha-12,13 could be practiced in the area
- Cultivation of high value fruits (like papaya, banana, mango, BAU kul, Sapota, lemon, Sojina, coconut) and vegetables (like cucumber, okra, country bean) would be profitable; for this cultivation training and motivation and supply of seeds are required
- Plantation of suitable trees (like Shil koroi, Mahogany, Supari, Kath badam, Rain tree, Neem, Krishna chura) can be done in the char areas at an accelerated rate.

7.3 Recommendation on sowing time management

In below table favorable sowing times for crops in saline soils are presented, jointly with the sowing time for non-saline soils for easy reference.

Table 7.3 Sowing time management of various crops in saline soil

Crops	Favorable sowing time in saline soil	Optimum sowing time (in general)
Wheat	November 1-20	November 2nd week - December 1st week
Chick pea	Before 15th November	November 15th - mid December
Tishi	Before 15th November	Mid October - mid November
Tomato	September - November (seed bed) October-December (transplanting)	November - mid January (transplanting)
Chili	November 1 - December 10	October - December
Garlic	November 15-December 15	November - mid December
Onion	October (seed bed) 15th November - 15th	October

Crops	Favorable sowing time in saline soil	Optimum sowing time (in general)
	December(planting)	
Groundnut	15th November - 15th December	Mid November - mid December
Soybean	November	Mid December - mid January
Sunflower	1st fortnight of November	Mid November - mid December
Sweet potato	Mid January	Mid October - mid November
Mung	Before 31st January	Last week of January - mid February

7.4 Other recommendations

HYV is generally recommended for PDZ 1 & 2 areas, as suitable for high and medium high land. Local Varieties (LV) are suitable for PDZ 3, which is in low land.

Aus crop:

PDZ-1

- Direct seeding is appropriate during dry period
- Both seed beds dry or wet can be used in normal season for transplanting
- Water melon, Okra, Sweet potato, Cucumber, Sunflower, Kang Kong, Indian spinach, Tomato, Maize and Soybean are found suitable before April as prevailing salinity is below 8 ds/m.

PDZ-2

- Deep dibbling method seeding is suitable for PDZ-2
- For transplanting**:** Raising of seedling in dry seed bed should follow dibbling method.

T.Aman:

PDZ-1

- BRRIdhan31, 32, 37, 38 are early varieties. Hence seedling raising for these varieties is preferable in first fortnight of July to avoid natural calamity
- BRRIdhan22 and 23 is suitable during optimum planting time and late planting as well.

PDZ-2

- BRRIdhan22 and 23 is suitable during optimum planting time and late planting as well.

PDZ-1&2

- BRRIdhan40, 41, 53, &54 are found suitable for PDZ-2 area in normal condition but these are intolerant in submergence condition
- BRRIdhan51 &52 is found tolerant in submerging condition for 10-15 days
- BRRIdhan 40,41,53,54 varieties are saline tolerant for T.Aman.
- BRRIdhan55 is saline tolerant for boro season.

Appendix 1- Image of Cultivation of vegetables beside pond surrounded by earthen bund in Urir Char