Char Development and Settlement Project Phase IV
Bangladesh

Technical Report No. 20

Project Completion Report

December 2018

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 Agriculture Extension (DAE)
- Forest Department (FD) and NGOs

Technical Assistance:

- BETS
- Euroconsult Mott MacDonald
- Socioconsult

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Abbreviations

AOS	Annual Outcome Survey
AWPB	Annual Work Plan and Budget
BCR	Benefit Cost Ratio
BWDB	Bangladesh Water Development Board
CBO	Community Based Organisation
ci	cropping intensity
COSOP	Country strategic opportunities paper
CRP	Community Resource Person
DAE	Department of Agricultural Extension
DC	Deputy Commissioner
DPHE	Department of Public Health Engineering
DPP	Development Project Proforma
DTW	Deep tubewell
EFA	Economic and financial analysis
EIRR	Economic Internal Rate of Return
EKN	Embassy of the Kingdom of the Netherlands
FD	Forest Department
FF	Farmers' Forum
FLI	Field Level Institution
FW	Future with project
FWO	Future without project
GoB	Government of Bangladesh
GoN	Government of the Netherlands
HH/hh	Household
HYV	High yielding variety
IFAD	International Fund for Agricultural Development
IGAs	Income generating activities
IMSC	Inter-Ministerial Steering Committee
IRR	Internal Rate of Return
KAP	Knowledge Attitude Practice
KM	Knowledge Management
LGED	Local Government Engineering Department
M&E	Monitoring and Evaluation
MFI	Micro Finance Institution
MIS	Management Information System
MoL	Ministry of Land
MoU	Memorandum of Understanding
MTR	Mid-Term Review
NGO	Non-Governmental Organization
NPV	Net Present Value
PCD	Project Coordinating Director
PCR	Project Completion Review/Report
PD	Project Director
PKSF	Government wholesale lending agency for NGO-MFIs
PMC	Project Management Committee
PME	Participatory Monitoring and Evaluation
PMU	Project Management Unit
PNGO	Partner Non-Governmental Organization
RDPP-1	Revised Development Project Proforma (first revision)
RDPP-2	Revised Development Project Proforma (second revision)
RIMS	Results and Impact Management System
SCF	Standard conversion factor
SDR	Special Drawing Rights
SFG	Social Forestry Group
STW	Shallow tubewell

SWRF	Shadow wage rate factor
TA	Technical Assistance
TBA	Traditional Birth Attendant
TOR	Terms of Reference
TUG	Tubewell Users Group
UP	Union Parishad
USD	United States Dollar
WA	Withdrawal application
WB	World Bank
WMA	Water Management Association
WMF	Water Management Federation
WMG	Water Management Group
WMO	Water Management Organisation

Currency equivalents

USD 1.00 = 82.00 BDT (PCR - April 2018)
USD 1.00 = 70 BDT (appraisal: September 2009)

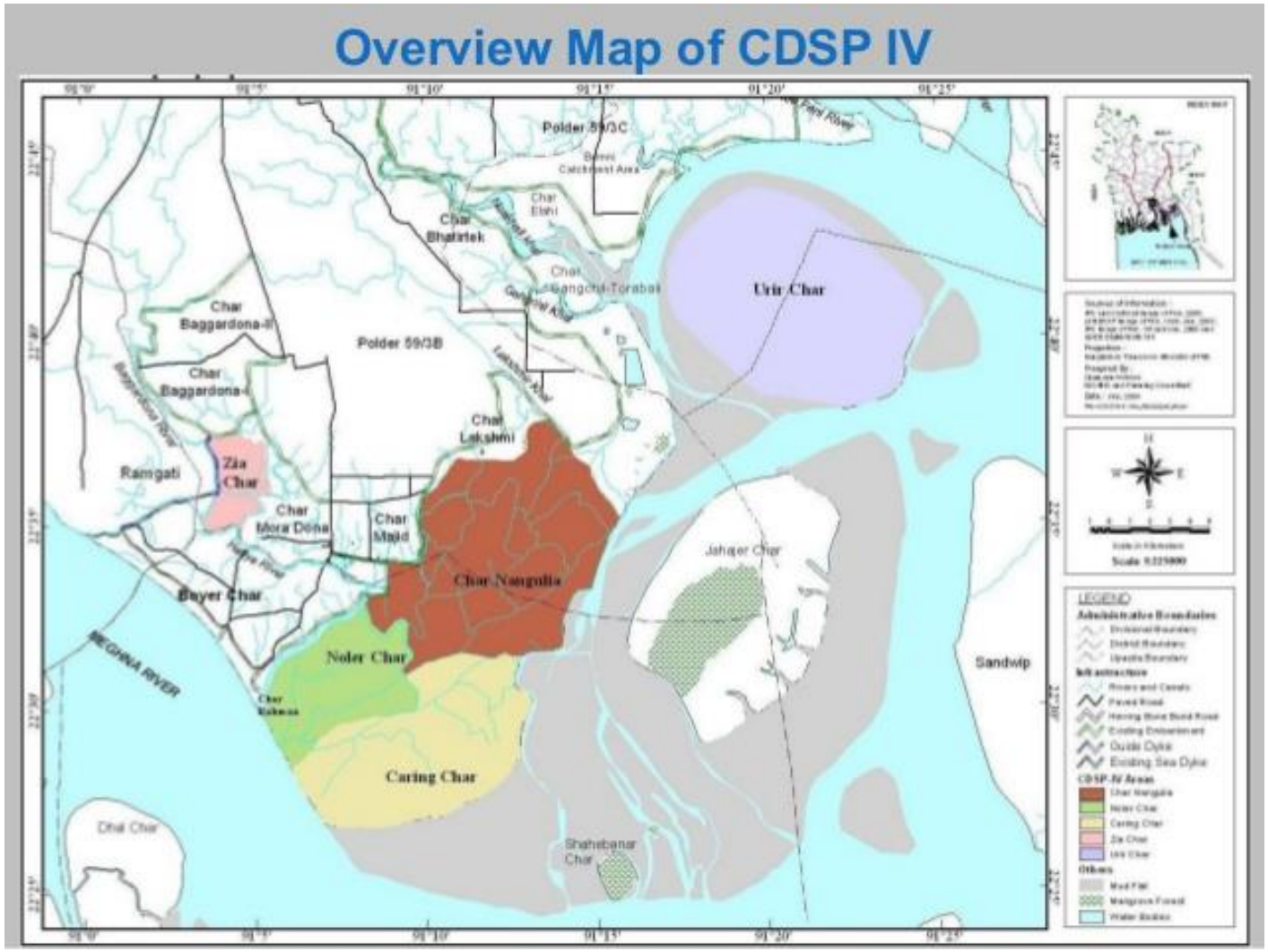
Fiscal year

1st July to 30th June

Weights and measures

1 decimal (dec)	=	0.01 acres
1 acre (ac)	=	0.405 ha = 100 decimals
1 hectare (ha)	=	2.47 acres = 247 decimals
1 bigha	=	33 decimals
1 maund	=	40 kg

Map of the project area



Project at a glance

BASIC INFORMATION

Country	**Bangladesh**
Project Name	**Char Development and Settlement Project – phase IV (CDSP IV)**

Key Dates:

IFAD Approval	Signing	Effectiveness	Mid-term Review (Plan)	Original completion	Actual completion
22-Apr-2010	09-May 2011	09-May-2011	2015	30-June-2018	30-June-2018
Actual Midterm Review	Interim Evaluation	Original loan closing	Actual loan closing	Number of extensions	
22-Mar-2015	none	31-Dec-2018	31-Dec-2018	none	

IFAD Financing:

Loan	SDR million		% disbursed		
	USD million	47.30	% disbursed	-	

Costs and financing (USD'000): (last revision of DPP)

Component	IFAD	Co-financier	Government	Beneficiaries	NGOs	Total
Protection from climate change	21,759	1 ,983	7,135			30,877
Climate resilient infrastructure	24,322	3,144	7,842	90		35,398
Land settlement and titling	408		590			999
Livelihood support	866	3,996	90		6,363	11,315
Technical assistance	-	10,710	-			10,710
Total at appraisal	47,354	19,833	15,657	90	6,363	89,278

Number of beneficiaries:

	Direct	Women		Indirect	
Total # of households	29,008	-		15,000	
Total # people	185,824	91,240		90,000	

Project Goal and Objectives:

The project goal was to reduce poverty and hunger for poor people living on newly accreted coastal chars.

The development objective of the project was improved and more secure livelihoods for 28,000 households.

Country partners:

IFAD focal point	Economic Relations Department, Ministry of Finance, Government of Bangladesh
Executing agency	Bangladesh Water Development Board, Ministry of Water Resources, Government of India
Implementing agencies	Bangladesh Water Development Board, Local Government Engineering Department, Ministry of Land, Department of Agricultural Extension, Department of Public Health Engineering, Forest Department
NGOs	BRAC, SSUS, DUS, SDI

Executive summary

1. CDSP IV was jointly financed by IFAD, the Government of Netherlands (GoN) and the Government of Bangladesh (GoB). At design the cost was estimated at USD89.2 million, funded by an IFAD loan of USD47.30, a GoN grant of USD20.6 million, GoB financing of USD15.6 million, NGOs credit funding of USD4.9 million, and beneficiaries' contribution of USD0.81 million. The project period is from May 2011 to June 2018.

2. The goal of CDSP-IV was reduced poverty and hunger for poor people living on newly accreted coastal chars. The objective was improved and more secure rural livelihoods for 28,000 households who comprise the population of Nangulia, Noler, Caring, Ziauddin and Urir Chars in the coastal area of Noakhali District in southeast Bangladesh.

3. Project implementation is organised in five components: (1) protection from climate change (water management and social forestry); (2) climate-resilient infrastructure (internal infrastructure, water and sanitation); (3) land settlement and titling; (4) livelihood support (agricultural support, social and livelihoods support); and (v) technical assistance and management support. Implementation responsibilities are assigned to six implementing agencies, each led by a Project Director: Bangladesh Water Development Board (BWDB); Forest department (FD); Local Government Engineering Department (LGED); Department of Public Health Engineering (DPHE); Ministry of Land (MoL); and Department of Agriculture Extension (DAE). Each of these agencies is led by a Project Director and has its own implementation plan – the Development Project Pro-Forma (DPP). In addition, supported by GoN funding, there is a technical assistance (TA) team and four partner NGOs (PNGO)

4. The government's DPP, was revised twice: (i) to reduce some targets in response of allocation of allocation of some of the project area to the army; and (ii) the need to construct additional embankments to replace those on land that was lost to erosion, and also to extend the project period from six to seven years to match the IFAD project period and allow more time to construct the embankments and complete other works, especially land titling.

5. Sub-component 1a (water management) was badly impacted by river erosion. Having constructed most embankments in the first three years, most of the major sea dykes needed to be rebuilt as retired embankments, involving compensation for who had settled within the polders and would lose land to embankments. One of the three large sluices was also lost to erosion, and still needs to be replaced, with tidal water entering the khal it was to have controlled. With erosion continuing, further embankment remodelling may be needed. In total 24 WMGs have been formed, trained and supported by CDSP IV – but the amount of training delivered was significantly less than in CDSP III. One problem has been that BWDB were unable to provide its own extension staff for this work.

6. Sub-component 1b (social forestry) – plantation outputs were affected by loss of land to erosion. A total of 630 SFG were formed with about 25 members each – 40% women

7. Sub-component 2a (internal infrastructure) was initially delayed by sharp increase in unit costs. Although flexibility in tendering meant work accelerated, the number of cyclone shelters had to be reduced to fit within the availability of funds, and some roads did not get the planned bitumen surfaces.

8. Sub-component 2b (water and sanitation) - cost savings allowed the numbers of DTW and latrines to be increased.

9. Component 3 (land settlement and titling) – continuing boundary disputes mean target for completion of CDSP III settlement will not be met. Land settlement in CDSP IV has had to overcome a number of hurdles and delays, but hopefully will get close to the target of 14,000 households getting secure titles.

10. Sub-component 4a (agricultural support) was implemented as planned and, having reached all physical targets, MoA did not extend its DPP for an additional year to utilise unspent funds.

11. Sub-component 4b (social and livelihood support) reached most of its targets. In 2014 activities in livestock, poultry and fisheries were added as the Danida-funded RLDC, which was covering these sub-sectors, closed. This mean that more intensive support reached more households than had been the case with RLFDC. Due to limited resources, CDSP IV support for the four PNGOs implementing this component was phased out prior to project completion.

12. Component 5 (technical assistance and management support) was provided by a consortium of national and international consulting companies funded by GoN. This consortium contracted four NGOs to implement sub-component 4b.

13. Outcomes and impacts: almost all logframe targets for objectives and outcomes were exceeded. At the outcome level, for water management over 90% of farmers within polders reported reduced crop damage from salinity, flooding and waterlogging, although indicators for the effectiveness and sustainability of WMG are not as good as for the longer established WMG of CDSP III. Outcome indicators for improved internal infrastructure include journey times reduced by 50% or more and transport costs by 60% to 80%. The average distance to safe water has fallen from around 380 metres to 60 metres, while the percentage of households with hygienic latrines has increased from 6% to 98%.

14. Outcomes for improved livelihoods and household welfare include adoption of HYV aman by an estimated 20,600 farmers, with 21,200 vegetable producers adopting new varieties, exceeding the target of 20,000 farmers adopting new technologies of all types. CDSP IV improved livelihoods for women, with 62% reporting that they had a direct IGA. At least 90% of the population were served by project health services, the Contraceptive Acceptance Rate increased from 41% to 91% and the proportion of children vaccinated from 52% to 99%.

15. At the objective level, livelihoods were improved, with (i) 22,850 households increasing rice production (target 20,000) by an average of 127%; (ii) 83,592 persons in income earning occupations (target 40,000), and 26,320 households adopting improved hygiene practices (target 21,000). At the goal level, poverty and hunger were reduced with: (i) average real income increasing by 157%, (ii) average real value of household assets by 4.5 times (target 50%), and (iii) households reporting food shortages fell by 78 percentage points (target 23 points).

16. Of the IFAD impact domains: (i) household income and assets are mentioned in the preceding paragraph; (ii) as is food security – quality of food intake also improved; (iii) human and social capital – many thousands of people have been trained and KAP monitoring shows a steady increase in knowledge and adoption, school attendance rate has increases, and links to markets and service providers have increased; (iv) agricultural productivity has increase – average yield of paddy doubled, cropping intensity increased from 104% to 130%, egg production by 3.5 times, milk production by 2.7 times, and fish production by 4.7 times; (v) access to markets has been transformed with average sales of farm produce now almost Tk90,000 per household, 28,239 individuals have borrowed USD23 million in 96,826 loans, (vi) natural resources and the environment have been improved, with several million trees being planted, and reduced flooding and salinity. Increased farm production has meant greater use of chemicals, but this has not affected integrated vegetable-fish production. Better flood control has enabled more farmers to grow boro, and irrigation of this crop is a potential threat to domestic water supply; (vi) adaptation to climate change has been supported through planning infrastructure to take account of likely changes in climate, construction of cyclone shelters and shelter belt plantations. Community organisations have been set up for water management and disaster response have been set up; (vii) gender equity and empowerment – the position of women has been greatly improved through economic opportunities, better living conditions at home, and improved health. In particular, women have become more secure through getting

land titles jointly with their husbands, and by the improved law and order situation; and (viii) overall poverty is greatly reduced with households moving up at least one wealth rank.

17. Targeting: the project was highly focused on poor households with no secure access to land. Special attention was paid to women headed households. Despite a net loss of about 10% of land to erosion, total outreach is estimated at 185,824 people in 29,008 households (target 155,000 people in 28,000 households.

18. Innovations included new crop varieties and farming technologies. The sojorn system of integrated vegetable-fish production was introduced and has been a catalyst for expansion of vegetable production. Animal health services via community service providers was another innovation. The Land Record Management System is an innovation at the national level.

19. Replication and scaling up: being the fourth phase of CDSP, the project has a proven potential for replication, however the degree to which this represents a scaling-up depends on the rate of land accretion and the area available for development and land settlement.

20. Actual project costs at are estimated to be USD79.6 million (up to project closure) – 93% of the last revised project cost. The IFAD loan is estimated to have spent 95% of its funds. Component 1 is forecast to only spend 86% of its allocation due to cost savings on retired embankments and river closures. The cost per person is USD 410 (IFAD loan USD 241).

21. Project management worked well, with coordination ensured via over 60 meetings of the inter-agency Project Management Committee and the work of the TA team. However, with six independent implementing agencies, it has not been easy to implement a computerised accounting system to generate the financial statements required by IFAD, while the seasonal nature of construction works has meant an irregular flow of disbursements.

22. The project partners (the Government, IFAD, GoN, implementing agencies, NGOs, community organisations) all made good contributions. Support from IFAD missions was particularly useful in assisting with decisions regarding re-configuration of embankments etc. in response to erosion.

23. The economic internal rate of return is estimated to be 38.9%. This is higher than the 17.2% estimated at design. Compared with design projections, there has been a greater adoption of HYVs, a higher increase in cropping intensity, and larger increases than projected in homestead production of vegetables along with livestock, poultry, fish and non-farm enterprises. Wage rates have risen relative to crop prices, resulting in improved terms of trade for hired farm labour – to the benefit to households who get most of their income from wages.

24. Sustainability of production systems, community institutions and benefits is good. This sustainability has been proven by the continued monitoring of outcomes in the earlier phases of CDSP – where land quality is still improving, farm production has continued to grow, and incomes increase. What is much less certain is the environmental sustainability – both of the groundwater aquifer in the face of increasing irrigation abstraction and, more important, the continuing river bank erosion resulting in loss of land and requiring more water management infrastructure to be replaced.

25. Lessons learned – key lessons include:

a) The current scope of CDSP IV activities is broad enough. As it is, health services and support for livestock, fisheries and forestry have had relatively little technical attention from IFAD missions.

b) Future planning of char development needs to have the best possible forecasts of possible areas at risk to erosion.

c) Costs of embankment construction can be significantly reduced through greater use of machinery rather than manual labour.

d) The CDSP approach of forming WMG with relatively few members that are representative of a much larger number of farmers works well, making the WMG easier to manage and more likely to be sustained when project support ends.

e) The rationale for creation of employment in project works for members of LCS and SFG does not have such a strong rationale for CDSP, where virtually all households have access to land (and hence self-employment) and where many different types of livelihood are being supported. However, SFG are still useful as they create ownership of trees and so increase survival rates, while the quality of works carried out by LCS can be better than that of local contractors, who in any case, may not want to do very small contracts.

f) Development of rural markets has been useful for homestead producers of vegetables, who tend to sell in small volumes which may be of less interest to traders operating at the farm gate.

g) Increasing volumes of cash crop production will need a denser road network and more crossing points on khals.

h) Sanitation interventions could be strengthened by adopting some of the practices of "community-led total sanitation" would help ensure that no household was left out and that good practices were universally adopted.

i) Land titling is not an easy process and needs a long project duration (or a follow-up project) to implement. It should not be attempted at locations where significant obstacles exist.

j) Direct assistance (as members of Farmers Forums) to 20% of farmers is sufficient to disseminate new technology to all farmers

k) Farmers need continuing advice on pest and disease control, especially for the new crops that are now becoming important as farming becomes more commercial.

l) The contracting and management of PNGOs via the TA team worked well with PNGOs being better integrated into the overall project and having a clearer idea of what they should do. Using access to credit funds from PKSF as one of the criteria for selection of the smaller PNGOs ensured the flow of credit to group members.

m) Livestock health and breeding services, and supply of inputs, can be provided on a fully commercial and sustainable basis by the private sector via local retailers and community animal health workers. These workers need to be properly trained and equipped and linked to supplies of the inputs they need.

n) CDSP IV had considerable achievements in M&E, but more can be done to make PME and KAP more useful, and to focus AOS more on immediate outputs. Surveys would be easier if tablets or mobile phones were used for data collection.

o) Although IFAD supervision and support missions are most useful and effective when the same individual was on a number of missions and so got to know the project well and understand the issues involved.

p) CDSP IV was a big investment per hectare of land developed and per household benefitted, but the economic and financial analysis shows that the returns have justified this investment.

50. Conclusion: CDSP IV has been highly successful in meeting its objective of reducing poverty and hunger for poor people living on newly accreted coastal chars. Despite unexpected and severe erosion, it has exceeded almost all of its goal, objective and outcome targets, and benefited more people than as envisaged at the time of its design.

51. Key factors for success of CDSP IV have been close cooperation of the six IAs and four PNGOs, with coordination, technical and management support from a skilled and experienced TA team.

52. Recommendations for the future: with continuing erosion, there will be a need for further reconfiguration of embankments, and replacement of a lost drainage sluice. There is also a need to upgrade and expand the road network, develop more markets, and provide more water and sanitation facilities.

53. The Water Management Groups need further support to become as strong as these groups in the older phases of CDSP. Farmers Forums also need more assistance.

A. INTRODUCTION

26. The Char Development and Settlement Project IV (CDSP IV) has been jointly financed by the International Fund for Agricultural Development (IFAD), the Government of Netherlands (GoN) and the Government of the People's Republic of Bangladesh (GoB). The total cost estimated at project design was USD89.2 million, including an IFAD loan of USD47.30 (SDR30.6 million), a GoN grant of USD20.6 million, GoB counterpart financing of USD15.6 million, NGOs credit contribution of USD4.9 million, and beneficiaries' in kind or cash contribution of USD0.81 million. The project became effective on 9th May 2011 and the planned completion date is 30th June 2018.

27. The goal of CDSP-IV was reduced poverty and hunger for poor people living on newly accreted coastal chars. The development objective was improved and more secure rural livelihoods for 28,000 households who comprise the population of Nangulia, Noler, Caring, Ziauddin and Urir Chars in the coastal area of Noakhali District in southeast Bangladesh.

28. Project implementation was organised in five components: (1) protection from climate change (water management and social forestry); (2) climate-resilient infrastructure (internal infrastructure, water and sanitation); (3) land settlement and titling; (4) livelihood support (agricultural support, social and livelihoods support); and (5) technical assistance and management support. Implementation responsibilities were assigned to six implementing agencies, each led by a Project Director: Bangladesh Water Development Board (BWDB); Forest department (FD); Local Government Engineering Department (LGED); Department of Public Health Engineering (DPHE); Ministry of Land (MoL); and Department of Agriculture Extension (DAE). Each of these agencies is led by a Project Director and has its own implementation plan known as a Development Project Pro-Forma (DPP). In addition, supported by GoN funding, there is a technical assistance (TA) team and four partner NGOs (PNGO)

29. The objective of this PCR is *to assess and document CDSP IV's implementation performance and the results that have been achieved*. The PCR has attempted to capture and document the experience and the lessons learned from project implementation for use by GoB, EKN, IFAD and others in future projects. Specifically, the PCR has attempted to: (i) assess the project's relevance at the time of design and at present, (ii) assess how effectively the project was implemented and met its objectives, (iii) document the immediate outputs, outcomes and impacts, (iv) record project costs and benefits, (v) assess the efficiency of project implementation process, including IFAD's and partners' performances, (vi) assess the prospects of sustainability of project benefits, (vii) document lessons from implementation useful for the design and implementation of similar projects in future and for cross-regional learning, and (viii) assess the potential for replication or scaling up of project best practices.

30. Information in this PCR has been drawn from project reports, including the IFAD design document, progress reports, technical reports and impact surveys, along with IFAD mission reports. As part of the PCR progress, two stakeholder workshops were organised in March 2018: one for the management staff of implementing agencies, and one with representatives of beneficiary groups and field level staff of implementing agencies.

B. PROJECT DESCRIPTION

B.1 Project context

31. With a population of 163 million living in an area of 147,570 square kilometres (or 1,252 persons per square kilometre)[1], Bangladesh is one of the most densely populated countries in

[1] World Bank data for 2016

the world. Over 70% of the population lives in rural areas and is mainly engaged in agriculture and related activities. More than two thirds of the rural population is landless or functionally landless (owning less than 0.2 hectares of land), and 26.4% are below the national poverty line with over half of these being are classified as very poor[2]. Endowed with limited land and other natural resources, and with a high population density, poverty is a pervasive problem in rural Bangladesh.

32. Agricultural production has increased substantially in Bangladesh over the past 25 years. Cropping is dominated by rice and annual rice production has grown from 10 million tons in 1971 to just under 35 million tons in 2016/7. This increase has come from a transformation of rice production from extensive low input subsistence systems to highly intensive high input systems using modern rice varieties, a large increase in fertiliser use, and a substantial increase in irrigation during the dry winter. The country is now more of less self-sufficient in rice in a normal year, but Bangladesh has to import rice following bad floods or droughts at critical growth periods and, with continued population growth and loss of land to urbanisation, there is a continued need to produce more rice every year.

33. According to a 2016 world risk report by the United Nations University, Institute for Environment and Human Security (UNU-EHS), Bangladesh is ranked fifth in the disaster risk among the world. Between 1970 and 1998, 171 large-scale water-related hazards such as cyclones, storm-surges, droughts, floods, and river erosion disasters killed an estimated half million people and affected more than 400 million. The poor are hit hardest because they live at greater density in the most poorly constructed housing in settlements on lands prone to hazards - particularly along the 700 kilometres of coast affected by storm surges[3]. Annually up to 20,000-30,000 households loose their homes, land and livelihood as a result of erosion and thus become destitute[4].

B.2 Project objectives

34. **The Goal** of CDSP IV has been to reduce poverty and hunger for poor people living on newly accreted coastal chars.

35. **The development objective** was the development of improved and more secure rural livelihoods in agriculture, provision of legal title to land, and through provision of climate resilient infrastructure.

12. These objectives were in line with IFAD's COSOP goal of supporting the scaling up of successful innovative approaches to poverty reduction. The project will give IFAD an opportunity to continue to pursue the COSOP policy objective of reform of policies for the management of rural markets.

13. **Components.** Project implementation is organised in five components:

Component 1: Protection from climate change

- sub-component 1a water management infrastructure (embankments, sluice gates, river closures and drainage khals)
- sub-component 1b social forestry (plantation of coastal shelter belts and plantation along roads and khals);

Component 2: Climate-resilient infrastructure

- sub-component 2a internal infrastructure (roads, bridges, markets, cyclone shelters, other public buildings)
- sub-component 2b water and sanitation (communal deep tubewells, household latrines);

[2] Household Income and Expenditure Survey 2016, Bangladesh Bureau of Statistics.
[3] Coastal Embankment Rehabilitation Project, Project Performance Assessment Report, World Bank 2005
[4] The Water Sector Track Record Of Bangladesh, Embassy of the Kingdom of the Netherlands, 2007

Component 3: Land settlement and titling (provision of legal title to households who are illegally occupying public land on newly emerged chars);

Component 4: Livelihood support

- sub-component 4a: agricultural support (agricultural extension, training, technology demonstrations)
- sub-component 4b: social and livelihoods support (micro-finance groups, homestead agriculture, health services, disaster preparedness, legal and human rights);

Component 5: technical assistance and management support. (advise and support ot implementing agencies, quality control, selecting and contracting of PNGOs, some training, monitoring and evaluation, knowledge management, feasibility studies for the next phase)

14. **Implementation arrangements**: responsibilities are assigned to six implementing agencies, each led by a Project Director (PD):

- Bangladesh Water Development Board (BWDB) – responsible for sub-component 1a and for overall coordination as the lead implementing agency. The BWDB PD is Project Coordinating Director (PCD);
- Forest Department (FD) – responsible for sub-component 1b;
- Local Government Engineering Department (LGED) – responsible for sub-component 2a;
- Department of Public Health Engineering (DPHE) – responsible for sub-component 2b;
- Ministry of Land (MoL) – responsible for component 3;
- Department of Agriculture Extension (DAE) – responsible for sub-component 4a.

15. Each of these agencies is led by a Project Director and has its own implementation plan known as a Development Project Pro-Forma (DPP). In addition, supported by GoN funding, there is a technical assistance (TA) team and four partner NGOs (PNGO). The TA team is provided by a consortium of international and national consulting companies. The four PNGOs are responsible for implementation of sub-component 4b.

Modifications in design.

16. The government's project document, the DPP, was revised twice. The first of the revisions was prompted by the allocation of a significant proportion (40%) of Caring char to the army. This resulted in a reduction in targets for land settlement and other activities. The second revision was prompted by the need to construct additional embankments to replace those lost to erosion. This required additional funds to be allocated to sub-component 1a, reducing the allocation for sub-component 2a. The second revision of the DPP also extended the period of project implementation from six to seven years to match the IFAD project period (see paragraph 53) and allow more time to construct the additional embankments and complete other works, especially land titling.

<u>Sub-component 1a: Water management</u>

17. Embankments and sluices were built as planned, but due to erosion 20 km of embankment were lost along with one of the large three sluices. Following consultation with IFAD, the DPP was revised to include over 10 km of retired embankments. The location of these retired embankments was revised three times in the face of continuing erosion. The location and design of one on the six river closures was also revised.

<u>Sub-component 1b: Social forestry</u>

18. A small change, introduced in RDPP-2, was to hire plantation watchers for mangrove plantations as well as for other types of plantation – newly planted mangroves on Urir char had been destroyed by herds of grazing buffalo.

Sub-component 2a: Internal infrastructure

19. LGED faced problems at the start of the project due to a sharp increase in construction costs. This meant that it could no longer implement the proposed volume of work within the funding allocated for this sub-component. Due to this increase in cost the number of cyclone shelters was reduced. A number of design modifications were made to improve the functionality and durability of these shelters. In the second revision of the DPP, there was a small reduction in the total allocation for this sub-component in order to produce additional funds to construct additional (retired) embankments in component 1a.

20. Considerable savings were made by a reduction in the number of bridges from 25 to only 4. One of the longer bridges was not needed as the road was routed via a river closure. Other bridges were replaced by cheaper box culverts as the waterways are not used for navigation. Overall there has been an increase in the number of culverts in response to issues of drainage congestion along new road embankments5.

21. Some minor works were dropped – including (in RDPP-2 a bus stand and road widening on Boyer Char (CDSP III) to accommodate bus traffic – this traffic has not developed to the extent envisaged. Seven ghats (boat landing stages) were dropped as it was thought not feasible to construct ghats due to the tidal range and risk of erosion.

Sub-component 2b: Water and sanitation

22. Ponds with sand filters and rainwater harvesting eventually dropped from project plans. These were included in case fresh groundwater was not available in some locations. In fact fresh groundwater was available in all parts of the project area, so these were dropped in the latter part of the project period and additional DTW and latrines constructed with this and other savings.

Component 3: Land titling

23. Following a government directive linked to the establishment of a new army base, Caring Char mouza with 12,109 acres of land having about 6,000 families was excluded from the project area of CDSP IV. As a result, all activities relating to settlement of land to the landless and other interventions were abandoned in the area. Consequently, with addition of some new mouzas and exclusion of Caring Char mouza the project area for land settlement (which excluded Urir Char) was reaffixed 46,149.75 acres (19,899 ha) instead of original 52,121.97 acres (21,102 ha), and the target for settlement was reduced to 14,000 from the original 20,000 households.

Sub-component 4a: Agricultural support

24. The major change to this component was the formation of fewer Farmer's Forums that had been envisaged, but each with a larger number of members, so the target of FF membership covering about 20% of all households was reached. This component was completed in June 2017 and DAE declined the option of extending their DPP for another year to utilise unspent funds on the grounds that their physical targets in terms of formation of FF, and implementation of farmer training and extension activities had been met.

Sub-component 4b: Social and livelihood support

25. The major change made to this sub-component was the inclusion of livestock, poultry and aquaculture activities from 2014?? The design of CDSP IV envisaged that the Danida funded RLFDC would take responsibility for these interventions as it was already operational in the project area. However, RLFDC came to an end in June 2013, and had only covered a limited number of CDSP IV farmers (1200 members of its farmer field schools). With

[5] Number of box culverts: DPP=16, RDPP-1=69, RDPP-2=93. Number of pipe culverts/U- drains: DPP=70, RDPP-1=123, RDPP-2=140.

agreement from the donors, it was to expand the scope of PNGO activities to support these sub-sectors, with an NGO Sector Specialist Livestock and an NGO Sector Specialist Fisheries, in the TA team.

Innovative features.

26. The main innovative feature that sets this project apart from other agricultural, water management and rural development projects in Bangladesh is the wide range of interventions that have been implemented in a coordinated manner by six different government agencies (from five different Ministries) along with four NGOs. This had enabled CDSP to address the wide range of needs of extremely poor people settling on newly emerged land with no physical, economic or social infrastructure. The land titling activity is unique in Bangladesh. Although there are other initiatives to settle landless people on khas land, only CDSP has done this on a mass scale. The provision of legal land titles jointly in the names of husband and wife has improved the status and security of women. Other interventions targeted at women included homestead production, legal and human rights, water and sanitation, and health and family planning. The comprehensive programme to address the needs of women resulted in CDSP IV winning the IFAD gender award for 2017.

B.3 Implementation modalities

Project management.

27. The project was led by the Bangladesh Water Development Board (BWDB), and the Secretary of the Ministry of Water Resources (MOWR) chaired the Inter-Ministerial Steering Committee (IMSC). Each of the six government line agencies were responsible for specific activities (organised as sub-components) as follows: (i) BWDB for protection for protective water management infrastructure of embankments, drainage khals and sluice gates; (ii) Local Government Engineering Department (LGED) for roads, markets, cyclone shelters & killas, and Union Parishad complexes; (iii) Department of Public Health Engineering (DPHE) for water supply and sanitation; (iv) Ministry of Land (MoL) for land settlement; (v) Department of Agricultural Extension (DAE) for agricultural development; and (vi) Forest Department (FD) for social forestry.

28. Each of these agencies had its own government project document (Development Project Proforma – DPP), Project Director and project implementation unit (placed within their existing offices in Noakhali district). The head of administration for Noakhali district, the Deputy Commissioner (DC), was ex-officio Project Director of the land settlement component as land settlement and ownership falls under the jurisdiction of the DC at the district level. Coordinated implementation was possible with only a minimal need for combined activities in the field – an approach that worked well in previous char development projects funded by the Netherlands. Where coordination is needed, this was ensured by the IMSC and by a Project Management Committee (PMC), chaired by the Project Coordinating Director of the BWDB component with the Project Directors for each sub-component as members. Coordination would also be ensured by having a single Technical Assistance (TA) team for the entire programme. The TA team was provided by a consortium of international and national consulting companies procured and funded by the Netherlands. The TA Team Leader was a member of the PMC. The TA Team also contracted and managed four partner NGOs (PNGO) implementing the Social and Livelihood Support sub-component.

29. The project was supervised by IFAD with active participation from the Embassy of the Kingdom of the Netherlands (EKN).

30. **Implementation strategy.** At the start of the project, mass meetings were held in each settlement (*samaj*) to explain the objectives and approach of the project. The modalities of CDSP were not difficult to put across to char households as they had usually heard of CDSP activities in earlier phases and were looking forward to CDSP arriving on their char. A series of mass meetings were held to select members of a number of different Field Level Institutions

– Water Management Groups, Farmers Forums and Social Forestry Groups – these being the key points of entry for BWDB, DAE and FD. WMG had an important role in identifying local needs and siting items of infrastructure. LGED and DPHE also worked closely with WMG. Each drinking water deep tubewells (DTW) were shared between 15 households, and PNGOs were responsible for formation of Tubewell User Groups (TUG) for each DTW, collecting a contribution to their cost from TUG members, and training a woman maintainer for each DTW.

31. The four PNGOs were each allocated areas in which to set up branch offices (a total of 13 branches). PNGOs then collected the profiles of all households in their areas and started to form female micro-credit groups. Women from virtually all households joined these groups, which were then provided with micro-finance services, training in homestead-based livelihoods, and training in legal and human rights and disaster management, along with health support services.

32. The activities of each IA and the PNGOs for each year was set out in a single Annual Workplan and Budget (AWPB). The AWPB was drawn up by each IA, coordinated by the TA team and approved by the PMC (and IMSC??). Physical construction works were procured and implemented by each IA, along with other activities such as training, with the TA team providing quality control and monitoring progress. The PNGOs implemented the social and livelihood support sub-component, supervised by NGO specialists in the TA team. with micro-finance funds coming from their own resources[6] and from the savings of group members. The TA team also provided a limited amount of specialised training, carried out a number of studies, including outcome and impact surveys and feasibility studies for the development of new chars in the next phase of CDSP. This work of the TA team was approved in advance by the PMC.

B.4 Target groups

Project area.

33. The project was located in the Meghna estuary - the central and most dynamic part of the coastal zone of Bangladesh. New land is emerging from the sea at the same time as land is being lost to erosion. The processes of accretion and erosion are determined by a complex set of interactions between the sediment load, its transport and distribution; the discharge of water and water levels; and tidal forces and estuarine circulation. On average each year, around 1.1 billion tons of sediment is carried down by the Ganges-Brahmaputra-Meghna river system, the largest sediment load in any river system in the world. About one fifth of the sediment load is retained in the estuary, forming the raw material of the land accretion process. Surveys, based on satellite pictures, have shown that each year there is a net accretion of around 20 km^2: with newly formed land of about 52 km^2 less eroded land of around 32 km^2. Accretion dominates around islands south and south-east of the Noakhali mainland, and south-west of Bhola island. The average yearly erosion of 32 km^2 means that, with an assumed density of 800 people per km^2, each year approximately 26,000 people (about 4,500 households) will lose their land in the estuary. Many of them will move to newly emerged lands, called *chars*.

34. Within this zone, CDSP IV focused its activities on the development of five new chars: Char Nangulia, Noler Char and Caring Char (these three chars are contiguous to each other), Urir Char (an island) and Char Ziauddin (on the mainland but not contiguous with the other chars). The total extent of these chars was around 30,000 ha, with an estimated population of 155,000 in 28,000 households. The project included some activities in the CDSP I, II and III areas in terms of support for operation and maintenance, and completion of land settlement in CDSP III. CDSP IV also identified some new chars, conducted feasibility studies for future char development, and developed some preparatory infrastructure on these chars (earth roads, water supply, cyclone shelters).

[6] One of the criteria for selection of PNGO was access to adequate credit funds and registration with the Microcredit Regulatory Agency.

Target population

35. The project was designed to target the whole population living on the five selected chars. This population have all benefited from the protection from reduced flooding and improved drainage arising from the water management interventions, from the communications infrastructure, households water supplies, cyclone shelters and other infrastructure. Interventions in these two sectors accounted for the bulk of the project investment.

36. Vulnerable groups. Within this population, the project design proposed that more disadvantaged sections of the community get additional support. This included:

(a) Settlers who do not have proper title to the land they are now occupying. This was the majority of the population of this CDSP IV chars
(b) Other landless households who can be settled on any public land that is now vacant – in particular these will be households who loose land they now occupy because of project infrastructure works. This has been a relatively small number of households.
(c) Women – including female headed households, women involved in capture of shrimp fry and women whose husbands have migrated to find work (although by the start of CDSP IV shrimp fry collection had very largely ceased). Women were particularly targeted for NGO activities.
(d) Children who were unable to attend school and who were involved the catching shrimp fry and other work.
(e) Landless, marginal and small farmers who will participate in agricultural development projects. As land settlement involves a standard allocation of 1.5 acres (0.6 ha), there is less inequality in land holdings compared to other parts of Bangladesh, and very few households lacked any access to land – even if they did not have a legal title to this land.

C. ASSESSMENT OF PROJECT RELEVANCE

C.1 Relevance vis-à-vis the external context

Performance is rated as satisfactory (score of 5).

37. **Alignment with national policies:** At design, the project was very well aligned with the government's second poverty reduction strategy (National Strategy for Accelerated Poverty Reduction 2009-11). In this strategy water management, agriculture, forestry, rural roads, land policy and disaster management are all focal areas for pro-poor growth to which the project will contribute. Supporting strategies include actions to reach extreme poor groups, support for better water and sanitation, especially where groundwater conditions are unfavourable (such as the saline coastal area), and adapting to climate change.

38. The poverty reduction strategy identified chars as being a pocket of extreme poverty and it specifically mentions the continuation of char development and settlement programmes – which this project was designed to both scale-up and deepen in terms of the scope of support for economic development and poverty reduction. The strategy also identifies the coastal zone as being of special risk from climate change.

39. Based on the Coastal Zone Policy of 2005, the Coastal Development Strategy (CDS) was developed and adopted by the Government in 2006. The CDS identifies nine strategic priorities: (a) ensuring fresh and safe water availability, in the context of regional water resource management (b) safety from manmade and natural hazards (c) optimising the use of coastal lands (d) promoting economic growth with an emphasis on non-farm rural employment (e) sustainable management of natural resources (f) improving the livelihoods of people, especially of women (g) environmental conservation (h) empowerment through generating and disseminating information (i) creating an enabling institutional environment. The work of CDSP IV covers, to a greater or lesser extent, all nine of these priorities

40. **Harmonization with Donors**: CDSP IV was jointly funded by IFAD and the Netherlands, and was planned to form part of a broader Integrated Coastal Zone Development Programme which was being planned as a framework for multi-donor support. This

cooperation with the Netherlands followed on from the Market Infrastructure Development Project in Charland Regions (MIDPCR) where the Netherlands has provided a grant of USD 5 million alongside the IFAD loan. The project was also closely linked to the Danida funded Agricultural Sector Programme Support Phase II, which undertook parallel fisheries and livestock development activities in the project area.

C.2 Internal logic

41. The project aimed to support the livelihoods of settlers in recently emerged chars. These are often families who have lost land to river erosion in nearby areas, who migrate to the newly formed land for shelter and livelihoods. A power broker, in many cases with ancestral links to newly accreted char land, tends to extend support and patronage to settlers. This type of autonomous settlement leads to a situation in which the official process of land settlement cannot start with a clean slate. Settlers are already present in new chars with active control over land before the official process has even started.

42. Powerful people, commonly known as *jotdar*, and the settlers controlled by them, occupy the land, begin with felling trees (the Forest Department plants mangroves on emerging chars), constructing thatched houses on raised mounds and digging ponds for drinking water and a little fish culture. The Forest Department is just not able to protect the plantations because it lacks the manpower and it faces influential opponents with political connections. Armed gangs (*bahinis*) are the local strong arm of the *jotdars,* and impose a regime of fear and terror on the settlers, often violating basic human rights. They extract large amounts of money from the settlers in exchange for the control over and use of a piece of land and for “protection”.

43. No institutions are present, except *samaj* (local communities), and mosque- and *madrassa* committees. These new chars, usually with a level of less than 3m PWD, are subject to regular flooding. There is no access to drinking water, especially in winter, and no system of communication. For food, the settlers are dependent on a low-yielding rice *aman* crop, limited *rabi* crops (the land is highly saline, and a little fish from ponds or caught in open waters. Some income is derived from tending cattle (often share-owned). People have no official title on the land they occupy. They are vulnerable to severe risks from flooding, storms and saline intrusion.

44. To support livelihoods in such a scenario and to make sustainable improvements stick, CDSP and its stakeholders need take a range of actions to address multiple challenges:

- To fill the institutional vacuum by: (i) creation of community organisations; (ii) bringing in local government institutions (offices were constructed for two new Union Parishads); (iii) getting government service agencies committed to the area (six government agencies are partners in implementing CDSP); and (iv) expanding and strengthening service delivery by NGOs.
- To improve the law and order situation through filling the institutional vacuum, improving communications, and breaking the power of the *bahini* through giving settlers legal title to their land; along with improved physical security from storms and cyclones through protective embankments and tree shelter belts, and by construction of cyclone shelters (some of which contain police camps) and a programme for disaster preparedness.
- To increase the productivity of the land through flood protection and drainage, introduction of better farming technologies, and incentives for investment by farmers in their own land though having secure tenure to this land.
- To provide access to markets through improved road communications, construction of public markets and support for market-orientated businesses.

- To broaden the economic base of the char community through development of: (i) more productive agriculture; (ii) new cash crops; (iii) trees for fuel, timber and fruit; (iv) access to credit for investment; (v) skills and knowledge of the population; and (vi) links to government service providers and the private sector.
- To ensure the welfare and equity of the population, especially for women and children, through promotion of human and legal rights, a community health programme, and establishment of schools in cyclone shelters. Homestead based farm and non-farm enterprises gave new opportunities for women to earn their own income.

C.3 Adequacy of design changes

46. Sub-component 1a: While the construction of retired embankments has plugged the gaps left by erosion of embankments, there is still a gap where a khal drains out. This was originally filled by a sluice (DS-2) which was also lost to erosion. Water continues to enter char Nangulia via this khal, along with silt which will reduce the effectiveness of the re-excavation of this khal. With erosion continuing (although possibly slowing down in some locations), some dwarf embankments have been constructed in the last months of the project to create a separate hydrological polder on Noler char – these may well need to be up-graded to sea-facing.

47. Sub-component 2a: Although significant savings were made with no loss of functionality by constructing culverts instead of bridges, rising unit costs and the need for additional funds for retired embankments, meant that the overall the amount of internal infrastructure developed was less than planned at design. The reduced number of cyclone shelters can only accommodate around half to two-thirds of the population. Fewer roads than planned were converted from brick to a smoother and more durable bitumen surface. Additional culverts were constructed to deal with problems of drainage congestion, but some more may be needed.

48. Component 3: the one year extension of the project period may allow MoL to reach, or almost reach, the revised target of 14,000 households with land titles in CDSP IV. However continuing boundary disputes mean that it will not be possible to complete land settlement work in the CDSP III area.

49. Sub-component 4a: At the time of the second revision of the DPP, the Ministry of Agriculture decided not to extend the DPP for DAE on the grounds that physical targets had been achieved, although there were still unspent funds in the allocation for this sub-component. This meant that support to farmers from DAE was wound down to what DAE can manage through its regular staff and funds from other projects.

50. Sub-component 4b: Livestock and aquaculture were added to the homestead-based livelihood activities supported by the PNGOs. Both the TA team and PNGOs hired specialist staff this activity and a much larger number of households were reached than were being supported through the Danida funded RLDC. While it was a good approach to develop community service health services providers for livestock and poultry, considering the number of livestock and poultry in the chars, these services only reached a relatively small proportion of livestock producers[7]. One problem appears to be the limited availability of vaccines from the Department of Livestock Services, but the effort may have needed to have been larger to have a greater impact.

[7] The impact survey estimated that the population of poultry is about 500,000 and bovines about 70,000. Poultry workers vaccinated 51,695 birds at least once, while 4,926 bovines were vaccinated by paravets in the period June to December 2017 – these animals require vaccination two or three times per year.

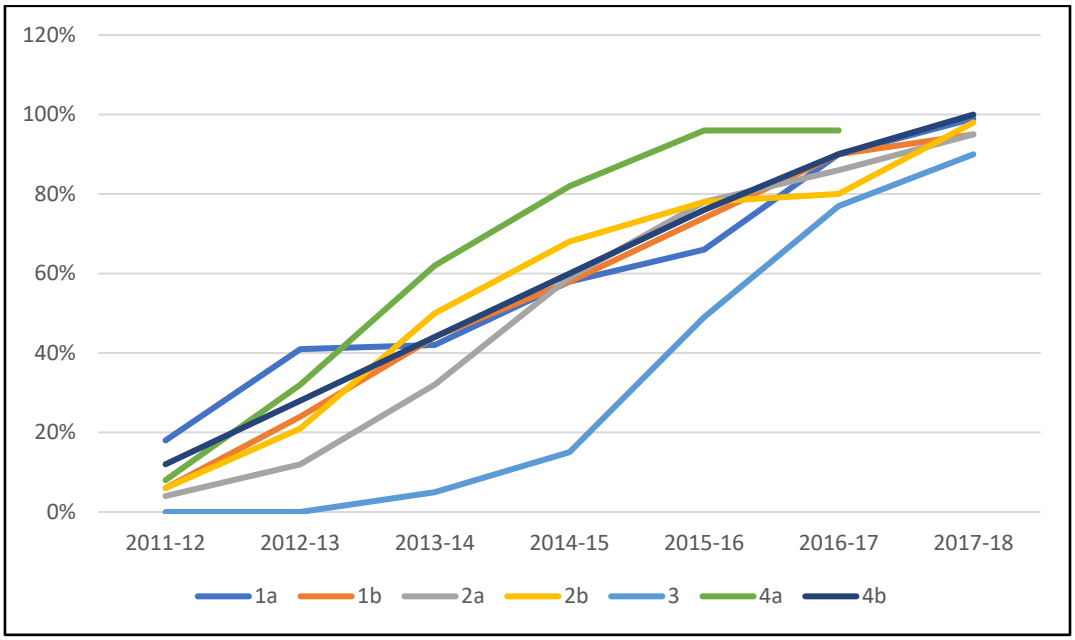
D. ASSESSMENT OF PROJECT EFFECTIVENESS

51. **Overall performance.** At completion, the effectiveness of the project is rated as *highly satisfactory (score of 6)*

D.1 Physical targets and output delivery[8]

52. **Overall performance.** At completion, the overall project implementation performance is rated as *satisfactory (score of 5)* with respect to the revised targets for project outputs. Figure 1 shows cumulative physical progress for each sub-component. Water management works of BWDB (component 1a) got off to a quick start, while land titling (component 3) only really got going in the second half of the project period due to the time needed for preparatory works, including the plot-to-plot survey (which was part of the Technical Assistance component that is not shown in the graph). The internal infrastructure works of LGED (component 2a) also initially lagged behind other sub-components, but later caught up. Component 3a (Agricultural support, was implemented by DAE within a five year period and this component was terminated after six years.

Figure 1: Cumulative physical progress of each sub-component



53. In the appraisal document and DPPs project activities were planned to be implemented over a six-year period, with the project agreement between GoN and GoB being for six years. However, the IFAD loan agreement allowed for a seven-year project period, as it was felt that delays could well occur. In particular, there were concern that the fund flow for an IFAD loan to six different implementing agencies could take some time to get going, as previous phases of CDSP had been funded through a grant from GoN. There were also uncertainties over how well coordination and management arrangements would work for a loan rather than grant funded project.

54. In practice, the funding, coordination and management arrangements worked well, and the major part of project activities might well have been implemented within a six year period if it were not for the severe river bank erosion. This erosion was more severe than would normally be anticipated (see IFAD ISM report of September 2015). As a result, the protective embankments, which were basically completed in the first three years, mostly had to be replaced with retired embankments built in the last months of the project. The location of other

[8] Only key outputs are presented here with details in Appendix 8.

works (DS-3 and river closures) was delayed as they were shifted to new locations less at risk of erosion.

55. The other element of the project that could not have been completed in six years was land settlement. CDSP IV inherited a backlog of land settlement cases from CDSP III, and had to face numerous problems in the CDSP IV areas that caused delays.

Component 1: Protection from climate change

Sub-component 1a: Water management

56. The progress of this sub-component, implemented by BWDB, was significantly impacted by river erosion. Having constructed most embankments in the first three years, most of the major sea dykes needed to be rebuilt as retired embankments. Originally the plan had been to construct 17 km of sea dyke, but in total 27 km were built or re-built. Construction of retired embankment involved displacement of people who had settled within the polders and there was a need to compensate them for loss of land – this was funded out of the GoB contribution to project costs, but the payment of compensation was s significant issue for the affected households (see stakeholder feedback in Appendix12[9]). The construction of retired embankments were delayed until near to the end of the project period so to be able to take account of any changes in the rate and location of erosion. This meant the work needed to be done as quickly as possible.

57. In total three large and three small drainage sluices were built. The three small ones were in Ziauddin char. One of the large sluices, DS-2 on char Nangulia was lost to erosion, and still needs to be replaced, with tidal water entering the khal it was to have controlled. The six river closures went ahead, although some were relocated and redesigned. The amount of khal excavation to be done was reduced from 205 km to 145 km during revision of the DPP, and this has largely now been done. Khal re-excavation was also greatly reduced – from 205 km to only 12 km, of which 3.7 km has been done. Details are in Annex VIII.

58. In total 24 WMGs have been formed, each having between 20 and 56 members. WMG were provided with tin-shed type centres for meetings. There were significant delays in construction of some of these buildings – WMG were meant to build them themselves, but some were not able to do this within the allowed budget, and others had problems in finding a site. WMGs have been trained and supported by CDSP IV – but the amount of training delivered was significantly less than in CDSP III (Technical Report 15) – although more has recently been done in the closing months of the project. One problem has been that BWDB has been unable to provide its own extension staff to do this work, which then become the responsibility of the TA team.

59. The total allocation for this sub-component was increased in the last revision of the DPP to allow for construction of retired embankments. Actual expenditure is likely to be less than this revised amount due to: (i) reduction in unit cost of embankments by around 33% due to the use of excavators rather than labour for earth moving – this also enabled the work to be done more quickly; (ii) reduction in the cost of a river closure after it was re-located (due to erosion) and re-designed; and (iii) delays in payments of compensation to households loosing land to retired embankments.

Sub-component 1b: Social forestry

60. With revision of the DPP there were some small changes in targets for social forestry plantations. There are some modest shortfalls in some of the revised targets for the volume (km or ha) of plantation work to be done (see Appendix 8). Erosion of embankments and the recent construction of retired embankments meant that only 35 km rather than 50 km of embankment planting were done. Foreshore planting was hindered by existing occupation of

[9] Stakeholders also complained of the lack of compensation for land taken for internal infrastructure (sub-component 2a). However, it is not the normal practice of LGED to pay for land acquisition.

this land as well by erosion, but the target of 200 ha was planted, of which 65 ha were lost to erosion. Block plantations were held back by lack of any provision to plant trees on mounds in locations likely to flood, and of the target of 100 ha, 87 ha was planted, of which 35 km was lost to erosion. The target of 7,400 ha for mangrove planting was met, but 3,800 ha has now been lost to erosion, occupation by the army and encroachment by settlers. Of the total target of 418 km for road and canal-side planting, 348 km were planted, of which 44 km were lost to erosion. Targets for planting on killas and at institutions were met.

61. As planned, a total of 630 SFG were formed, but 49 have lost their trees due to erosion. These SFGs have about 25 members each, with over 40% being women. SFG have signed agreements with the Forest Department to get a share of the benefits from plantation – they are allowed to take branches for firewood and get a share of the final value of the trees when they are felled at maturity.

Component 2: Climate-resilient infrastructure

Sub-component 2a: Internal infrastructure

62. This sub-component, implemented by LGED, had a slow start, with delays in the first two years due to a sharp increase in the cost of construction materials. This meant that it became necessary to reduce the number of cyclone shelters from an appraisal target of 60 to 42 to fit within the project budget. Increasing costs also meant that bids from contractors exceeded the maximum amount allowed in LGED's official schedule of rates. This meant tenders failed, causing more delay. After market rates were accepted instead of strict adherence to the rate schedule, construction got going and good progress was made. Considerable cost savings were made by reducing the number of bridges, routing one road over a river closure, and replacing other bridges with box culverts.

63. At the second revision of the DPP there was a small reduction in the total allocation for this sub-component in order to allocate funds for retired embankments. As a result, some roads that were to have been upgraded from a brick to bitumen pavement, have remained as brick. Boat landing ghats and a bus stand were dropped as no longer needed. but other works were done as planned, including 7 rural markets, 17 killas, two Union Parishad office complexes and two cluster villages. The latter were built after some delay in finding locations not at risk from erosion. The idea behind these villages was to accommodate people who had been displaced by foreshore plantation. In a departure from normal cluster villages, each house was allocated 0.2 ha of land for vegetable, fruit production, or to keep animals. About five cyclone shelters and some earth road were built outside of the CDSP IV chars on chars identified for CDSP V. LGED also carried out maintenance of roads, cyclone shelters and public toilets on Boyer char (CDSP III) using GoB funds for CDSP IV.

64. Some works for both sub-components 2a and 2b were undertaken by Labour Contracting Societies LCS). These are groups of men and/or women from the local community who are contracted to undertake construction works in place of a contractor. CDSP IV LCS guidelines aimed to ensure that people from poorer households were selected for this work. The work was initially mainly earthworks for roads, but later (on advice from IFAD) this work was expanded to construction of rural markets and other works. An assessment of LCS (Technical Report 17) showed that, up to September 2017, there had been 56 LCS contracts with LGED, valued at a total of Tk52.4 million. These involved a total of 1,247 men and 381 women, generating a total of 86,991 days of employment. More work has been undertaken since then. The quality of works undertaken by LCS is generally thought to be better than that from small contractors, although they needed more support and guidance from LGED.

65. Total expenditure on this sub-component has been less than that in the revised allocation as it has not been possible to construct one or two of the planned cylcone shelters due to land erosion.

Sub-component 2b: Water and sanitation

66. This sub-component, implemented by DPHE has substantially met its targets. The original target of 1,160 DTW for domestic water was increased to 1,532 in the revised DPP and 1,475 have been sunk (103 lost to erosion). The original target for 23,909 household water sealed ring-slab latrines was increased to 26,909. Actual construction was 25,639, of which 710 have been lost to erosion. Some of the DTW and latrines were constructed on the proposed CDSP V chars. DPHE has also sunk a few replacement DTW and provided additional latrines on Boyer char to meet the needs of the rising population.

67. At the start of the project it was found that contractors were unwilling to manufacture ring-slab latrine for the rate offered by DPHE. At the suggestion of IFAD, this work has mostly been undertaken by LCS. Up to September 2017, 11 LCS contracts worth Tk4.38 million had generated 1091 days of work for men and 642 for women.

68. DPHE has worked closely with PNGOs, who have been responsible for forming tubewell user groups (TUG) with about 15 women members, and collecting Tk1400 from each group, that is transferred to DPHE as a contribution towards the cost of the DTW. PNGOs also selected and trained two women from each group as caretakers – who were given tool kits for simple maintenance tasks. In addition, PNGOs, who had WATSAN coordinators in each branch office, selected households for latrines, and raised awareness of the importance of good hygiene practices in 9,874 TUG meetings, with a special programme for 3,105 adolescent girls. DPHE is rightly proud of achieving "100% total sanitation" in CDSP IV.

Component 3: Land settlement and titling

69. This component is one of the unique features of CDSP. Nowhere else are thousands of families given legal title to their land. This component was implemented by the Ministry of Land through the District Administration, with the Deputy Commissioner as PD. The initial plot-to-plot survey to establish which family is living on what plot of land was undertaken by surveyors contracted by the TA team. The original project target was to complete the process of land titling for 3,842 families from CDSP III in Boyer char and provide 20,000 titles in CDSP IV[10]. The CDSP IV target was reduced to 14,000 titles following the loss of a substantial proportion of Caring char to the army..

70. A total of 2,138 titles have been granted for Boyer char, but continuing disputes about the upazila boundary between Hatiya and Ramgati means that this is all that will be achieved. In the CDSP IV area, to date 11,944 titles have been granted and it is hoped to get close to the target of 14,000 by the end of the project – despite around 1,500 households dropping out of the land settlement process due to loss of their land to erosion. Although successive phases of CDSP have streamlined the process, land titling is a lengthy process subject to many delays – in the PTPS, disputes over occupation, legal challenges, and transfers of government land staff.

71. Another area where CDSP IV has made good progress has been with the computerised Land Record Management System (LRMS). This had been started during CDSP II, but was still at an early stage. Under CDSP IV a software company was contracted who developed the software than is now installed and in use in district and upazila offices. This allows data on land to be entered from different locations.

[10] Urir char that was not included in CDSP IV land titling due to uncertainty regarding the boundary between Chittagong and Noakhali districts

Component 4: Livelihood support

Sub-component 4a: Agricultural support

72. To implement this sub-component, DAE recruited nine field and technical staff who worked alongside DAE's regular staff[11]. DAE formed 90 Farmers' Forums (FF) at mass meetings, each with 60 members. The total membership of FF, 5,400 was about 20% of the total number of farmers in the project area, and was a considerably higher than the coverage of around 6% in CDSP III. FF members had regular monthly meetings with DAE staff and one day training sessions covered all FF members. In addition, 1,900 farmers participated in four day residential training at the N-RAS training centre in Noakhali. This training covered a range of seasonal topics and was provided by officers from other agencies as well as DAE. Farmers on these courses visited different research stations, seed farms etc. for hand-on training. In addition, 13 Training-of-Trainers courses were organised for DAE and PNGO staff from the project area. Posters and other publicity material was produced.

73. To disseminate new ideas and technologies, 72 farmer tours were organised to take farmers to see places of technical interest in the region. A total of 1,080 demonstration plots showed farmers new technologies – especially new varieties – and 84 field days were organised around these demonstrations. Seeds and equipment, along with pheromone traps were distributed. As a result, a number of new varieties of paddy, rabi crops and vegetables have been widely adopted, and pheromone traps are often seen in those crops where they are effective.

74. DAE monitored progress and made plans for its next season through a series of seasonal and annual workshops which were attended by a wide range of stakeholders. Salinity levels were monitored and a number of surveys carried out. DAE achieved all the physical targets in its DPP and, although there were still some unspent funds, the Ministry of Agriculture decided not to extend DAE's DPP beyond December 2016. In fact, Appendix 8 shows that almost all DAE activities were implemented in a four year period 2012-13 to 2015-16.

Sub-component 4b: Social and livelihood support

75. This sub-component was implemented by four PNGOs, who established 13 branches on the project chars (but two were lost – one when when the army took over much of Caring Char and another to erosion). The PNGOs were contracted to form women's micro-credit groups covering all interested households – the project provided part of their staff costs. In total 26,373 women joined these groups (representing just over 90% of all households). PNGO provided credit funds using group member savings and their own resources. PNGO also recruited a staff to implement programmes in health and family planning, legal and human rights, disaster management, and homestead-based livelihoods (vegetables, poultry, livestock, aquaculture). In total PNGOs have employed around 233 staff, of whom up to 24% were female.

76. For the health programme, PNGOs employed a paramedic (medical assistant) in each branch and held fixed and mobile clinics (total of 16,966 clinic-days up to December 2017 treating 178,514 patients). For each branch three local women was employed and trained to be a Health and Family Planning Facilitator – who made 152,110 home visits and held 46,420 group Health Forums, distributing iron tablets, anti-worm tablets, micro-nutrient sachets, oral rehydration salts and contraceptives. They also monitored blood pressure, and advised on feeding of infants, and on family health and nutrition. Each branch also trained and equipped 15 Traditional Birth Attendants, who delivered 13,100 babies. A revolving fund allowed each branch to hold a stock of medicines, selling Tk6.0 million of medicine with no profit mark-up.

77. The legal and human rights (LHR) programme was supported by an LHR coordinator in each branch. The programme involved training three local women per branch as Legal and

[11] DAE had no permanent field level staff (Sub-Assistant Agricultural Officers) based in the CDSP IV chars.

Human Rights Promoters (LHRP), as well as a range of workshops and training for 13,173 women. LHRPs set up 1,229 Law Implementation Committees at the samaj level which held 4,536 meetings, and lobbied on LHR issues, such as registration of births and marriages and the prevention of early marriage.

78. The Disaster Management initiative formed 13 Auxiliary Disaster Management Committees which were linked to the official Union Disaster Management Committees. Training was given to 3397 people, with 7608 awareness meetings with the microfinance groups. House strengthening was done for 417 very poor households, mainly female headed and mostly on Caring char. Training on making improved stoves was given to 260 people, and 5,765 stoves were built.

79. To develop homestead livelihoods, PNGOs employed agricultural specialists in each branch. A total of 21,902 people were trained in livestock, poultry, vegetable and fish production. In the non-farm sector 199 women were trained for 30 days in tailoring and given sewing machines. Of these, 125 took up tailoring as an IGA, and some of them trained other women.

80. Poultry, livestock and fishery activities started in 2014, and PNGOs employed six poultry and livestock coordinators. To provide preventive health services 12 paravets and 114 poultry workers were recruited and trained to provide fee earning services. Fodder grasses were demonstrated on 12 plots and Sonali cross-bred chicken in 30 households. To improve supplies of fingerlings, 150 people (mostly women) were trained to operate nurseries and 133 went into fingerling production. For fish production 5440 farmers were trained, of whom 1050 given extra training and support as model fish farmers.

81. The value chain development scheme trained 13,520 farmers and carried out 9,476 demonstrations (high value crops, pest control, fruit orchards, vermicompost and rainwater collection ponds), along with tours and field days. With specialised training, 125 tree nurseries were developed, with 110 becoming business enterprises.

82. In the last two years of the project, support for PNGO activities was phased out. In December 2016 support was cut back to only six branches, with all support ending in December 2017. The branches continue to operate micro-finance and are have some programmes funded by other agencies or from the PNGO's own resources.

Component 5: Technical assistance and management support

83. A consortium of international and national consulting companies was selected to provide the TA team for CDSP IV. These were Euroconsult Mott MacDonald, BETS and Socioconsult. The TA team consisted of 11 professional, 44 technical and 23 support staff, plus short-term contract staff. In the last two years of the projects these numbers were gradually reduced.

84. The TA team supported each IA and the Project Management Committee (PMC) chaired by the Project Coordinating Director (BWDB PD). The TA consortium contracted the four PNGOs to implement the Social and Livelihood Support sub-component and supervised their activities in the field. The TA team supported planning and tendering of works, and a quality control system ensured the quality of these works.

85. The TA team was also responsible for monitoring and evaluation, reporting, consolidation of financial statements, and preparation for Withdrawal Applications. The TA team has also provided training to IAs and, in key subjects, to FLIs and farmers.

D.2 Project outcomes and impacts

86. **Overall performance.** At completion, project outcomes and impacts are rated as *highly satisfactory (score of 6),* with almost all logframe targets for objectives and outcomes being exceeded.

1. Project outcomes[12]

Outcome 1. Water resources managed effectively to protect land from tidal and storm surges, improve drainage, and enhance accretion

87. Indicator 1a: 80% WMG rated effective/ sustainable. The assessment of WMG carried out in 2017 (Technical Report 15) rated all CDSP IV WMG according to a number of governance, management and operational criteria. Out of 24 WMG, 4% were rated A (highest). 46% B, 21% C and 13% D. A sample of WMG from earlier phases of CDSP were also rated, with CDSP III WMG achieving significantly higher ratings than those in CDSP IV. These CDSP III WMG had received more training than those in CDSP IV as well as some support during CDSP IV. This suggests that CDSP IV WMG need more training (more was provided in 2018) and continuing support during the next phase of CDSP.

88. Indicator 1b: 70% of poldered land has reduced soil salinity and flooding, and improved drainage. Monitoring by DAE on all five chars shows that in March (when salinity as at its highest) average soil salinity declined from as ECe of 23.2 ds/m in 2012 (which is classed as extremely saline) to 7.7 ds/m (moderately saline) in 2016 In the impact survey of 2018 (Table 1), many fewer farmers located inside a polder reported significant damage to homestead vegetables. The difference for aman was smaller, but still significant for flood damage.

Table 1: Percentage of farmers reporting moderate or heavy crop damage

Source of damage	Crops	Inside polder	Outside polder
Salinity	Aman paddy	21%	22%
	Homestead vegetables	8%	25%
Flooding	Aman paddy	20%	27%
	Homestead vegetables	2%	23%
Waterlogging	Aman paddy	21%	22%
	Homestead vegetables	8%	25%

Source: impact survey 2018, more detailed data in Appendix

89. More farmers inside polders also report reductions in crop damage, especially from flooding, than those outside polders (Table 2). Improved drainage developed by CDSP IV may help account for the reported improvements to crops outside the polder.

[12] These outcomes are organised in accordance with the CDSP IV logframe updated at PCR.

Table 2: Percentage of farmers reporting reduced crop damage

Source of damage	Crops	Inside polder	Outside polder
Salinity	Aman paddy	96%	78%
	Homestead vegetables	96%	78%
Flooding	Aman paddy	95%	64%
	Homestead vegetables	96%	65%
Waterlogging	Aman paddy	94%	82%
	Homestead vegetables	95%	77%

Source: impact survey 2018, more detailed data in Appendix

Outcome 2. Improved road communication, infrastructure available for multipurpose use, and safe water and hygienic sanitation ensured.

90. Indicator 2a: Better communications to different places. Prior to CDSP IV, there were no brick or bitumen paved roads on the project chars. Impact survey data shows that 75% of journeys to schools and markets now use paved roads, with the average distance being 1.5 km to school and 2.5 km to market. The journey time to school has been reduced by 50% and to market by 60%. A rapid survey of transport operators and users shows that there has been a 60% to 80% reduction in the cost of transporting agricultural products.

91. Indicator 2b: Number of people having access to shelter: Prior to CDSP IV there was only one cyclone shelter on project chars. This was on Urir char and has now been lost to river erosion. The project has built a total of 40 cyclone shelters, 37 of them on the five CDSP IV chars and the remainder on chars earmarked for CDSP V. With a capacity of 2,500 persons each, these 40 shelters can provide refuge for 100,000 people, but the capacity of the 37 shelters on CDSP only amounts to about 50% of the population.

92. Indicator 2c: Number of children attending school in shelters The rapid survey of cyclone shelters (Technical Report 14) in mid-2017 showed that schools were operating in 29 of the 31 shelters that were then complete, with a total of 7,746 pupils (49% girls). Eight of the shelters were being used as clinics, one as a police camp, and one as a navy camp. Four were also used for CDSP IV FLI meetings and training courses.

93. Indicator 2d: 21,000 households with access to safe water and hygienic sanitation. Prior to the start of CDSP IV, the baseline survey of 2011 showed that 99% of households (27,720) used water of reasonable quality from tubewells, but they had to go some distance to collect this water (345 metres in the dry season, and 418 metres in the wet season). Now all 29,000 households have access to tubewell water – most from CDSP DTW – much closer to their homes at 59 metres in the dry season and 61 metres in the wet season.

94. The baseline survey showed that, in 2011, only 6% of households (1,680) were using hygienic latrines. Now this has increased to 98% (27,442 households), 91% of whom have received water sealed ring slab latrines from CDSP IV.

Outcome 3: Secure possession of land

95. Indicator 3: Number of households maintaining possession of land. Prior to the start of CDSP IV, only 1.2% of households (336) had secure title to their land (baseline study 2011). The 2018 impact study shows that 61% now have secure titles (*khatian*). Evidence of such possession being maintained over an extended period of time comes from earlier phases of CDSP. The 2017 AOS shows that 87% of CDSP III households have *khatians*, as do 58% of those from CDSP I&II.

Outcome 4: Improved livelihoods and household resilience

96. Indicator 4a: 20,000 farmers report adoption of improved farming practices With improved water management, reduced salinity, access to markets, and improved knowledge and technical support, CDSP IV farmers have enthusiastically adopted a range of new farming practices. The most prominent of these is the adoption of modern high yielding varieties of rice and other crops (see Technical Report 16 on Farmers Forums). The benchmark agricultural survey of early 2012 found than only 2% of farmers were growing HYV aman paddy. This proportion increased to 87% over the following 5 years (impact survey 2018). This adoption of HYV aman alone represents 20,600 farmers. Boro (dry season) paddy was grown by 16% of households in 2017 (more in the current season), almost all of whom use hybrid seed, which was unknown in the area prior to CDSP IV. Linked to the use of hybrid seed, farmers are transplanting single seedlings at a younger age. Instead of just using urea (N), farmers now apply a range of fertilisers with P and K along with zinc and gypsum.

97. In areas of poor drainage, the sorjon system of integrated vegetable and fish production now covers around 350 to 400 ha and is used by 44% of those growing field vegetables. Significant numbers of farmers are using biological means of pest control including pheromone traps, along with vermicompost. New vegetable varieties have been tried and adopted by 74% of vegetable producers – amounting to 21,200 adopting households.

98. However, some technologies have not yet caught on. Very few farmers transplant paddy in lines, which enables the use of labour-saving push weeders (only 3% of households use these – Impact Survey). As in other parts of Bangladesh, urea super-granules (USG) have not been adopted due to difficulties in application. Although most farmers (58%) now use peddle threshers, power-driven threshers are so far only used by 25% of farmers. Rainwater harvesting ponds for irrigation of vegetables were widely demonstrated by CDSP IV, but have not been adopted by other farmers. Relatively few households (25%) report using de-worming medicine on their livestock, and even fewer (6%) use artificial insemination.

99. Indicator 4b: Number of women involved with their own IGA The impact survey showed that 68% of women (a total of 33,200) earn an income. Moreover 95% of spouses said that livestock was their secondary occupation (housewife being their primary occupation). Over 120 women are running tailoring businesses, having been trained by CDSP, and a similar number are running plant nurseries. Other women have a range of farm and non-farm enterprises – fish ponds and fingerling nurseries, vegetable production in both the homestead and sorjon plots, grocery shops handicrafts and petty trade (see Technical Report 18 - Gender Impact Assessment, and Progress Report 12). In the eighth round of PME, 62% of women reported having a direct IGAs (Appendix 16). Women were trained as Poultry Workers, and over 50 are earning an income from vaccination of chickens and ducks.

100. Indicator 4c: Percentage of households using health and family planning services. These services reached the 27,654 households registered by the PNGOs – and other households may well have also been befitted – so it is likely that at least 90% of the char population were served. The assessment in Technical Report 18 shows that 96% of the women's consultation groups rated that the services from CDSP Health and Family Planning Facilitators and the Traditional Birth Attendants as very useful. Data from PNGOs shows that the Contraceptive Acceptance Rate (CAR) increased from 41% in 2012 to 91% in 2017. The impact study shows 100% of eligible couples using family planning methods, and 99% of children being vaccinated (figures at baseline were 34% and 52%).

101. Indicator 4d: Percentage of women aware about legal rights. The Knowledge Attitude Practice evaluations carried out by the CDSP IV M&E unit found that knowledge of legal and human rights was good for 58% of sample women and moderate for the remaining 42%. The knowledge gained was practiced by 72% of the sample (Appendix 16). The Gender Impact Assessment (Technical Report 18) reported that women are now more aware of their rights. For instance, early marriage and wife beating has been reduced, and stopped altogether in

those families who received land title or have joined CDSP PNGO microcredit groups. Men are now aware about women's rights. Generally, they have stopped passing unfavourable comments about women's activities.

2. Project impacts

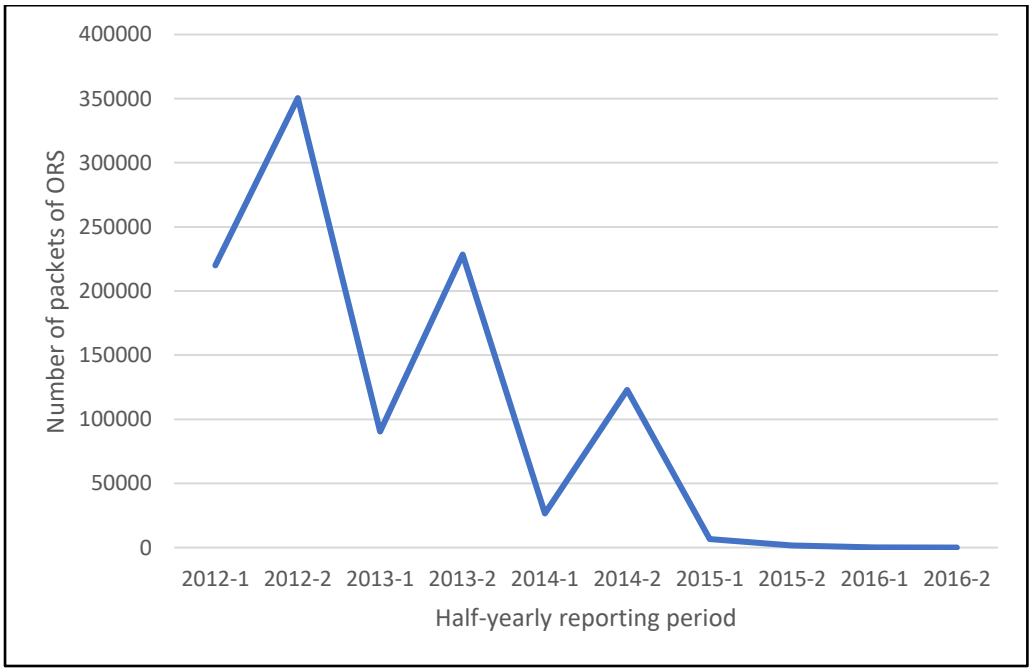
Development objective (logframe purpose): Improved and more secure rural livelihoods for 28,000 households in coastal chars.

102. Indicator 1: 20,000 households reporting increased agricultural production. Paddy is the dominant crop in the project area, accounting for 80% of the total area of all crops. Data from the impact survey shows that 79% of all households (22,850 households) report increased paddy production – this being 93% of all paddy producers. The overall increase in production is estimated from impact survey data at 127%. However, this is based on farmers' recall of their total production six years ago and may not be totally accurate. Other sources suggest that the increase in production may be considerably higher. Farmers attending the PCR stakeholder workshop, and interviews with Water Management Groups and Farmer's Forums (Technical Reports 15 and 17), as well as the Mid-Term Agricultural Survey carried out with DAE in 2015, all say that paddy production increased by three times (or more).

103. Indicator 2: 40,000 people in income-earning occupations. The impact survey recorded that, on average, each household has 2.87 members (1.73 men and 1.14 women) earning an income – out of a total of 6.4 persons. With a total population of 29,000 households, this amounts to 83,592 persons in earning an income, of whom 40% are women.

104. Indicator 3: 21,000 households with improved health practices and outcomes. The baseline survey estimated that 94% of households (26,320) were washing their hands with plain water after using the latrine. Six years later, the impact survey found 95% (26,320 households) were using soap or ash when washing their hands. The installation of hygienic latrines and clean water from DTW, as well as adoption of improved practices, such as hand washing, have dramatically reduced the incidence of diarrhoea. Diarrhoea was identified as a major problem at the start of the project, and packets of oral rehydration salt (ORS) were distributed in large numbers. As the incidence of diarrhoea was reduced, demand for ORS fell and was eliminated by 2016 (Figure 2). This improvement in health was confirmed in FGD during the Gender Impact Assessment (Technical Report 18).

Figure 2: Distribution of oral rehydration salts



Project goal: Reduced poverty and hunger for poor people living on newly accreted coastal chars.

105. Indicator 1: Increase in household income. Data on household income was collected by baseline and impact surveys. This shows that average annual income per household increased by four times from Tk71,950 in 2011 to Tk296,925 in 2017. Even if an allowance is made for inflation of 60%[13] over this period, the increase is still 157%. The magnitude of the increase is confirmed by annual tracking of income in AOS and by the stakeholder PCR workshop – where farmers said their income had increased by three of four times.

106. Indicator 2: 50% increase in household assets. Data on asset ownership was collected in the baseline and impact surveys. This shows the average value of assets per household increased by over seven times – from Tk35,162 to Tk261,480. Allowing for inflation the increase is over 4.5 times. These assets include household goods and productive assets for farm and non-farm businesses, but not the value of land and houses.

107. Indicator 3: Number of households with five months or more of food shortage reduced from 46% to 23%. At baseline the survey recorded that 82% of households suffered from acute food shortage (although the period of shortage is not defined so it may be less than five months). This has now been reduced to only 4% of households. AOS data shows how CDSP IV caught up and slightly surpassed households in the older areas in terms of this indicator of food security. The average period that households are able to meet their basic (i.e. rice) food needs from their own production has increased by 51% from seven to 10.6 months, and 69% of households now produce enough for the entire year.

3. IFAD impact domains

(a) Household income and assets.

108. The improvement in household income and assets is *rated as highly satisfactory (score=6)*. The increase in these goal level indicators has already been mentioned. Table 3 shows income at baseline and completion for each char. Average income in Urir char is significantly higher than the other chars. Although this is an island cut off from the mainland with no flood protection embankment, it is less densely populated with larger land holdings. There is also ample land for grazing herds of cattle, buffalo and sheep.

Table 3: Average annual household income (Tk)

Name of char	Baseline 2011	Impact 2017
Ziauddin	65,743	241,213
Nangulia	69,152	278,089
Noler	69,281	292,322
Caring	71,475	260,604
Urir	104,400	509,514
All CDSP IV chars	71,950	296,925

Source: Impact and baseline surveys

109. Although the share of farming in rural income would be expected to be declining with the growth of the non-farm sector and employment, data for CDSP IV (Table 4) shows some growth in the share of income from the farm sector, which may be linked to improvements in farming bought about by CDSP IV. Although the share from field crops has declined, homestead production, livestock and poultry have all expanded their shares. The non-farm sector still provides 60% of all income (although some employment and trade will be linked to

[13] Increase in consumer price index – source World Bank

the farm sector), but the share from employment has fallen, possibly due to better opportunities in farming.

Table 4: Share of income by sub-sector

	Baseline 2011	Impact 2017
Field Crops	21.7%	15.9%
Homestead	4.3%	7.9%
Livestock	3.7%	9.3%
Poultry Rearing	2.6%	3.2%
Aquaculture	3.8%	3.7%
sub-total	36.1%	39.9%
Wage/Salary	46.4%	33.4%
Petty trade/business	9.6%	11.8%
Rickshaw/Van	3.8%	1.4%
Fishing/PL	2.9%	3.2%
Remittance	0.8%	6.2%
Handicrafts & other	0.4%	4.1%
sub-total	63.9%	60.1%
Total	100.0%	100.0%

Source: Impact and baseline surveys

110. There has been an even larger growth in asset value than income. The share of this value by different classes of assets is shown in Table 5. This shows that the share of farm and non-farm assets have significantly increased, while that for livestock has fallen (despite growth in the numbers of animals and birds. The main non-farm asset are shops (mainly grocery shops). Although these are only owned by only 10% of households, they are valuable assets. The main farm asset are trees, which are owned by virtually all households who have planted some hundreds of fruit, timber and palm trees around their homesteads and ponds, and on field boundaries. The main household asset is jewellery, although solar power systems have also become significant.

Table 5: Asset value and categories of assets

	Baseline 2011	impact
Average value per household Tk	35,162	261,485
Share of value		
Household assets	21%	19%
non-farm enterprises	3%	12%
farm assets	13%	41%
Livestock and poultry	62%	26%
Total	100%	100%

Source: Impact and baseline surveys

111. Two of the sample of 1004 impact survey households had lost all their land to erosion and were now squatting on an embankment. The other 1002 owned or informally occupied an average of 199 decimals (0.8 ha) of land (Table 6). Only 6% of these households had less than 50 decimals (0.2 ha) which meant they would be classified as functionally landless, with 30% in the marginal farmer category (0.2 to 0.6 ha), 44% in the small farmer group (0.6 to 1.0 ha) and 21% with over 1 hectare (mainly on Urir char). An average of 48 decimals (0.19 ha)

per household is either leased in (by 27% of households) or leased out (by 10% of households) – mostly through share-cropping arrangements. Taking account of this leasing in and out, 86% of households actually cultivate an average of 123 decimals (0.5 ha of land)

Table 6: Use of land by households

Use of land	Percentage of households	Average area per household	
		Decimals	= hectare
Homestead	100%	32	0.13
Pond	99%	32	0.13
Cultivated land	86%	123	0.50
Fallow land	6%	4	0.02
Total land		190	0.77

Source: Impact survey

112. With secure tenure of their land and increased income, many households have invested considerable sums (typically about Tk100,000) in building better and larger houses. Housing has considerably improved (Table 7), with the quality of houses largely catching up with those in the older CDSP areas (see Technical Report 19 - AOS 2017).

Table 7: Housing in CDSP IV

		Baseline 2011	Impact 2017
Average size of house	Square metre	25.3	43.9
Tin sheet / brick walls	% of households	13%	84.1%
Tin sheet roof	% of households	16%	82.0%

Source: Impact and baseline surveys

(b) Food security

113. The improvement in food security is *rated as highly satisfactory (score=6)*. The reduction in food shortages and increase in self-sufficiency has already been discussed as one of the indicators of the project goal. The quality of food consumed has also improved – with more vegetables, eggs, meat and fish being eaten. Over one third of homestead vegetables and fruit are consumed by producers' households, virtually all households keep poultry and consume an average of 200 eggs and 14 birds per year. Impact survey data shows that, on average, each household also consumed 44 litres of milk (35% of production) and 80 kg of fish (53% of production).

114. A survey of LCS (Labour Contracting Society) members (Technical Report 17) made an assessment of improvement in the quality of diet has been made by asking about the types of food consumed in the last 24 hours, and comparing this data with that collected in the 2009 RIMS baseline survey (Table 8). The baseline survey covered a cross section of the char population, while the LCS members in this survey could be assumed to be poorer than average. Nevertheless, the data does show that more households are consuming a greater range of food items – in particular more legumes/pulses, milk products, eggs, fish and fruit.

Table 8: Diversity of food intake

Food group	Percent of HH reporting consumption of food item in last 24 hours	
	2017 LCS survey	2009 RIMS baseline
Cereals	99%	99%
Roots & tubers	34%	13%
Legume/pulse	71%	32%
Milk product	46%	15%
Eggs	40%	5%
Meat & poultry	29%	
Fish	97%	67%
Oil & fat	98%	94%
sugar & honey	96%	
Fruits	96%	9%
Vegetables	99%	77%
'n	160	900

* Number of households reporting increase less number reporting decrease.
Source: Technical Report 17

(c) Human & social capital and empowerment

115. The development of human and social capital and empowerment is *rated as satisfactory (score=5)*. Large numbers of people have been trained or have received other capacity building including 5400 members of Farmers' Forums and about 21,000 women on IGAs (about 80% of microcredit group members), and 13,000 on vegetable production and value chains (about 50% of micro-credit group members). Capacity has also been built on legal and human rights (for 5,100 women) and on disaster management, livestock, poultry and aquaculture. Participants in the gender assessment workshops (Technical Report 18) rated most of this training as very useful. Results of KAP show a steady increase in knowledge and adoption for both technical and social training topics (Appendix 16).

116. In addition, a combination of the creation of schools in cyclone shelters, better communications, increased income and greater awareness has increased the numbers of children going to school. In 2013 64% of households had children going to school, and 54% of children aged 5 to 11 were attending school (NGO baseline survey 2013). The impact survey shows that 83% of households now have school-going children, with 90% of children aged between 5 and 16 going to school.

117. People and communities have been empowered by developing links to markets and buyers of crops (some have contract marketing arrangements), and by connecting with service providers such as DAE – as well as the community service providers for livestock (paravets and poultry workers) and farm machinery contractors / providers. WMGs are organising collective action to operate and maintain (primarily cleaning) water management infrastructure.

(d) Agricultural productivity

118. The improvement in agricultural productivity is *rated as highly satisfactory (score=6).* The increase in rice production has already been mentioned in the section on indicators of the project development objective. With improved growing conditions and adoption of HYVs, the average yield per hectare for paddy (of all types) has doubled from 1.9 tons per ha to 3.8 tons per ha (baseline and impact surveys). With the current growth in hybrid boro production (which is expected to produce 5 to 7 tons per ha), it is likely that average yields will rise further (providing that boro irrigation from groundwater proves sustainable). Yields of other crops has also increased, but data is not available for calculation of the actual increase in yield.

Table 9: Crop area as percent of cultivated land

Crop	Baseline 2011	Impact 2017
Aus paddy	3.8%	0.4%
Aman paddy	91.7%	87.2%
Boro paddy	0.6%	16.3%
Sub-total paddy	96.2%	103.9%
Pulses		12.8%
Oilseeds		4.6%
Spices		2.6%
Roots and tubers		0.4%
sub-total other crops	8.3%	20.4%
Field vegetables and melons	0.02%	6.1%
Total field crops	104.4%	130.4%

Source: Impact and baseline surveys

119. The area of crops has also increased, with baseline and impact studies showing an increase in cropping intensity from 104% to 130%. Table 9 shows that aus paddy has now almost disappeared, but the increase in boro cultivation has offset some decline in the area of aman, so overall more land is now occupied by paddy. There has been a larger increase in the area of non-rice crops and, in particular in vegetables and melons grown in the field. In addition, the vast majority of households are growing vegetables and fruit around their homesteads.

120. Almost all households now keep poultry and the number of birds has almost doubled, with egg production and sales income increasing by 3.5 times, and egg consumption by over four times (Table 10).

Table 10: Poultry

	Baseline 2011	Impact 2017
HH rearing poultry (% of all HH)	89	99
Average nos. of chicken per HH*	5.3	13.0
Average nos. of duck per HH*	6.2	7.6
Production of eggs (No/ HH per year)*	156	551
Consumption of eggs (No/ HH per year)*	47	199
Income from eggs (Tk/ HH per year)*	817	3081
Chickens & ducks consumed (no/HH per year)*		15.0
Chickens & ducks sold (no/ HH per year)*		20.2
Income from sales of chickens and ducks (Tk/ HH per year)*		5281

* average for all 1400/1004 sample households in baseline and impact surveys

121. Around three-quarters of households keep bovines (primarily cattle). Increasingly mechanized cultivation (tractors replacing draught animals) and reduced grazing on fallow land with the increase in crop cultivation, have discouraged households from keeping more cattle. There has been a switch to milk production and, compared to the baseline, production, consumption and sales have all greatly increased (Table 11). Beef fattening has become an important activity and almost half of all CDSP IV households report sales in the last year, with average sales of 0.85 animals. Although the value of these sales appears to be much larger than the value of milk sales, household spend a significant amount on purchasing animals to

fatten and the value added by this activity will be lower. Sheep and goat production is not so widespread, with 25% of CDSP households keeping goats and 2% sheep.

Table 11: Cattle and buffalo

	Baseline 2011	Impact 2017
Number of HH rearing cattle/buffalo (% of all HH)	75%	77%
Number of cattle/buffalo*		2.49
Number of HH with milking cows*		35%
Number of HH producing milk*		37%
Avg. milk production (Lt per year)*	47	126
Avg. milk consumption (Lt per year)*	26	44
Number of HH selling milk*		37%
Avg. income from milk *	1,169	4,348
Number of HH selling cattle*		48%
Number of animals sold *		0.85
Income from animal sales*		21,920

* average for all 1400/1004 sample households
Source: Impact and baseline surveys

122. Almost all households own ponds and these are now nearly all cultivated – compared with little more than half at baseline (Table 12). More or less all households with sorjon plots report cultivating fish in the ditches. Total fish production for households with ponds in CDSP IV has quadrupled and yield per unit area has gone up 5.5 times.

Table 12: Aquaculture

		Baseline 2011	Impact 2017
Owning a fish pond	% of all HH	99%	98%
Cultivating fish in pond	% of all HH	51%	98%
Cultivating fish in sorjon	% of all HH		5%
Consuming fish	% of all HH		97%
Selling fish	% of all HH		77%
Area of pond	Decimal/ all HH		31.7
Area of sorjon	Decimal/ all HH		2.8
Area cultivated	Decimal/ all HH		27.9
Total production	Kg/ all HH	43	204
Yield	kg/hectare	420	2,313
Amount consumed	Kg/ all HH	29	80
Amount sold	Kg/ all HH	14	71*
Average price	Tk/kg	105	148
Sales value per year	Tk/ all HH	1,455	10,270

'* some fish remain in stock in the pond
Source: Impact and baseline surveys

(e) Institutions and policies

123. The capacity of institutions and policies *is rated as moderately satisfactory (score=4*). CDSP IV has built the capacity of community organisations, particularly WMG, but also a range of other community groups including Farmers Forums and Social Forestry Groups. Apart from the main FLI (WMG, FF, SFG, LCS. TUG and micro-credit groups), a number of specialised groups have been established and supported – including Law Implementation Committees (as

part of the legal and human rights effort), Auxiliary Disaster Management Committees (with a formal link to Union Disaster Management Committees), Market Management Committees (in the seven markets constructed by CDSP IV), School Management Committees (in cyclone shelter schools), and Cyclone shelter Committees (often part of the job of the school committee with support from a WMG).

124. The capacity of government agencies participating in CDSP IV was developed – both through training of their staff and though the experience gained in project implementation. An example of development of capacity of government agencies has been the computerised Land Record Management System. This has been developed and made operational in the offices of government administration at district and upzila levels; and it useful in that data can be inputed from a number of different locations. It will become even more useful as land surveys become digital (maybe in the next phase of CDSP). The project also built two office complexes for Union Parishads – the lowest level of local government institutions which, prior to CDSP IV were largely absent in the five chars.

(f) Access to markets

125. Improved access to markets is *rated as highly satisfactory (score=6)*. The combination of improved communications, connecting he chars to markets in the rest of Bangladesh, and he increased potential to produce crops and other products, has resulted in a large increase in the volume of produce being marketed. Instead of needing to bring rice from other parts of Bangladesh to feed the local population, the chars now have a surplus. Similarly, other crops such as cucumber, country bean, water melon and okra are now sent to markets in the major cities. But it is not just a one-way traffic. With increased population and income, households in the chars are buying more from other parts of Bangladesh. One fisher trader said that he used to send fish from the chars to external markets all year round – now for part of the year he brings fish from other areas to sell in the chars. This is despite the huge increase in pond fish production.

126. Estimates from the impact survey of the average value of sales of farm produce per char household are in Table 13. The largest sale item are bovine animals (mainly cattle) which account for 24% of total sales - as already mentioned this is rather misleading as most cattle are traded a number of times so their cumulative sale value rises. Paddy has the next largest sales value (18% of the total), followed by homestead vegetables – but homestead vegetables and field vegetables added together exceed the value of paddy sales. Vegetable production and sales in CDSP IV also exceeds that in the older CDSP areas (see Technical Report 19 - AOS 2017).

127. According to a DAE officer who knows the area well, the development of the sorjon system in char Nangulia has boosted homestead production. Nangulia has conditions that are suitable for sorjon (waterlogged land that is protected from flooding) that do not exist in the other chars or in the previous phases of CDSP. The development of sorjon created a cluster of commercial vegetable production which attracted the interest of traders seeking to buy products – especially country beans and cucumber. Other households saw the money being generated by this business and started production around their homesteads and ponds and on field boundaries. They were helped in this by the training offered by DAE and PNGOs and by technology demonstrations from these agencies. Although each homestead producer does not produce as much as a sorjon farmer, there are a much larger number of homestead producers.

Table 13: Sales of farm produce

	Tk per HH	% of total
Homestead vegetables	14,764	16%
Homestead fruit	4,677	5%
sub-total	19,440	22%
Field vegetables	4,998	6%
Paddy	16,221	18%
Other crops	3,026	3%
sub-total	24,245	27%
Eggs	3,081	3%
Poultry birds	5,444	6%
sub-total	8,525	9%
Milk	4,348	5%
Cattle and buffalo	21,920	24%
Goats and sheep	1,124	1%
sub-total	27,393	30%
Fish	10,270	11%
Total	89,874	100%

Average for all households, not just for producers of the different commodities
Source: Impact Survey

128. The project has built roads and developed the infrastructure of public markets. The Assessment of Farmers Forums (FF) in Technical Report 16 reported that all FF discussed production problems, usually for three or four different crops, but marketing of crops was not generally seen as a problem. Some FF did not respond to the question on marketing problems – implying that there was no problem. Of those that did respond, more than 80% reported that there were no marketing problems. When there are problems, these are mostly related to transport and communications – roads do not reach all parts of the chars, some bridges are missing (see case study 8 in Technical Report 18), and bulky vegetable crops are best produced where trucks can be loaded close to the field where they are grown. A small number of FF report other marketing problems – for instance saying that they feel that buyers do not give them a fair price (Table 14).

T**able 14: Marketing problems**

Crop	No problem		Transport problem		Other problems		Total responses (n)*	
	Number of FF	Percent of FF	Number of FF	Percent of FF	Number of FF	Percent of FF	Number of FF	Percent of FF
Paddy	64	82%	9	12%	5	6%	78	100%
Beans	45	82%	8	15%	2	4%	55	100%
Cucumber	31	89%	3	9%	1	3%	35	100%
Other	49	80%	9	15%	3	5%	61	100%

* out of 82 FF covered in the survey. Source: Technical Report 16

129. To ensure that there were no barriers to market access and to obtain the best possible price for farmers, CDSP IV initiated a value chain development programme involving both DAE and PNGOs. The focus was on nine types of vegetables, two oilseeds, two pulse crops, one spice, three fruits, milk, fish and poultry. Improved varieties were introduced, producer groups formed with 520 lead farmers, and 120 market actors (traders) identified. Farmers and traders were trained and weighing scales and other marketing equipment provided. Although linkages

between farmers and traders were developed, it is difficult to identify specific improvements to market access. Some traders and farmers were already operating contract farming arrangements with major wholesalers and agribusiness enterprises for crops such as country bean, gourds, cucumber, okra and water melon – where farmers got advances towards production costs and a good price for the final product.

Table 15: Sales of vegetables by CDSP IV market-linkage traders

Year	Tons sold
2013	15,542
2014	20,291
2015	26,525
2016	33,633
2017	32,222

Source: Completion report on PNGO activities

130. Char households now have access to financial services. One of the criteria for selection of the four PNGOs was their ability to provide and manage microfinance. Alongside savings collected from their group members, PNGOs have used their own capital and loans from banks and PKSF to finance micro-credit loans. Data in project progress reports show that 26,373 women joined microfinance groups, although this had declined to 22,869 members in 1045 groups by December 2017 – this decline is to be expected as groups mature some members find they no longer need this service. In addition, some households have moved to other providers that have started operating in the chars – MFIs such as ASA and Grameen bank, banks and leasing companies - while other households have left the area (especially victims of river erosion).

131. The total amount of loans disbursed up to December 2017 was Tk1,767 million (USD 23 million) in a total of 96,826 loans to 28,239 individual borrowers, all of whom had at least one loan (this suggests that the total number of people who benefited from microfinance services exceeded the peak membership of 27,654 as members were joining while others were leaving). At the end of December 2017, Tk259.9 million (USD3.38 million) was outstanding to 16,621 borrowers. The total balance in member's savings accounts was Tk111 million (USD 1.44 million). Deducting this from the amount of outstanding loans means that Tk148.9 million in loans needed to be financed from the NGOs own resources.

132. Of the total amount disbursed by the three PKSF PNGOs (SSUS, DUS and SDI), only 36% was regular micro-credit, with 24% being seasonal loans for farm activities, 22% being ultra-poor loans on advantageous terms for the poorest households (these loans tend to be smaller in size and so cover over a third of all current borrowers), 16% for development of larger micro-enterprises, and 2% to take land on a mortgage. The other PNGO, BRAC, implemented its Targeting the Ultra Poor (TUP) programme in its CDSP IV branches, providing grants to 450 of the poorest households along with other support – amounting to a total of Tk25,000 to Tk30,000 per household (examples of TUP households are in Technical Report 18, case studies 2 and 6).

133. Table 16 shows the stated purpose of loans from PNGOs. The largest share (43%) has gone on livestock and poultry investment, followed by vegetables and crops with 30%. Compared with most micro-credit lending, the share for trading is relatively low, at only 18%. This shows how micro-credit has complemented the other activities of CDSP IV in developing the farm sector.

Table 16: Purposes of loans disbursed by PNGO

Purpose of loan	Total disbursed to Dec 2017	
	Tk. Million	% of total
Poultry rearing	124.2	7.4%
Cow rearing	403.0	23.9%
Goat rearing	48.8	2.9%
Beef fattening	154.2	9.1%
Vegetable cultivation	320.0	19.0%
Agriculture (all crops)	192.2	11.4%
Fish Culture	112.0	6.6%
Motor Cycle/Rickshaw/Van purchase	34.9	2.1%
Trading enterprises	299.0	17.7%
Total	1,687.5	100.0%

Note the total amount of loan is a little less than the actual total reported by PNGOs
Source: Completion report on PNGO activities

134. PNGOs have provided life insurance for group members and their spouses, with benefits being paid to 366 families – a total of Tk933,300 came from CDSP IV resources with an equal amount from the PNGOs' own funds. The three PKSF member MFIs are operating special savings schemes to allow group members to make additional savings including a monthly deposit scheme, double deposit scheme and fixed deposit scheme.

(g) Natural resources and the environment

135. Environment and natural resource management is *rated as satisfactory (score=5*). In developing the chars CDSP IV has enhanced the natural resource base of the chars. Land has become much more productive – thanks both to the water management infrastructure and to efforts of farmers to improve their own land (with the incentive of secure land tenure and opportunities for more productive land use). These improvements by farmers include extending homestead areas, digging fish ponds and making areas for sorjon cultivation.

136. The SFGs, as part of the social forestry sub-component, have enhanced the environment through creation of strip and block plantations. More trees (an average of 214 per household according to the impact survey) have been planted by individual households around homesteads and ponds and on field boundaries. This has transformed the landscape, providing shade and shelter for humans and wildlife. There has been a noticeable increase in biodiversity, with many more birds to be seen.

137. Construction of embankments (maybe for roads as well as flood control) are reported to have caused drainage congestion on char Nangulia, preventing cultivation of aman. Although, in the impact survey, only 6% of aman growers in this char said drainage had got worse, the area under aman in Nangulia has fallen from 91% to 72% of the cultivated area. Current works to excavate khals and install more culverts aim to reduce this problem, and farmers have also mitigated the problem: either by converting land to sorjon or by growing boro paddy in the dry season (which has increased from 0.7% to 34% of cultivated land in Nangulia).

138. The improved growing environment for crops and access to markets has encouraged a switch to HYVs and greatly increased vegetable cultivation. Although production and farm income are much higher, there has been increased use of fertilisers and pesticides, with consequent potential adverse impacts on the environment. CDSP IV has sought to mitigate this by promoting the use of pheromone traps and other non-chemical means of pest control, along with the use of organic manures. The major system of field vegetable production is sorjon – with vegetables grown on ridges and fish in ditches. The impact survey shows that

almost all sorjon farmers actually produce fish in these ditches – which would not be possible if large amounts of toxic pesticides were being used.

139. Reduced intrusion of saline water and protection from flooding has enabled many more farmers to take up boro production. The impact survey recorded boro being grown on 16% of cultivable land in 2016-17, but it has expanded further in the current 2017-18 season. This crop is irrigated by a combination of surface water from ponds and khals and by groundwater. As the area of irrigation expands, great reliance is placed on groundwater, and farmers are now sinking tubewells to a depth of over 200 metres to tap a deep fresh water aquifer which is below a layer of salt water. This fresh water is recharged by horizontal movement in the aquifer from some distance inland. The rate of recharge is believed to be slow and this aquifer has been reserved for abstraction of drinking and domestic water via the hand pumped deep tubewells installed by CDSP IV. Abstraction of much larger volumes for irrigation could well damage this aquifer, resulting in saline intrusion and loss of supplies of drinking water.

(h) Climate change

140. Adaptation to climate change is rated as *highly satisfactory (score=6*). CDSP IV has been developing land on the coast of Bangladesh that is only just above sea-level. This is one of the areas of the world that is most vulnerable to climate change – both sea level rise and increased frequency of storms. The infrastructure developed by CDSP IV aims to build resilience to climate change by: (i) building embankments at a height that takes account of likely sea level rise: (ii) sluices and drainage khals to allow water from more intense rainfall to be drained away; (iii) building roads on embankments above flood levels; (iv) building cyclone shelters and livestock refuges (killa) as refuges from extreme weather events; (v) strengthening houses against flood and cyclone; (vi) installation of deep tubewells to supply drinking water; (vi) planting shelter belts of trees; and (viii) introduction of new crop varieties, including stress (salt, drought, submergence) tolerant paddy. The project has encouraged households to take their own actions to adapt to climate change – including tree planting and strengthening of houses (see Technical Report 14) and conversion of waterlogged fields for sorjon integrated vegetable-fish production.

141. The formation of community organisations has also aimed to support adaptation to climate change, with WMG operating and maintaining water management infrastructure, Farmers Forums disseminating knowledge of climate resilient cropping practices, and Auxiliary Disaster Management Committees with a formal link to Union Disaster Management Committees). The survey of the response to recent cyclones in Technical Report 14 showed that all households now get adequate warning and can go to shelters – prior to CDSP IV there were no shelters (apart from one on Urir char) and people either had to try and leave the char, take refuge on higher ground, or just stay at home and hope that no disaster befell them.

142. Although not a major thrust of the project, actions have also taken place to mitigate climate change. Planting of trees (upward of 6 million) will not only absorb CO_2, but also are allowing fuel wood to replace dung as fuel for cooking, allowing more organic matter to be returned to the land. Improved and more efficient cooking stoves have been introduced. Solar energy for domestic use has been adopted by 68% of households – this was enabled by higher incomes, microfinance services, and access to markets (shops selling panels). This not only reduces CO_2 emissions, but also reduces indoor air pollution with important health benefits, as well as improving household resilience.

(i) Gender equity and women's empowerment.

143. Gender equity and women's empowerment is rated as highly satisfactory (score=6). From the outset CDSP IV has aimed to improve the position of women and girls living in the chars. This was both in terms of their practical needs for food, water, shelter, income and support services (especially health), and to the status, security and position of women in their households and in wider society. Prior to the advent of CDSP IV, women of the chars were in a dire position – not having enough to eat, living in very poor houses (often subject to tidal

inundation), at risk from cyclones and storms, and under the constant threat of physical assault from land grabbers and other thugs. The efforts made by CDSP IV to change the lives of women has been recognized by the 2017 IFAD gender award for outstanding results and impact.

144. The project had a Gender Action Plan. There was a major effort on Legal and Human Rights, and PNGOs report that there has been an 85% reduction in child marriage and 97% reduction in multiple marriages. All marriages are now legally registered, compared with 70% before. All CDSP groups had targets for the participation of women as members and leaders, and some were exclusively female. Further details are in project progress reports.

145. Women have benefited from increased income, food and fuel security, better and more durable housing, improved communications, good water supplies and sanitation. Women and their families have had access to health services. Many of these changes save women much time. They no longer need to go some distance to find water or fuel, repair houses, or care for sick children. Women are now able to work as community service providers and have taken up new economic opportunities in the farm and non-farm sectors. Women are now much more mobile, regularly visiting markets, clinics and going to the local town. Most important, women are now getting a joint title to land, which makes them less vulnerable to divorce or abandonment. More details are in Technical Report 18.

146. As a result of these efforts, position of women within the household has greatly improved – which can be attributed to their increased economic role and the overall improvement of living standards. Men are taking a larger share of domestic tasks, partly offsetting the increased time women are spending on income generating work. There has been an even greater improvement in the feeling of security of women within their households – attributed to their joint ownership of land along with greater awareness on human and legal rights. Women are also more secure as household farms are now much more productive and protected from damage by floods and storms. However, women's role in household decisions, although improved, has not been as great as her improved position and security in the household. Ultimately men are still considered to be the head of the household (Table 17).

Table 17: Empowerment of women

	greatly improved	moderately improved	slightly improved	total
Position in the household	84%	12%	4%	100%
Role in household decisions	68%	28%	4%	100%
Feeling of security in household	92%	8%	0%	100%
Position in community	84%	16%	0%	100%
Feeling of security in community	96%	4%	0%	100%

Source: Gender assessment workshops, Technical Report 18.

147. Women's position in the wider community has also greatly improved – with women becoming much more mobile, participating in markets, and joining (and sometimes leading) community institutions. Most of all, women's feeling of security in the community has improved, with the establishment of the rule of law and end of the reign of terror by lawless land-grabbers.

(j) Overall poverty

148. The overall poverty impact is *rated as highly satisfactory (score=6)*. Prior to the start of CDSP IV there was extreme poverty and hardship in the project chars. Within six or seven years the chars have changed out of all recognition – trees, good roads, productive fields and new housing being the most visible impacts. As part of the impact survey, respondents were asked to place their household in a wealth category, and then asked what category they were in five years earlier. Data in Table 18 shows that, five years ago, 97% of households considered themselves to be poor or very poor. Now 90% are in the rich and medium

categories. Households have generally moved up at least one rank, with most of the previously very poor households moving up two ranks.

Table 18: Self-assessed wealth ranks

	now	5 years ago
Rich	16%	0%
Medium	74%	3%
Poor	10%	69%
Very poor	0%	29%
Total	100%	100%

Source: Impact Survey

149. The gender assessment (Technical Report 18) carried out a participatory wealth ranking with 139 women across all five chars. The result of this (Table 19) are much the same as the self-assessment, with most households moving up one or two wealth ranks.

Table 19: Participatory wealth ranking

	Now	Before CDSP
Solvent	73%	12%
Poor	24%	37%
Very poor	3%	51%
Total	100%	100%

Source: Technical Report 18

D.3 Targeting and outreach

150. Targeting and outreach are rated as *highly satisfactory (score of 6)*.

151. **Targeting.** The project was designed to target the whole population living on the five selected chars. The majority of households fall into the key IFAD target group of poor small and marginal farmers, but with no title to land – identified as a vulnerable group in the project design. Table 20 shows that over half (56%) of all households are marginal farmers, with another 16% being small farmers. Larger holdings are predominantly on Urir char (and to a lesser extent Caring char). Excluding Urir char (where land settlement did not take place) means the proportion of marginal farm households increases 56% to 59%.

Table 20: Farm holdings by size

Farm size category	Classification	All chars	Excluding Urir char
1 to 49 decimals	Functionally landless	16%	17%
50 to 99 decimals	Marginal farmer	30%	32%
100 to 149 decimals	Marginal farmer	26%	27%
150 to 249 decimals	Small farmer	16%	15%
over 250 decimals	Medium / large famers	12%	8%
Total		100%	100%

Source: Impact Survey

152. The project also paid special attention to women headed households. Overall 4.4% of households are classed as female headed. The project was able to give such households and other extreme poor households special assistance through supply of inputs for farm enterprises, and training to become community service providers such as poultry workers and traditional birth attendants. Although women were only 25% of the members of Labour

Contracting Societies, 22% of these women were from female headed households. They benefited from LCS membership – recording a larger percentage increase in income than other members – either women or men (Technical Report 17).

153. Women headed households were also a priority group for strengthening of houses against storm damage and for training as tailors (with a sewing machine given to them after training. Case studies 1, 2, 6, 8, 21, 22, 23 and 24 in Technical Report 18 describe the efforts of these women to improve their lives.

154. **Outreach – directly benefited households** At the time of project design in 2009 it was estimated that the population of the project chars was 155,000 persons in 28,000 households. In 2012, after the project has started the PNGOs carried out a baseline census of households in their working areas and registered a total of 128,508 people in 25,423 households. This registration continued and by December 2014 a total of 27,654 households had been registered. To further update the population – taking account of both loss of land to erosion and continued in-migration, WMG were asked to provide data on the total number of households in their areas as part of the WMG assessment in 2017. A total of 29,008 households were recorded and this is the updated number used in Table 21.

155. Data on the number of persons in each household was collected in the 2017 impact survey, which has been used to calculate a total population of 185,824 (Table 21). The average number of people per house is now 6.41. This is more than the figure of 5.9 persons that was recorded in the 2011 baseline survey and much more than the 5.05 persons in the 2012 PNGO census. While it would be expected that, with a falling birth rate, household size would be falling, it seems that CDSP IV has many large households – 9% of sample households had 10 or more members, with the largest having 18 persons[14]. It is reported that many households displaced by river erosion have moved in with relatives living in the chars – which would boost the size of these households.

Table 21: Population in the project area.

Char	Area hectares		Population estimate in 2009		Updated estimate 2017		
	2008	2017	Households	Population	Households	Persons / h'hold	Population
Nangulia	8,990	8,530	12,000	67,000	15,113	6.20	93,701
Noler	2,690	2,560	6,000	33,000	6,152	6.58	40,480
Caring	6,850	2,200	6,000	33,000	2,638	6.75	17,807
Ziauddin	1,943	1,943	2,000	11,000	2,380	6.42	15,280
Urir	10,300	12,300	2,000	11,000	2,725	6.81	18,557
Total	**30,773**	**27,533**	**28,000**	**155,000**	**29,008**	**6.41**	**185,824**

156. The estimate made by WMGs of 29,008 households has been cross-checked against the number of micro-credit group members reported by PNGOs and the proportion of sample households in the impact survey who were members of these groups. The maximum number of microcredit group members reported by PNGOs was 26,373, and 89% of respondent households said they had, at some time, belonged to these groups – giving a total population of 29,684 households. The current number of microcredit groups members is 22,869 and 74% of respondent households said they were currently members - giving a total population of 30,861 households. This confirms a total population of at least 29,000 households.

[14] This household had 5 men (4 of whom were earning), 5 women (4 earning), 3 children aged 5 to 16 (all at school), and 5 children aged under 5 years.

157. **Outreach - indirectly benefited households**. CDSP IV provided some support in the areas covered by earlier phases of CDSP. This included limited support for some of the WMGs and support for maintenance of sluices, khals, roads, cyclone shelters and other infrastructure. Some works (earth roads, DTW and cyclone shelters) were constructed in the proposed CDSP V chars. Most of this work was done in the CDSP III area where there are about 10,000 households, and maybe another 5,000 benefited in the CDSP I & II areas and in the new chars, making a total of 15,000 indirectly benefited households.

158. **Outreach – individuals receiving project services.** In January 2018 it was calculated that 114,263 people were receiving a service from the project – in terms of being members of FLI, involved in land titling, training, attending workshops, getting health services etc. Adjusting for people getting multiple services, the total number of individuals getting one or more services from the project was 48,906. These services were primarily from component 4 (livelihood support) plus component 3 (land titling), 2b (water and sanitation) and 1b (social forestry). Apart from membership of WMGs and LCS, no "services" are being shown as being delivered by the infrastructure development of sub-components 1a and 1b – where the major investment by CDSP has taken place. This data relates to FY 2017-18 and there will be additional people who participated in some activities in the past, but were not active in this FY[15]. The figure also excludes individuals who got treatment from the CDSP IV clinics and community health workers.

D.4 Innovation, replication and scaling up

159. **Innovations.** Overall performance is rated as *satisfactory (score of 5)*.

160. CDSP IV introduced a number of new ideas and technologies for farmers in the chars. New crop varieties were introduced – especially HVY aman paddy. BR 52 has become popular – in DAE demonstrations BR 52 yielded 4.2 tons per hectare. All boro now grown seems to be hybrid varieties. Although the project did not promote boro production as groundwater resources are limited, agreements with BADC to establi

161. sh seed dealers in the chars has meant these seeds are now more easily available. New crops that have been promoted include water melon, sweet gourd and soyabean. Agricultural has also become mechanised. At the start of CDSP IV draught animals were widely used, now virtually all land cultivation is done by power tillers. CDSP IV demonstrated and distributed pedal threshers for paddy which are now used by 58% of farmers (impact survey data), with another 25% using engine-driven threshers.

162. One of the most significant innovations has been the sorjon system of integrated vegetable-fish production. This system originated in Indonesia and has become quite widespread in south-western Bangladesh. It was introduced into CDSP III by the project's Agricultural Advisor, but conditions for sorjon are most suitable in char Nangulia. Both DAE and PNGOs informed and trained farmers about this system, which has proven to be a catalyst for development of the vegetable sub-sector. For homestead vegetable production, PNGOs have promoted the idea of "vertical gardening" – growing vegetables on trellis supports – which enabled homestead producers with little space to produce sorjon crops. To further develop sorjon, improved varieties of cucumbers, gourds and country beans were introduced, along teasel gourd (a new crop) and single-sex tilapia – quick growing fish. Biological systems of pest control were also introduced, and pheromone traps are now often seen.

163. Improved varieties of many types of vegetable have been introduced. Vermicompost has been demonstrated and taken up farmers who find it particularly useful for vegetable production (see Appendix 17, case study 13).

[15] In particular, around 7,600 women, who had previously participated in microcredit groups, are not included in the total of 48,906 recipients of project services unless they are also participating in another activity.

164. For livestock, the use of community service providers (poultry workers and paravets) to provide preventative animal health services is an innovation in the area (see Appendix 17, case studies 10 and 11). Improved goat houses (raised off the ground) have been introduced, along with fodder crops (Napier grass) and Sonali cross-bred chickens. Innovations in aquaculture include the use of lime, fertiliser and feed to increase yield and the stocking of ponds with mixed varieties of carp.

165. Although not specifically promoted by CDSP IV, solar lighting is now being used by almost two-thirds of households – and this power is also used for fans and recharging mobile phones and electric vehicles.

166. An important innovation of CDSP IV has been the introduction of a computerised land record management system (LRMS). Although there are plans for a national LRMS, these seem to have stalled, and CDSP IV has been a pioneer in this area.

167. In the early stages of the project, CDSP IV worked with an IFAD-funded grant project implemented by IRRI, Support to Agricultural Research for Climate Change Adaptation in Bangladesh. This project distributed improved seeds to project farmers, established compost pits and, in particular, developed community enterprises for the production of fish fingerlings. However little real innovation came about and the community fish enterprises have not been sustained.

Replication and scaling-up. Performance is rated as *satisfactory (score of 5)*.

168. As the 2017 IFAD supervision mission said, the CDSP model for development of newly accreted chars has great potential for replication to other newly accreted chars. The degree to which this represents a scaling up depends on the rate of land accretion and the area of land that is ready for development. It also depends of the government agreeing to allow settlement on these areas rather than allocate them to other uses. Construction of a cross-dam between the Noakhali mainland and Urir char (a major investment) should result in considerable land accretion (12,000 ha has been mentioned). However, at the moment, there are no firm plans to undertake this project.

E. EFFICIENCY OF PROJECT MANAGEMENT

169. Overall the performance is rated as *highly satisfactory (score of 6)*. Project efficiency includes project financing, quality of project management, partners' performance, quality of supervision and implementation support and project internal rate of return, as described below.

E.1 Project costs and financing

170. **Project financing.** At design the total funding allocation was USD89.2 million, including an IFAD loan of USD47.30 (SDR30.6 million), a GoN grant of USD20.6 million, GoB counterpart financing of USD15.6 million, NGOs credit contribution of USD4.9 million, and beneficiaries' in kind or cash contribution of USD0.81 million.

171. **Disbursement by financier.** Actual project costs have been estimated based on expenditure to date and an estimate of likely expenditure up to loan closing in December 2018. Table 21 shows these actual costs relative to the allocation from each financier at appraisal and at the last (second) revision of the DPP (converted into USD at USD1=BDT77). Overall expenditure is estimated at USD79.63 million, 93% of the revised allocation. The shortfall due to lower than anticipated expenditure on components is explained in the next paragraph. The contribution from NGOs consists of the amount of capital needed to find the microcredit operation less that which can be funded from the savings of group members. There was an arithmetic error in the appraisal calculation of the annual additional amount needed. This is corrected as the "last revised" amount in Table 21. Details are in Appendix 7. The contribution of the beneficiaries is a cash contribution of Tk1,400 for each DTW plus their

microfinance group savings (as part of credit fund). These savings are more than double that anticipated at appraisal.

Table 21: Financing allocation and actual cost by financier USD'000

	IFAD	GoN	GoB	NGOs	Benefs	Total
Appraisal	47,346	20,606	15,572	4,876	811	89,211
Last revised	47,354	19,833	15,657	1,818	771	85,434
Actual	44,789	18,490	12,884	1,934	1,537	79,633
% of revised	95%	93%	82%	106%	199%	93%

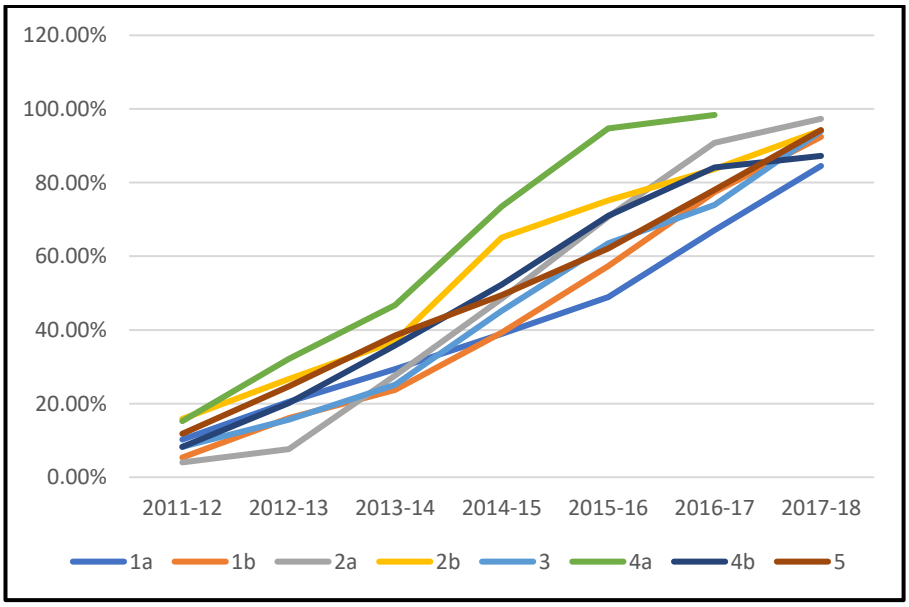
172. **Disbursement by component.** Addition funds were allocated to component 1 (protection from climate change), mainly to construct retired embankments. This component is likely to only spend 86% of its revised allocation as: (i) the retired embankments only cost two-thirds of the anticipated amount per km due to the use of machinery (to do the work quickly) rather than labour intensive methods; (ii) due to erosion a river closure had to be relocated and redesigned – and so cost less than anticipated; and (iii) some of the GoB funds allocated for land acquisition have not been spent. Slightly more than expected has been spent on livelihood support due to more money being absorbed by microcredit operations.

Table 22: Financing allocation and actual cost by component USD'000

	Protection from climate change	Climate resilient infrastruct.	Land settlement	Livelihood support	TA & management support	Total
Appraisal	28,694	37,780	733	10,911	11,093	89,211
Last revised	30,877	35,443	999	7,406	10,710	85,434
Actual	26,498	34,319	939	7,802	10,076	79,633
% of revised	86%	97%	94%	105%	94%	93%

173. Details of each sub-component are in Appendix 7. Figure 3 shows cumulative expenditure for each sub-component. This shows the faster progress of component 4a (agricultural support of DAE), which ended one year earlier than other sub-components. The initial slow rate of expenditure of sub-component 2a (internal infrastructure of LGED) can be seen, as can the later slower rate of spending on component 1a (water management of BWDB.

Figure 3: Cumulative financial progress of each sub-component



174. **Coherence with AWPB.** In most years the project substantially underspent its approved AWPB, only reaching 70% in two years. One problem was that the Ministry of Finance tended to revise the approver AWPB and reduce the allocation during the course of the financial year. This may have encouraged the project to request larger amounts in its initial approved AWPB.

Table 23: Annual workplan and budget achievement

	AWPB Tk million	Actual expenditure Tk million	Actual as % of AWPB
2011-12	810.05	459.84	56.7%
2012-13	1,276.16	474.86	37.2%
2013-14	1,534.38	823.12	53.6%
2014-15	1,930.19	1,009.19	52.3%
2015-16	1,747.96	1,032.23	59.1%
2016-17	1,472.14	1,136.59	77.2%
2017-18	1.025.05	550.01	53.6%
2018-19	253.85	202.92	79.9%

175. **Cost per person**: the cost of CDSP IV per individual beneficiary and per household is shown in Table 24. Excluding the credit fund (which remains intact at the end of the project), the cost per household is USD2,626 and per person is USD 410. This is at the upper end of IFAD projects[16] but not unreasonable for a water management investment.

Table 24: Cost per person

	Total cost	IFAD loan	
Total cost*	76.16	44.79	USD million
Outreach	29008	29008	households
Cost per household	2626	1544	USD per household
Total beneficiaries	185,824	185,824	persons
Cost per person	410	241	USD per person

* excludes credit fund

176. Table 25 shows the cost for each component per household that is directly involved in each sub-component. As would be expected, the major infrastructure development sub-components (1a and 2a) have the highest cost per household.

[16] Of 27 IFAD Asia Pacific Region projects that have produced PCRs in 2015 to 2017, the highest cost was IIDP (irrigation rehabilitation in Sri Lanka) with a cost per household of USD4,542 and per person of USD1,240. This was followed by RaFPEP (agriculture in Philippines) at USD2868 per households and USD 574 per person. Compared with CDSP IV, DAPRP (agriculture in China) had a slightly lower cost per households (USD 2507) but a higher cost per person (USD 470)

Table 25: Cost per household by sub-component

	Sub-component	Total cost USD'000	Households benefited	Cost USD/hh	Note
1a	Water management	22,464	29008	774	All households
1b	Social forestry	4,034	14520	278	SFG members
2a	Internal infrastructure	31,223	29008	1076	All households
2b	Water and sanitation	3,001	25639	117	Latrine recipients
3	Land titling	939	16138	58	Titles CDSP IV & III
4a	Agricultural support	940	5400	174	FF members
4b	Social and livelihood support	3,486	27654	126	PNGO health prog.
5	Technical assistance	10,076	29008	347	All households
	Total cost	76,163	29008	2626	All households

E.2 Quality of project management

177. Project management is rated as *highly satisfactory (score of 6)*. The project has an outstanding system for management, coordination and oversight which has played a major role in contributing to its success. An Inter-Ministerial Steering Committee (IMSC) met annually or biannually under chairmanship of the Secretary of the Ministry of Water Resources, providing overall guidance and making decisions on policy issues. The Project Management Committee (PMC) met most months (61 meetings up to April 2018) under the chairmanship of the Project Coordinating Director (BWDB PD). PMC meetings have provided a good flow of information and cooperation between the IAs, while the operational independence of each IA (with its own PD and DPP) ensured each IA has ownership and full responsibility for implementation of its sub-component. Cooperation and coordination problems with IAs were identified as a potential risk at the start of the project but were the only one of the eight risks reported in the six-monthly progress reports that never actually occurred.

178. The TA team, financed by the grant from GoN, is another key success factor in the success of CDSP IV. The TA team supported both the PMC and each individual IA and included sector specialists as well as field-based local area coordinators. The contracting of the four PNGOs to implement the Social and Livelihood Support sub-component via the TA consortium was a change from the previous phase of CDSP, when EKN directly contracted a lead NGO (BRAC) who in turn contracted four local NGOs to implement the project in the field. EKN lacked the capacity to supervise field-level implementation, and the division of work between the lead and field NGOs was not entirely satisfactory. The CDSP IV PNGOs say that the new arrangement has worked better, with detailed guidance on what they needed to do, better coordination with CDSP FLIs and IAs, and support from the TA team in implementation of the extensive training programme.

179. Some project management difficulties have arisen due to the relative inflexibility of the multi-year DPPs which are effectively the project implementation plan for each IA. The process of amending the DPP takes 6 to 12 months, involving both the IAs' parent Ministries and the Planning Commission, with only two revisions are allowed during the project life. Other factors that constrained implementation at some point during the life of the project are summarised in the matrix of project risks in Appendix 4.

180. **Monitoring and evaluation**. CDSP IV has a comprehensive M&E system designed to record the progress of implementation and to assess results. Key elements of the system are as follows:

a) Six-monthly progress reports describing project implementation activities, outputs, and key events; and identifying any constraints holding back work in the field. These reports

included detailed tables of physical and financial progress relative to the AWPB. There was also an analysis of the risks faced by the project.

b) Pilot implementation of the "Standard IFAD Monitoring and Evaluation System" (SIMES) for monitoring and reporting on project physical and financial progress and on IFAD RIMS indicators.

c) Process monitoring via Participatory Monitoring and Evaluation (PME) and Knowledge, Attitude Practice (KAP). In total 8 cycles of PME were conducted between 2012 and 2016 and reported feedback from members of different project FLIs concerning delivery of project outputs and changes in their lives and livelihoods. KAP gathered information on the knowledge gained from training and the practical application of that knowledge. Eight rounds of KAP were done between 2013 and 2016, each covering different sub-sectors such as homestead gardening and backyard poultry as well as social issues. Results show how knowledge levels improved over time and the adoption rates increased. PME and KAP results were included in project progress reports.

d) Outcome monitoring via Annual Outcome Surveys (AOS) conducted annually from 2012 to 2017. AOS is one of IFAD's M&E tools, but CDSP IV is the only project in Bangladesh to adopt the approach. CDSP IV has adapted the AOS methodology, with each survey covering a panel sample of 200 households in each of three domains (CDSP I&II, CDSP III and CDSP IV). This enables changes in CDSP IV to be compared with the older, more developed areas and measure the extent to which CDSP IV is catching up with the developed areas. It also generates evidence of the sustainability of CDSP interventions and any continued growth in production and income after project interventions are completed.

e) Impact evaluation via a baseline survey in 2011 and an impact survey in 2017. The baseline survey covered a sample of 1400 households and the impact survey (report not yet prepared) had a sample of 1004 – mostly the same as the baseline households. This has focused on gathering data on logframe and other IFAD impact indicators.

f) RIMS anchor indicator surveys where carried out in 2009 (baseline) and 2015 (mid-term), however this data has been less useful than that from the 2011 and 2017 surveys and a further impact survey was not carried out[17].

g) Additional ad hoc studies and surveys have been carried out in 2016-18 including: (i) Household Impact Assessment Using the Five Capitals of Livelihood Approach; (ii) Rapid survey of cyclone shelters and disaster response at the household level; (iii) Evaluation of Water Management Groups; (iv) Assessment of Farmers' Forums in CDSP IV; (v) Impact of employment in project works on members of Labour Contracting Societies; and (vi) Gender Impact Assessment. Additional studies are under preparation on: (i) sorjon integrated vegetable-fish farming; (ii) transport and communications; and (iii) agricultural impact.

181. The CDSP IV M&E system was implemented by sub-team (an M&E Advisor and two Monitoring Officers) within the TA team. This team were responsible for process, outcome and impact monitoring and surveys, as well as SIMES, the ad hoc studies and knowledge management. They were assisted by contracted enumerators and a survey supervisor/data analyst. International short-term consultants from the TA team also provided support, especially in 2017-18.

[17] Reasons why the RIMS impact surveys are not so useful are: (i) they did not collect data on many of the important logframe and impact indicators; (ii) baseline data was collected in 2009 (as part of the project design effort), two years before the start of implementation; (iii) baseline anthropometric data showed less child malnutrition than would be expected – and less than in the more developed and wealthier CDSP I, II and III areas with better food security. When this data was collected again in the mid-term survey, it was not surprising that these indicators were little changed despite the improved food security.

182. In addition to the work of the M&E team, DAE and the TA agricultural team carried out surveys of agriculture in 2012, 2014 and 2015. DAE also monitored soil salinity levels in each of the project chars. PNGOs collected baseline profiles of project households in 2012 and baseline data on livestock in 2014. BRAC carried out studies of the social and livelihood support sub-component in 2015 and 2017.

183. The considerable effort put into M&E has enabled CDSP IV to generate more detailed evidence of results that is usually the case for IFAD-supported projects. A number of useful lessons have been learned regarding M&E systems and processes.

184. **Knowledge management** A significant effort was also put into knowledge management (KM). With help from IFAD and support for TA short-term international consultants a KM strategy was drawn up and implemented. This included establishing a project website (www.cdsp.org.bd) with useful information on the project and as a means of sharing documents on project results. A number of useful experiences were shared through "good practice" leaflets.

185. In 2013 coastal farmers' resource book was prepared "Coastal Agriculture under Unfavourable Ecosystem" and 500 copies distributed to project stakeholders. Reports were prepared on Climate Change and Food Security (Mission Report 4 and Technical Report 12) and on Field Level Institutions (Mission Report 5). An on-line repository of ley documents from all four phases of CDSP has been created, and a book drawing together the whole CDSP experience and lessons is under preparation.

186. In 2013 CDSP IV was one of the case studies for the project ´Pro-poor Resource Governance under Changing Climates', a joint research initiative of the IFAD and the Institute for Advanced Sustainability Studies (IASS), Potsdam. BRAC collaborated on this study and a paper was presented at a workshop at IFAD headquarters in Rome. IFAD's communications division produced three videos about different aspects of the project in 2013 and 2017, while IFAD's Bangladesh Country Office arranged visits by newspapers to the project area, resulting in publicity for CDSP IV. Difficulties in access to the project area from Dhaka have deterred high level visits from the donor agencies. However, the achievements of CDSP IV have been recognised through three awards: (i) from the Prime Minister of Bangladesh in 2017 for the best forest plantation; (ii) from IFAD in 2017 for gender impact; and (iii) from British Expertise International in 2018 for positive social impact

E.3 Quality of financial management

187. **Financial management.** Financial and administrative management was the responsibility of each Implementing Agency (IA) under the supervision of its own Project Director. The TA team was responsible for reviewing and consolidating financial information, preparing withdrawal applications (WA), and generating consolidated financial reports and statements.

188. The project accounts have been managed using specialised financial management software (Tally), however this took some time to procure (it was only fully deployed in August 2015), and it has not been possible to fully adapt the software to generate all of the customised financial reports required by IFAD – Tally have told the project that such modifications are not possible. This means that some accounting functions continue to be done manually. One problem has been getting agencies that are implementing the smaller sub-components of CDSP IV (FD, DPHE, MoL, and DAE) to make the effort required to fully implement Tally (their accounts staff in small local offices often lack expertise in use of computers) – and also other financial management requirements such as fixed asset registered and audit follow-ups.

189. **Withdrawal applications.** Up to December 2017, the project had submitted 10 withdrawal applications (WA) – see Table 26.

Table 26: List of withdrawal applications

WA#	Date of Submission	Amount Claimed by CDSP IV in US$	Amount received by CDSP IV in US$	Remarks
1	14/11/2011	3,669,504	3,669,504	Only IFAD Loan Amount
2	10/08/2012	4,600,621	4,600,621	Only IFAD Loan Amount
2 (revised)	23/1/2013	-	-	Only expenditure reported
3	06/05/2013	1,159,560	1,159,560	Only GoN Grant Amount for Civil Works
4	23/9/2013	7,833,100	7,833,100	Only IFAD Loan Amount
5	11/02/2014	9,101,095	9,101,095	IFAD Loan US$8,171,500 & GoN Grant US$929,595
6A	15/12/2015	7,536,642	7,536,642	Only IFAD Loan Amount
6B	15/12/2015	888,231	888,231	Only GoN Grant Amount for Civil Works
7A	05/09/2016	-	-	Only expenditure reported on IFAD Loan. WA rejected by IFAD.
7B	05/09/2016	-	-	Only expenditure reported on GoN Grant. WA rejected by IFAD.
8A	16/7/2016	-	-	Only expenditure reported
8B	16/7/2016	-	-	Only expenditure reported
9A	16/10/2016	5,282,167	5,282,167	Only IFAD Loan Amount
9B	16/10/2016	622,669	622,669	Only GoN Grant Amount for Civil Works
10A	06/12/2017	5,282,167	5,282,167	Only IFAD Loan Amount
10B	06/12/2017	622,669	622,669	Only GoN Grant Amount for Civil Works
Total		**46,598,425**	**46,598,425**	

190. IFAD requested the project to submit at least two WA per year, but this was difficult as civil works were mainly carried out in the dry season between November and April – with the WA following two or three months later. As IFAD requires 80% of the previous advance to be spent before making a WA, it was not possible to send in WA in advance of the main expenditure season.

191. Two WA (7A and 7B) were rejected by IFAD as they did not meet IFAD's new reporting systems and there were some discrepancies in the figures. They were re-submitted as WA 8A and 8B. It is expected that three more pairs of WA will be submitted before the end of the project (WA 11A&B, 12A&B and 13A&B).

192. **Procurement** has not presented any major problems for CDSP IV. The Netherlands Government procured the consortium of consulting companies to provide the TA team prior to the start of the project. The TA team in turn procured the four PNGOs through a competitive process. Procurement processes follow the Bangladesh Public Procurement Regulations of 2008, provided they are consistent with IFAD guidelines. BWDB and LGED, with support from the TA team, procured contractors for civil works, as did DPHE for the installation of DTW. However, for some smaller contracts it has proved difficult to find satisfactory contractors and, following recommendations of IFAD missions, some of the market contraction work (LGED) and most of the latrine construction (DPHE) has been done by Labour Contracting Societies.

193. **Auditing.** The project had dual audit system, with two independent external audits. One of these is from FAPAD (Foreign-Aided Projects Audit Directorate), and the other from a firm of private auditors. FAPAD issues individual audit reports for each of the six IAs. While the most recent of these (FY 2015-16) were unqualified for all six IAs, the reports lack some of the statements and reconciliations required by IFAD. Earlier FAPAD audit reports had numbers of audit observations, mostly regarding non-compliance with government rules and inadequate documentation.

194. The auditor's report and management letter from the private auditors (A. Mannan & Co.) for FY 2015-16 gave an unqualified opinion on the financial statements. There is also an Internal Audit, also conducted by a private audit firm.

195. **Compliance with Loan Covenants**. The Project has generally complied with all the loan covenants.

E4 Partners' performance

196. The Government of the Netherlands co-financed the project. Its performance was rated as *satisfactory (score of 5).* There were no problems in the flow of funds from GoN and EKN participated in most of the IFAD supervision missions, making particular contributions on issues of food security, gender and targeting.

197. **The Government's** performance was *satisfactory (score of 5)*. The government has continued to be supportive of the unique approach of CDSP, although the allocation of a substantial amount of land on Caring char for use by the army shows that it has to balance conflicting demands for land resources. The Administration of Noakhali district, apart from implementing the land titling component, have given much practical assistance and encouragement to the project, as have other tiers of government at the upazila and union parishad levels.

198. **Implementing Agencies** performance is rated as *satisfactory (score of 5)*. All six implementing agencies (IA) have shown real commitment to the project, implementing their sub-components as planned and agreed in the regular PMC meetings.

199. **Partner NGOs'** performance is rated as *satisfactory (score of 5)*. Of the four PNGOs, one (BRAC) is a large national NGO and was lead NGO for CDSP III. The other three (SSUS, DUS and SDI) are small locally-based NGOs who were already active in the CDSP IV chars. SUSS performed particularly well, but all added value though implementing additional schemes in the CDSP branches, bringing in additional resources for training or for supporting the poorest households. All PNGOs were able to mobilise adequate resources for microcredit loans, and access to such finance was not a problem for project households.

200. **Field Level Institutions** The overall performance of these community-based organisations is rated as *satisfactory (score of 5)*. WMGs played a key role in the local level planning of infrastructure development works and were very useful in solving site-related problems during construction. However, they have not yet had much opportunity to operate water-related infrastructure or carry out minor maintenance tasks – although some have had some small earthwork contracts from BWDB. FF had a key role in implementation of component 4a (agricultural support), assisting DAE in selecting farmers for training and demonstrations and in the distribution of inputs. They acted as the key link between DAE (and also PNGOs) and farmers. SFG carried out the actual work of tree planting and care-taking for the social forestry sub-component 1b. PNGO microcredit groups were the vehicles for delivery of financial services and a range of other services in sub-component 4b. LCS carried out construction works for subcomponent 2 (both LGED and DPHE). The quality of these works tended to be better than that done by contractors, although LCS needed additional supervision.

201. **Contractors** for civil works performed *satisfactorily (score = 5)*. Contractors have learned and accepted that the standard of works required by CDSP IV may be higher than that for other projects. For example, when constructing embankments, they build earthworks over-size to allow for subsequent settlement.

E.5 Quality of supervision and implementation support

202. IFAD's performance in providing supervision and support is rated as *satisfactory (score of 5)*. During project IFAD fielded five annual Supervision Missions, one Mid-Term Review Mission and six Implementation Support Missions (see Appendix V). Regular meetings were also held in Dhaka between IFAD (mainly Bangladesh Country Office staff), EKN and CDSP

IV staff. These missions and meetings provided timely support and guidance, and were particularly useful is trying to deal with the critical problem of land erosion, where decisions needed to be made regarding the retirement of embankments and relocation of river closures. In this respect it was good that six of the missions (four SM, the MTR and one ISM) had the same water resources engineer.

203. IFAD also provided useful support in specialised areas such as finance, gender, KM and M&E, helping to develop project guidelines and disseminate news about CDSP IV. All of the five SM, the MTR and three of the ISM had financial management specialists, but this work was done by a number of different individuals on different missions, as was the agriculturalist (in a total of five of the 12 missions), gender/institutions/targeting (in six missions), M&E (five missions), and land titling (seven missions). Only three missions had the same mission leader. This turnover in mission specialists meant they got less chance to gain an in-depth knowledge of the project, and risked conflicting advice being given by different individuals on different missions.

E.6 Project internal rate of return

204. **Approach and methodology.** An economic and financial analysis has been carried out based on the following:

a) Actual project costs as incurred to date, plus an estimate for final expenditure up to December 2018. An estimate has been made of future O&M costs for project infrastructure.
b) Estimated benefits to the char population in terms of their increased income from this investment, both those that have accrued to date and those that are likely to accrue in future - the "future with project" situation (FW). To calculate the incremental benefit an estimate has been made of change in incomes that would have occurred had the project not been implemented – the "future without project" situation (FWO). The net benefit to the char population is the difference between FW and FWO.
c) Calculations have been made using constant 2017-18 prices. To convert prices to economic values the following adjustments have been made: (i) for tradeable goods (rice, soyabeans and fertiliser) to border prices using the current exchange rate; (ii) for non-tradable goods, current local prices have been adjusted by the standard conversion factor (SCF) which reflects a degree of protection in the economy and slight overvaluation of the BDT; (iii) for a few items, with a high import content, but no border value, prices have been left at market values and not adjusted downwards using the SCF; and (iv) farm labour has been adjusted by a shadow wage rate (SWR) factor reflecting a degree of under-employment in farm households and unemployment in the project area.

205. **Costs and benefits** have been projected over a 20 year period, with calculations of benefits made for th**e** following situations:

a) Year 1: the pre-project situation, using data from the 2011 baseline survey, supplemented by information from the project design EFA from 2009, and recent farmer interviews.

b) Year 7: the current situation at project completion, using data from the 2017 impact survey plus recent farmer interviews.

c) Year 15 for the FW situation: a moderate increase over year 7 reflecting continued improvement in the project area. Evidence for this comes from the AOS that show continuing increases in production and income in the CDSP I, II and III areas after the end of CDSP interventions. The impact survey shows that CDSP IV farmers continue to have some yield reduction due to unfavourable growing conditions and the AOS show that conditions are better in the old CDSP areas, but are still continuing to improve in these areas.

d) Year 15 for the FWO situation: a modest increase over the year 1 situation. This is based on the assumption that the physical environment for agriculture will not have improved, and the area will still be cut off from other parts of the country. However, despite this, economic development in the rest of Bangladesh will provide incentives to increase production in undeveloped chars. Stress-tolerant rice varieties will enable more production in unfavourable environments

e) Year 20 for both FW and FWO situations assume no change from year 15.

206. **Land area and population:** The land area of CDSP IV is shown in Table 27. Areas and population in years 1 and 7 are as estimated at the start of the project in 2011 and in 2017. Compared to year 1, by year 7 a total of 5,220 ha had been lost on Noler, Caring and Nagulia chars, with a gain of 2,000 ha on Urir char. The year 1 and year 7 areas of Caring char have been adjusted to reflect loss of land taken over for an army base. Following a government order, 2,709 ha was handed over in early 2013. Although this was project year 3, to simplify calculations this amount was deducted from the year 1 area. Most of this area has been lost to erosion, but by 2017 (year 7) the army was still occupying about 20% of Caring char, leaving 880 ha for CDSP activities.

Table 27: Land area of CDSP IV chars

		Nangulia	Noler	Caring	Urir	Ziar	total
Pre-project 2011	year 1	8990	2690	6850	10300	1943	30773
Completion 2017	year 7	8530	2560	2200	12300	1943	27533
Adjusted*							
Pre-project 2011	year 1	8990	2690	4141	10300	1943	28064
Completion 2017	year 7	8530	2560	1760	12300	1943	27093
future area 2025							
baseline	year 15	8100	2200	880	14500	1943	27623
high erosion	year 15	6000	1350	0	12300	1943	21593

'* adjusted for allocation of land on Caring char to the army.

207. Two future scenarios have been projected in Table 28 for year 15: (i) baseline - the loss of another 1,890 ha on Noler, Caring and Nagulia chars and gain of 2,200 on Urir char; and (ii) high erosion - the loss of 8,140 ha Noler, Caring and Nagulia chars and no gain on Urir char. The high erosion scenario assumes that all of Caring char will be eroded, along with half of the 2011 area of Noler char and one third of char Nangulia.

Table 28: Number of households in CDSP IV chars

		Nangulia	Noler	Caring	Urir	Ziar	total
Pre-project 2011	year 1	12000	6000	6000	2000	2000	28000
completion 2017	year 7	15113	6152	2638	2725	2380	29008
future area 2025							
baseline	year 15	15786	5816	1451	3534	2618	29204
high erosion	year 15	11694	3569	0	2998	2618	20878

208. Population estimates for year 1 and year 7 are the actual population for 2011 and 2017 (see section on outreach). Projections for year 15 assume a 10% increase over year 7 less a pro-rata reduction in proportion to loss of land to erosion. This results in a marginal increase in the number of households for the baseline scenario and significant reduction in the high erosion scenario.

209. **Benefit streams:** projections of economic benefits are based on the following benefit streams:

a) Agriculture – this includes: (i) field crops; and (ii) homestead vegetables and fruit. Benefits for field crops are derived from changes in crop areas (including increased cropping intensity – see Table 29) and increased yields, leading to higher margins per

ha (although input use and labour also increase – see Table 30). In addition, there are benefits for project farmers from reduced transport costs from farm to local market and from local market to outside the char. Benefits from homestead vegetables and fruit are based on impact survey data of the value of sales. The proportion that is home consumed (around one third) is approximately the same proportion of the gross value that is absorbed by production costs for field vegetables, so the value of sales has been assumed to approximate to the margin over costs (Table 31).

Table 29: Cropping pattern and crop areas

			year 1	year 7 FW	yr 7 FWO	yr 15 FW	yr 15 FWO
Aman	local	% of cult.area	86	26	63	16	40
	HYV	% of cult.area	6	61	30	78	54
Aus	local	% of cult.area	4	0	0	0	0
Boro	hybrid	% of cult.area		16	0	8	0
Rabi	keshari	% of cult.area	7	11	7	5	7
	felon	% of cult.area		2	1.5	3	3
	soyabean	% of cult.area		5	4	13	8
	chilli	% of cult.area	1	3	2.5	6	4
Vegetables		% of cult.area		6	2	10	4
Cropping intensity		% of cult.area	104	130	110	139	120

Keshari is grass pea, felon is cow pea
Keshari and felon are representative of all pulses, soyabean of all pulses, and chilli of all spices and tubers.
Year 15 projections are for the baseline land area assumptions (this applies in all tables unless stated otherwise

Table 30: Summary of crop budgets (financial prices)

Item	Aman (local)	Aman (HYV)	T. aus (local)	Boro (hybrid)	Soya-bean	Chili	Keshari	Felon	Field vegetable
Gross Margin, Tk/ha									
Year 1	(2,232)	(834)	(6,764)	-	37,573	54,525	20,640	19,413	
Year 7 FW	21,749	31,048	-	13,367	64,819	154,431	28,773	62,370	152,387
Year 7 FWO	1,473	4,708			39,468	65,602	23,122	33,361	91,351
Year 15 FW	27,098	38,028	-	19,129	90,150	204,074	33,271	75,815	203,424
Year 15 FWO	5,178	10,250	-	-	41,362	76,679	25,604	47,309	91,351

Table 31: Net income from homestead fruit and vegetables

	Net income Tk per hh per year (financial prices)			Number of h'hold*	Total income Tk million
	vegetable	fruit	Total		
Year 1	2,254		2,254	28,000	63.11
Year 7 FW	14,764	4,677	19,441	29,008	563.94
Year 7 FWO	3,500	1,000	4,500	29,008	130.54
Year 15 FW	19,193	6,080	25,273	29,204	738.09
Year 15 FWO	7,000	2,000	9,000	29,204	262.84

*number of households is the total population as net income per household is based on average sales value for all households, not just those households reporting sales.

b) Livestock: benefits are based on household models for one dairy cow, one beef animal being fattened, and backyard poultry. These models show the pre-project (year 1) and present (year 7 FW) costs and benefits. Numbers of producers, number of animals/birds, production levels and output prices are based on survey data, with other information collected from producers. In the FWO situation, the margin over costs in year 7 is assumed to be 50% of the FW figure. Both FW and FWO margins are assumed to increase by 10% between year 7 and year 15.

Table 32: Livestock models – number of producers and margin over costs

	Percentage of hh who produce:			Number of producers		
	poultry	milk	beef	poultry	milk	beef
year 1	90%	41%	24%	25,200	11,480	6,720
year 7 FW	98%	42%	48%	28,428	12,183	13,924
year 7 FWO	92%	42%	30%	26,687	12,038	8,557
year 15 FW	98%	50%	60%	28,620	14,602	17,523
yr 15 FWO	94%	42%	35%	27,452	12,266	10,222
	Margin over costs per producer Tk'000 (financial prices)			Total margin over costs for all producers Tk'000		
	poultry	milk	beef	poultry	milk	beef
year 1	0.05	1.96	1.51	1,260	22,501	10,161
year 7 FW	9.36	13.46	7.83	266,156	163,927	109,052
year 7 FWO	4.68	6.73	3.92	124,930	80,988	33,511
year 15 FW	10.30	14.80	8.62	294,753	216,120	150,961
yr 15 FWO	5.15	7.40	4.31	141,361	90,770	44,030

c) Aquaculture benefits are based on a household fish pond of 30 decimals, with a model of the costs and benefits for pre-project (year 1) and present (year 7 FW). Numbers of producers, size of pond, production levels and output prices are based on survey data, with other information collected from producers (Table 33). The margin over costs for year 7 FWO is assumed to be 50% of that for year 7 FW. In year 15 the margins increase by 20% for both FW and FWO.

Table 33: Income from pond aquaculture

	Number of fish pond producers		Margin over cost Tk'000 financial prices	
	% of all households	Number producers	Per producer	Total all producers
year 1	47%	13,160	1.80	23,685
year 7 FW	98%	28,428	28.49	809,990
year 7 FWO	64%	18,420	14.25	262,420
year 15 FW	98%	28,620	34.19	978,567
yr 15 FWO	80%	23,363	17.10	399,415

d) Non-farm enterprises. At least some of the growth in the non-farm sector can be attributed to CDSP IV interventions in agriculture. Some of these enterprises are closely linked to farming – farm input and output trading, machinery hire, and transport services. Others have been supported by the project though training (tailoring) or micro-credit (grocery shops). Most of all, they have benefited from the improved communications infrastructure. Based on baseline and impact survey data, for project households, petty trade / business earnings increase from about Tk72,000 for 10% of households in year 1 to Tk306,000 for 11% of households in year 7. In the future without project scenario petty trade earnings are half the FW figure for year 7, and both FW and FWO increase by a further 30% by year 15 (Table 34).

Table 34: Income from non-farm enterprises

	Number of households with enterprises		Margin over cost Tk'000 financial prices	
	% of all households	Number households	Per producer	Total all producers
year 1	10%	2800	72.00	201,600
year 7 FW	11%	3191	306.00	976,409
year 7 FWO	11%	3191	153.00	488,205
year 15 FW	15%	4381	397.80	1,742,624
yr 15 FWO	15%	4381	198.90	871,312

e) Income from trees: income from fruit trees has been included in homestead vegetable and fruit income. Income from firewood, poles and timber has been calculated for: (i) trees planted by the social forestry sub-component; and (ii) trees planted around homesteads and fields on private land. The impact survey shows 100% of households own trees, with an average of 101 timber, 83 fruit and 30 palm trees. This means there are a total of 2.8 million timber around homesteads and on private land. In addition, SGFs have planted 0.75 million trees (excluding mangroves) on social forestry plots (net of losses to erosion). Economic benefits are based on SFG standards for the value of firewood etc. each year after planting and then a final timber value when felled after 15 years. For SGF trees there is a benefit sharing arrangement, with SFGs getting a share of around 50%, and this is taken into account in calculating the increase in income resulting from social forestry.

210. **Increase in household income.** EFA calculations show that average incremental household income in Tk88,017 in year 7, increasing to Tk137,086 in year 15. Adjusted to 2017 price levels, the impact survey recorded an increase in household income of Tk181,130 (Table 35). This is about double the increment of Tk88,017 per household calculated in the EFA – it is reasonable to suppose that much of the increase came from sources not connected to CDSP.

Table 35: Incremental income in 2017

	Average household income	
	Taka per year	2017 prices
Baseline survey 2011	71,950	115,120
Impact survey 2017	296,250	296,250
increase	224,300	181,130
EFA - incremental income per HH		88,017

211. **Economic analysis** aims to show if the investment is justified in terms of the economy as a whole. To convert prices to economic values the following adjustments have been made:

a) For tradeable goods (rice, soyabeans and fertiliser) to border prices using the current exchange rate, and assuming import parity (Bangladesh is a net importer of these items). As there are significant subsidies on fertiliser, the economic value of fertilisers is considerable higher than the market price, while paddy is a little lower (local market prices of paddy have increased due to poor harvest last year), while soyabean is higher than the market value.
b) For non-tradable goods, current local prices have been adjusted by the standard conversion factor (SCF) of 0.94 which reflects a degree of protection in the economy and slight overvaluation of the BDT.
c) For a few items, with a high import content (pesticides, machinery services), but no border value, prices have been left at market values and not adjusted downwards using the SCF
d) Farm labour has been adjusted by a shadow wage rate factor (SWRF) of 0.75 reflecting a degree of under-employment in farm households and unemployment in the project area.
e) Project costs have been adjusted to 2017-18 terms by application of the consumer price index. Civil works and plantation have been adjusted by the SCF but other categories of project expenditure have left unchanged. The investment in credit funds (by PNGOs including the value of group member savings) has been included in project investment costs, but as these funds will not be exhausted, their value is included as a credit item in year 20.
f) From year 8 onwards, infrastructure O&M costs are included at an annual amount of 3% of civil engineering costs. O&M during the project period is included in project investment costs.

212. The economic internal rate of return (EIRR) over a 20 year period, for base case assumptions, is 38.9%. Sensitivity analysis (Table 36) shows the EIRR remains at an acceptable level, with a positive NPV (discount rate 10%) with adverse movements in benefits – both for the base case and the high erosion scenarios.

Table 36: Sensitivity analysis

		Land area: base case		Land area: high erosion	
		EIRR	NPV Tk m	EIRR	NPV Tk m
Base case		38.94%	10,083	37.07%	8,066
Change in agricultural benefits	-20%	35.68%	9,011	33.69%	7,123
	-40%	32.49%	7,939	30.38%	6,181
Change in total benefits	-20%	30.56%	7,096	28.44%	5,483
	-40%	22.30%	4,110	19.97%	2,900
Two year delay in benefits		23.77%	6,461	22.21%	5,053

213. At the time of project design the EIRR was calculated to be 17.2%. Reasons why the EIRR at completion is higher are:

a) A larger increase in cropping intensity: the design document assumed a 16 percentage point increase (from 144% to 160%), while this analysis uses a 24 percentage point increase (from 104% to 130%).
b) A larger switch from local varieties of paddy to HYV – with consequent bigger increase in paddy production. At design is was assumed in year 10, 75% of aman would be local varieties, in fact, at year 7, only 30% is local variety. No boro production was included in the design projections.
c) A much larger growth in homestead production of fruit, vegetables, poultry, livestock and aquaculture. At design it was assumed that these, together with non-farm enterprises, would amount to only Tk9,333 per household, while PCR estimates, based on actual data, amount to Tk55,690 per household (all at economic prices). This increase can be attributed to: (i) the catalyst that sorjon field vegetables played in expanding homestead production; and (ii) large scale implementation of activities aimed at poultry, livestock and fish producers rather than leaving this to another project (RLFDC) with very limited outreach in the CDSP IV chars.

214. On the other hand, EFA in the design document did not allow for any loss of land to erosion, nor did it include a FWO projection of growth in a without project situation. Farm wages were Tk100 per day at design but are now Tk450. This 350% increase is greater than for other inputs and for outputs. In fact, wages may have been priced too low in the design document (Tk150 to Tk175 may have been more accurate). Even so, there has been a real improvement in relative prices in favour of labour. At the time of design, one day of labour at Tk150 was equal to 10 kg of paddy. Now one day of labour is equal to 22.5 kg of paddy – over twice as much. Daily labour is the main source of income many families, and higher wages will have improved living standards. It cannot be claimed that growth in the char economy bought about by CDSP IV has, by itself, raised wages. Nevertheless, CDSP IV will have contributed.

215. **Non-quantified benefits.** Benefits from CDSP IV which have not been quantified and included in the economic analysis include the following:

- Palm tree products such as leaves for thatch and handicrafts not included in fruit or timber.
- Mangrove poles and timber
- Profits for production of sheep and goats
- Income generated by transport enterprises – these have flourished with the good road network
- Reduced cost of food and consumer goods purchased in the chars due to reduced transport costs
- Increased opportunities for wage labour and employment – both within the chars and, due to better transport links, in other parts of Bangladesh and abroad.
- Value of time saved due to better, faster travel.
- Benefits (both financial and welfare) stemming from improved health due to project water, sanitation and health interventions, and from better nutrition.
- Value of time saved due to reduced distance to water supplies
- Benefits from community and social empowerment, including greater gender equality
- Benefits from disaster risk reduction due to embankments, communications, cyclone shelters and disaster preparedness training.
- Benefits from improved access to education due to roads and schools in cyclone shelters
- Environmental benefits and climate change mitigation due to tree planting (including the benefits to fisheries from mangroves) and use of solar power.

F. ASSESSMENT OF SUSTAINABILITY

216. Overall assessment of sustainability is rated as *moderately satisfactory (score of 4).*

217. **Political sustainability.** *Satisfactory (score of 5)*. GoB is firmly behind the CDSP concept of char development and land settlement. The fact that this has been the fourth phase of CDSP IV is evidence of this commitment – and also the commitment of GoN. The project is also popular with MPs in the char area and representatives of local government.

218. **Institutional sustainability.** *Satisfactory (score of 5)* The key community organisation concerned with the sustainability of CDSP IV are the WMG. The assessment of WMG (Technical Report 15) found that CDSP IV were not as well managed and sustainable as those in CDSP III – which had been given more training and support – both during CDSP III and in CDSP IV. However, as TR 15 shows, WMG from CDSP I and II are still functioning effectively – what can result in their demise is erosion of their command areas (see environmental sustainability below) or becoming embroiled in local political disputes (as has happened to some CDSP II WMG in south Hatiya. Moreover, unless effected by erosion, the water management infrastructure in the old CDSP areas is still operating well. AOS show that crop production in these areas continues to increase and farmers report improving conditions for crop production.

219. SFG have also been shown to be sustainable, with SFG from CDSP I and II looking after their second cycles of trees. Once trees are planted and have passed through the initial care-taking period, there is little for SFGs to do other than receive a share of benefits. TUG also have relatively little to do apart from making small contributions to DTW maintenance costs – these would primarily be spares for the hand pump and cement to repair the slab. The microfinance groups of the PNGOs are now viable businesses and will continue to operate for as long as their members find them useful. These groups will also be the channel for other support delivered via NGOs – some groups are now becoming involved in the Samruddhi project of PKSF.

220. At least half of all Farmers Forums (FF) have continued to meet after the end of DAE involvement in CDSP IV. FF remain useful as a place for farmers to meet, discuss problems and identify solutions. However agricultural activities during the implementation of CDSP IV meant that many farmers made direct links to DAE and other farm service providers, and may feel that they no longer need an organised forum. The fact that farming has continued to thrive in the old CDSP areas, where relatively few farmers belong to an FF or similar association, suggests that FF are not critical for the sustainability of the gains made by farmers during CDSP IV.

221. **Social sustainability.** *Satisfactory (score of 5)*. The approach of CDSP IV was to align community participation to char settlements – known as *samaj.* This ensured that each samaj was represented in different FLIs (as were women) and the project has largely avoided getting involved in local disputes during implementation. The wide range of FLIs with different functions has enabled many different people to get involved in leadership positions. Unlike many other projects, at any location there was no single FLI involved in all aspects of project inventions. This helped avoid local arguments and so contributes to sustainability.

222. **Technical and economic sustainability.** *Satisfactory (score of 5)*. The improved farming systems supported by CDSP IV are entirely market-led. Farmers obtain inputs through market channels and sell products in the open market – and these will continue to operate after the end of the project. Support services have developed – such as machinery hire services and financial services – that are operated as businesses and so sustainable. To improve animal health services, CDSP trained poultry workers and paravets, who generate an income from provision of their services and so should be sustainable. However supply of vaccine

appears to be a problem – this largely comes from the Department of Livestock Services[18], and supplies are limited.

223. Of all the services supported by CDSP IV, stakeholder project completion workshops identified health services from PNGOs as unlikely to be sustained. Although some PNGO could continue to operate clinics using profits generated from microfinance (at least one does so), margins from such operation are under increasing pressure, and the resources are likely to be limited unless coming from another external source (such as PKSFs Samruddhi project). However discussions with women living in the chars have highlighted the following: (i) people now have money and can afford to pay for health services – even going to specialised hospitals in major cities; (ii) better roads mean it is now easy for sic people to reach facilities outside the chars – and people increasing want to visit properly qualified doctors rather than the paramedics in CDSP clinics; and (iii) overall health levels have greatly improved and there is now much less need for medical services – this has come about through improved water and sanitation, and better knowledge of health and hygiene issues. Health service providers trained by CDSP IV will continue to operate. Traditional Birth Attendants were doing this work before CDSP arrived, and will continue to do it afterwards, although they say that demand for their services is greatly reduced after the universal adoption of family planning. At least one paramedic from a PNGO is continuing to work – having set up a pharmacy shop.

224. Another issue for sustainability is the maintenance of water and communications infrastructure. WMG may do some minor maintenance, such as cleaning out weeds out of drains and removing cross dams, but is unrealistic to expect them to do more substantial works. BWDB and LGED have substantial and growing maintenance budgets, but the demands of these budgets usually exceeds the funds available. Nevertheless, maintenance gets done – considerable work was done during CDSP IV using GoB funds. There is no evidence that faming is suffering because of ack of maintenance, and the standards of road maintenance in Bangladesh as a whole seem to be improving.

225. **Environmental sustainability.** *Moderately unsatisfactory (score of 3).* Much of the work of CDSP IV has been to make rural livelihoods more environmentally sustainable and resilient to climate change. Water management infrastructure aims to protect farmers from rising sea levels and storms. Trees provide shelter and mitigate climate change. Farmers were encouraged to adopt sorjon, a good example of a climate-resilient farming system, along with environmentally friendly methods of pest control and use of organic composts.

226. However, the flood protection offered by the embankments, plus possible drainage congestion resulting from embankments have encouraged farmers to grow significant amounts of boro paddy, especially in char Nangulia. Irrigation of boro is extracting groundwater from a fresh water aquifer with limited recharge – and this could well affect the operation of the many drinking water tubewells installed by CDSP IV. This issue also effects the earlier phases of CDSP IV as there has been a sharp increase in boro cultivation over the entire area – encouraged by the current high paddy prices following poor harvests last year.

227. An even more serious issue is erosion of land along the Sandip channel and Meghna estuary. In 2017 it was estimated that 5240 ha, 17% of the original area of 30,773 ha in the CDSP IV chars, had been lost to erosion. This was partly offset by 2,000 ha of accretion on Urir char, making a net loss of 10.5% of the original area. This has meant that much of the protective embankment has been lost and has had to be replaced, and a replacement sluice is still needed. Although the erosion seems to have slowed or stopped at one or two locations, it is continuing over most of the affected shoreline. This means further loss of land – with a consequent reduction in project benefits. Further replacement infrastructure may be needed.

[18] Supply of vaccine was a problem for MFTSP, an IFAD livestock project that closed many years ago. The government was then keen that vaccine costs were kept low to make them affordable to farmers- but this deterred commercial production by pharmaceutical companies.

228. **Exit strategy.** *Satisfactory (score of 5)*. An exit strategy has been drawn up and circulated to project stakeholders. This sets out the actions to be taken by the six IAs and 4 PNGOs in the post project period to ensure that the gains made by CDSP IV are sustained in each of the sectors where it operated. The strategy also states how the partnerships between different stakeholders, including with and between FLIs, will operate in future. Issues regarding the need for re-alignment or replacement of infrastructure are being discussed as part of a follow-up project.

G. LESSONS LEARNT

Overall design

1. There were suggestions at PCR workshops that four additional government agencies should be included in future phases of CDSP to cover health, education, fish and livestock But, arguably CDSP is already over-complex, with six government implementing agencies plus NGOs, and its efforts suffer from being too diffused. Technical aspects of health services, livestock and aquaculture did not get much attention, and there were no specialists in these areas on IFAD supervision missions (nor were there any forest specialists). This is understandable, these activities only absorbed a very small proportion of project funds, and missions needed to focus on priority issues. Although the interventions in health, livestock and aquaculture generated good results, no doubt more could have been done to adopt improved technologies for livestock and aquaculture, increase the numbers of birds and animals vaccinated, and to make a better exit from the health services.

2. Consideration should be given in future designs of projects in locations vulnerable to erosion to making specific provision for families displaced by erosion. Land may well not be available for their resettlement, but homestead plots / houses and support for non-land based IGAs could be considered.

Sub-component 1: Water management

3. The overriding issue for this sub-component has been the unexpected and significant loss of land to erosion – with embankments and one major sluice also being lost. Although CDSP IV commissioned a study on erosion on the Meghna estuary shoreline from the Institute of Water Modelling (the premier organisation in this field in Bangladesh). This was completed in 2013 and did not raise serious concerns, with serious and rapid erosion starting in the Hatiya channel during the 2014 monsoon. Whether or not more in-depth morphological studies could have uncovered information to give an advance warning is uncertain, but there is clearly a need to generate a better understanding of the processes of erosion and accretion in order to plan coastal zone development – including possible construction of cross-dams. Despite this uncertainty, it seems logical to carry out as much detailed investigation as possible prior to investing in land reclamation works.

4. The construction of the recent retired embankments has only cost about two-thirds of the original estimated amount due to the use of machinery rather than manual labour for earthmoving. This has also meant the work was done more quickly. If more embankment (and other earthwork) can be constructed with the same investment, it is likely that far more work will have been created through the resulting improvement in agriculture than will have been lost with the elimination of manual labour for construction work.

5. The assessment of WMG showed that CDSP III WMG were performing better than the more recently formed CDSP IV WMG. CDSP III WMG have got more training, and have had some further support from CDSP IV. The lesson seems to be that more attention needs to be given to building the capacity of WMG, but this may also require the efforts of a follow-up project.

6. Another lesson from the WMG assessment is that the CDSP approach of forming WMG with relatively few members (around 35) that are representative of around 1,000 farmers in the WMG area works well. Normally WMG promoters aim to have the vast majority of farmers as members of the WMG – on the grounds that this gives them a say in how the WMG is managed and a commitment to contribute to their membership. In practice this requires a considerable effort and can become a headache to manage after project support ends. As are result it is not unusual for such WMGs to cease to operate within a few years. CDSP WMG are relatively small and easily managed, and a number are continuing to work well 20 years after they were formed. Such representative-type WMGs may well not be appropriate for the management of irrigation systems, but drainage and flood control needs much less active management and water distribution between farmers is not an issue. The CDSP WMG do not sem to have any problem in co-opting assistance from other farmers

Sub-component 1b – social forestry

7. This component has helped transform the appearance of the chars from open mud flats into lush green landscape. In terms of providing shelter from storms and cyclones the foreshore plantations would seem to be the most useful, but a lesson from CDSP IV is that these are not easily to get planted – people can already live on, or otherwise use, foreshore land and be unwilling to leave it to make way for trees. It is also vulnerable to erosion.

8. Social Forestry Groups are a useful way of providing poor landless people with access to a natural resource and an additional source of income. However in the context of CDSP, these benefits are less obvious. Almost all households on these chars possess (even if they lack formal title) some cultivable land, and most SFG members have more trees on their private land than their share of trees in the SFG. The rationale for the use of SFG in CDSP is therefore of getting trees planted and cared for, rather than providing landless people with access to a natural resource

Sub-component 2a – internal infrastructure

9. A significant proportion of the roads built by LGED have brick paving. These roads have a rough surface and bricks tend to get stolen, making the surface even more uneven. Projects need to have sufficient resources to convert these roads into bitumen surfaced once the base is fully settled

10. Bridges are often not needed - if waterways are not used for navigation bridges can be replaced by lower cost box culverts. However unforeseen areas of drainage congestion can require many more culverts than were originally planned, and budgets need the flexibility to accommodate these. U-drains have been shown to be lower cost and more robust that the equivalent pipe culvert.

11. Homestead vegetable production has boomed in CDSP IV, and many households sell relatively small volumes in local markets – while he smaller number of farmers growing vegetables on a larger scale seem to mainly sell to traders at the farm gate. Given that the total volume of sales of homestead vegetables far exceeds that of field vegetables, rural markets play a vital role in marketing, and more development of market infrastructure is needed.

12. The survey of Farmers Forums showed that, if there were marketing problems, then these were largely related to transport. Although CDSP IV has built a considerable length of road, still more are needed, as well as more foot crossing points on khals.

13. CDSP IV made a number of useful detail design improvements to cyclone shelters. It is suggested that future shelters include an access ramp to enable handicapped people to get the safety. However, these have also been proposed to enable livestock to enter the shelter, and there is unlikely to be enough space in a real emergency for both people and their animals.

14. Cyclone shelters with polders have an enclosed ground floor. Primary schools often do not need all the ground floor rooms as well as the first floor, and there is potential for them to share shelters with other users. Spare rooms could be used as bases (office, meeting room, information centre) for WMG and other FLIs.

15. LCS in both sub-components 2a and 2b have provided poor households with a useful source of income, however there are important issues regarding whether LCS have a future in Bangladesh. The use of labour-intensive methods for construction is in the process of being phased out, and many of the labour-intensive works being undertaken by LCS could be done at lower cost by machine. The lower cost of infrastructure built by machines means the investment will benefit more people, creating more long-term employment.

16. Although working in LCS may give poor women a better wage and the opportunity of a share of profits, it is still hard manual work of low status. Unlike other projects in Bangladesh, in CDSP IV the great majority of households have access to farmland and there are better opportunities for women and their households.

17. Although LCS contracts specify the same wage for both men and women, they are based on the standard rate schedules (of LGED or other agency) per unit work done. These rates do not differentiate between men and women and, as men can move a bigger volume of earth per day, their LCS will earn more. This may help explain why women only comprised about 25% of LCS members. There are reports of men doing the work for women LCS (sometimes the LCS sub-contracts out most of the work to other people), and earth moving machinery is also sometimes used[19].

18. That said, LCS are likely to have a greater interest in the use and functionality of the final infrastructure than an outside contractor. It is often reported that LCS works are of better quality than those done by contractors, and it can be difficult to find competent contractors for small contracts (such as DPHE latrine rings and slab).

Sub-component 2b - water and sanitation

19. Although this sub-component has worked well, adopting some of the practices of "community-led total sanitation" would help ensure that no household was left out and that good practices were universally adopted. In particular the establishment of village (samaj) sanitation committees and involvement of schools would make implementation more effective. There is also a need for a critical evaluation of hygiene education and adoption (this is one of the original applications of the KAP approach).

Component 3: land settlement and titling

20. Land titling has been one of the biggest success stories of CDSP. A number of important lessons have emerged. One is that land titling is not an easy process. Although CDSP has now developed a widely accepted process, there are still many delays caused by a range of factors (including lack of survey base maps, transfers of government staff, disputes regarding administrative boundaries, and claims that land titles were already granted). Land titling had to be dropped at some locations. The lesson emerging from this experience is that land titling needs a long project duration (or a follow-up project) to implement, and it should not be attempted at locations where significant obstacles exist.

21. The land settlement process could be improved if upazila project offices were to get an allocation of funds. This would enable timely and smooth implementation of field activities and payment of salaries with no delays.

[19] LCS earth-moving work should not be done by machinery as the rate for excavation by machine is lower than for manual labour.

22. There have been reports of rent-seeking during the land titling process. Steps taken by CDSP IV to combat this include dismissal of PTPS surveyors. making the process even more transparent with more public meetings to disseminate information. To stop the unjust payment process, awareness building information posters, and a public ceremony to distribute title documents, were introduced. A telephone help line was set up in the DC's office to receive any allegations of corruption. The computerised LRMS can track the process and prevent the loss of paper files. Further use of technology for land surveys could reduce areas of doubt which in turn results in demands for illegal payments.

23. Secure title to land triggers investment by households in fixed assets – improving the land with ponds, sorjon systems, bigger homestead plots, planting trees and building better houses.

Sub-component 4a: Agricultural support

24. Direct assistance (as members of Farmers Forums) to 20% of farmers is sufficient to disseminate new technology to all farmers

25. The survey of FF shows that farmers continue to need advice on pest and disease control (which they see as their major problem), especially for the new crops that are now becoming important as farming becomes more commercial. Although most FF are maintaining their links with DAE, future projects could consider developing more sustainable models for technical problem solving, possibly based around "plant clinics/doctors[20]" and/or mobile phone based information services.

26. Salinity monitoring data collected by DAE was presented as an average for each char. It would have been more useful if the spatial distribution of salinity levels could have been shown on a map. Measurement of soil salinity has significant technical challenges and it may be better carried out by a specialised agency such as the Soil Research and Development Institute.

Sub-component 4b: Social and livelihood support

27. The contracting and management of PNGOs via the TA team was a change from previous phases of CDSP. This worked well with PNGOs being better integrated into the overall project and having a clearer idea of what they should do. Using access to credit funds from PKSF as one of the criteria for selection of the smaller PNGOs ensured the flow of credit to group members.

28. Livestock health and breeding services, and supply of inputs such as feed and chicks, along with fish fingerlings, can all be provided on a fully commercial and sustainable basis by the private sector via local retailers and community animal health workers. Projects need ensure these workers are properly trained and equipped and linked to supplies of the inputs they need. Although some free provision of inputs may be justified in terms of introducing new ideas and systems, widespread provision of free or heavily subsidised inputs and services will undermine the viability of community and private sector providers.

29. Future project might consider aligning human health interventions to an exit strategy – so interventions are aiming to build a post-project strategy for health service provision (although in context of this project maybe this is not vital).

30. Value chain development efforts do not seem to have added much to what would have happened through the market forces that emerged in response to improved connectivity and the growth of production on the chars. The lesson here is to focus on innovations in the value chain – such as building links with major companies that are not yet directly linking to farmers in the project area.

[20] https://www.plantwise.org/plant-clinics/

Component 5: Management

31. CDSP IV had considerable achievements in M&E – which point the way to what more could be done in future. Few projects, if any, regularly report findings of PME and KAP – and there is scope to develop these to provide more useful feedback and evidence of the effectiveness of training. CDSP IV AOS generated more detailed data than those on other projects – the lesson here is to focus more on immediate outputs than impacts. The ad hoc studies show what can be done with small surveys and investigations into specific topics. The lesson is that this needs significant resources in terms of staff and expertise.

32. M&E data collection in CDSP IV relied entirely on paper questionnaires. Data entry and quality control were time consuming. Surveys would be easier if tablets or mobile phones were used for data collection – as they are for other projects.

33. Financial management: it has not been easy to meet IFAD requirements for financial reporting and audit. It is almost impossible to simultaneously implement detailed and complex IFAD fiduciary and procurement systems in six separate and independent implementation agencies whose staff have had little or no prior exposure to donor funding requirements and computer accounting systems.

Project supervision

34. Although IFAD supervision and support missions generally did a good job, they were most useful and effective when the same individual was on a number of missions and so got to know the project well and understand the issues involved – as was the case for the water management engineer.

Impact

35. CDSP IV was a big investment per hectare of land developed and per household benefitted, but the economic and financial analysis shows that the returns in terms of improved livelihoods, increased production and higher incomes, have justified this investment. The nature of the transformation to the productivity of land has been similar to the results of an irrigation project – which justifies costs in the same order of magnitude (or maybe a little lower).

36. Farmers on chars that did not get protective embankments (Urir char and, leaving aside the fact of land erosion, Caring char) also seem to have benefited, even if this has not been as much as those on the other protected chars. The investment here is much lower. More needs to be done to understand the changes that take place here, which may primarily be driven by better access to agricultural information and support.

H. CONCLUSIONS AND RECOMMENDATIONS

229. Overall project performance is rated as *highly satisfactory (score of 6)*.

230. There is good evidence that CDSP IV has been highly successful in meeting its objective of reducing poverty and hunger for poor people living on newly accreted coastal chars. CDSP IV exceeded almost all of its goal, objective and outcome targets, and benefited more people than as envisaged at the time of its design. CDSP IV exceeded almost all of its goal, objective and outcome targets, and benefited more people than as envisaged at the time of its design. Although unexpected and severe erosion has had a major impact, resulting in much land being lost and households displaced, the project has still more than justified its investment, transforming the economy, landscape and infrastructure of the chars,

231. For most households, settling on undeveloped chars was an act of desperation, having lost land elsewhere due to erosion. Before CDSP IV arrived, they had a miserable existence, with unproductive land, and uncertain tenure being at the mercy of gangs of land grabbers who extorted whatever money they could, and physically assaulted women. Living conditions were

very poor, with bad housing, no fresh water nearby, and no health or other services. In this situation, many people went hungry or had a poor quality diet. With the development of CDSP IV there has been a dramatic improvement in their lives in terms of better livelihoods, higher income, elimination of hunger, and improved security, especially for women.

232. Key factors for success of CDSP IV have been close cooperation of the six IAs and four PNGOs, with coordination, technical and management support from a skilled and experienced TA team. The fact that the project is in its fourth phase (fifth if the pilot Land Reclamation Project is included) means that the development approach is now well tested and known to all involved - both char dwellers and government officials. CDSP IV made some small changes that seem to have worked well – particularly in the way the PNGOs were contracted and managed.

233. The most serious challenge has been the severe and unexpected loss of land to river erosion – reducing the project area, displacing households, and necessitating additional expenditure to rebuilt lost embankments. Previously a significant proportion of Caring char had been removed from CDSP IV and allocated for use by the army. Although the settlement of thousands of landless households with secure titles to their land is one of the major success stories of CDSP, the process continues to be challenging, with many pitfalls and delays.

234. Recommendations for the future: with continuing erosion, there will be a need for further reconfiguration of embankments, and the drainage sluice (DS-2) that was lost to erosion needs to be replaced – tidal water is entering char Nangulia via the khal that was controlled by DS-2, and silt removed that has been deposited by this water. There is also a need to replace a cyclone shelter that was lost to erosion. Due to the need to divert funds for additional embankments, some of the roads constructed by CDSP IV were not converted from brick paving to a smoother and more durable bitumen surface. This now needs to be done. Continuing population growth and expansion of commercial crops means more roads, crossings of khals, and markets are needed, along with water and sanitation facilities.

235. The Water Management Groups set up during CDSP IV need further support to become as strong as these groups in the older phases of CDSP. Farmers Forums also say they need more assistance, especially regarding control of pests and diseases in emerging commercial crops, along with stress-tolerant crop varieties. There are opportunities to capitalise on this expansion of cash crops by linking farmers to private sector agribusinesses elsewhere in Bangladesh.

Appendix-1: PCR rating matrix

PROJECT NAME: Char Development and Settlement Project - phase IV (CDSP IV)	
PROJECT ID:	
BOARD APPROVAL DATE: 22 April 2010	
ENTRY INTO FORCE: 9 May 20111	
PROJECT COMPLETION DATE: 30 June 2018	
LOAN CLOSING DATE: 31 December 2018	
IFAD LOAN AND GRANT (USD MILLION): 47.35	
TOTAL PROJECT FINANCING: 89.28	
IMPLEMENTING AGENCY: Bangladesh Water Development Board (lead agency)	
Criterion	**PCR Rating**
Project Performance	
– Relevance	5
– Effectiveness	6
– Efficiency	6
– Sustainability	4
Rural poverty impact	
– Households' incomes and assets	6
– Human and social capital and empowerment	5
– Food security	6
– Agricultural productivity	6
– Institutions and policies	4
– **Overall rural poverty impact**	6
Additional evaluation criteria	
– Gender equity and women's empowerment	6
– Access to markets	6
– Innovation	5
– Potential for scaling up	5
– Environment and natural resource management	5
– Adaptation to climate change	6
– Targeting and outreach	6
Partners performance	
– IFAD's performance	5
– Government performance	5
Overall project achievement:	**6**

a/ Rating scale: 6= highly satisfactory; 5= satisfactory; 4= moderately satisfactory; 3= moderately unsatisfactory; 2= unsatisfactory; 1= highly unsatisfactory

Appendix 2: Logical framework

Appendix 2 A: Logical framework at Appraisal

Narrative summary	Indicators	Means of verification	Assumptions
Goal Reduced poverty and hunger for poor people living on newly accreted coastal chars	- Reduction of 25% in number of children stunted and number under-weight - 50% increase in household assets - No. hh with 5 months or more of food shortage reduced from 46% to 23%.	Impact surveys at baseline, mid-term and completion (RIMS)	Real price of rice does not rise relative to wages
Purpose Improved and more secure rural livelihoods for 28,000 households in coastal chars	- 20,000 hhs reporting increased agricultural production - 28,000 hhs with more livestock - 40,000 people* in income earning occupations; - 21,000 hh with access to improved water supply and sanitation	Impact and outcome surveys undertaken by the M&E unit.	No major natural disasters Economic growth and stability Law and order in char areas
Outputs	*Immediate oucomes in italics*		
1. Water resources managed effectively to protect land from tidal and storm surges, improve drainage, and enhance accretion	- 10,000 ha of land empoldered. - 41 km of embankment and 17.5 km of foreshore protected by plantation - 31 water management and 490 social forestry groups - *80% WMG rated effective/ sustainable* - *70% empoldered land has reduced soil salinity and flooding*	- Field surveys of soil sanity and drainage. - Project reports from BWDB and FD - Participatory monitoring of community orgs.	- Sufficient allocations for O&M by the Government. - - Possible to carry out successful foreshore plantation
2. Climate resilient infrastructure for communications, markets, cyclone protection, potable water and hygienic sanitation.	- 160 km road constructed - 25 bridges & 72 culverts built - 9 markets constructed - Reduction in transport costs - 60 cyclone shelters & 24 livestock refuges constructed. - *No. people* using cyclone shelters* - *No. children* at school in shelters* - 1380 water supply points operational & no. of hh supplied. - 26,735 hygenic latrines operational - 17,600 women earning from LCS	- Project reports from LGED - Participatory monitoring feedback and surveys - Project reports from DPHE	- Sufficient allocations for O&M by Government. - No unexpected changes in groundwater quality due to sea water intrusion.
3. Secure land title granted to 20,000 households.	- 26,000 target group hh getting secure title to land	- Project reports from MoL	- Vested interests & elites do not disrupt land settlement.
4. Improved livelihoods and household resilience	- 5,600 farmers* attending agric. extension events - *20,000. farmers* report adoption of improved agricultural technologies* - 28,000 women in 1120 NGO group - *Amount of savings and no. of loans* - 234 health workers & 13 clinics - *No. people* using health services* - 28,000 women trained in IGA - *No. people* with improved employment & own enterprises* - 28,000 women attend rights-based training and events - Indicators of improved rights	- Participatory monitoring feedback and surveys - KAP surveys - Project reports from DAE and NGOs	- DAE able to post staff to implement agricultural development programme. - Appropriate technologies for salt affected land available. - NGOs not subject to undue regulatory interference.
5. Knowledge management and lessons for Integrated Coastal Zone Mgt (ICZM).	- Project reports, studies workshops and other events	- Project reports	- Government continues to support coastal development
Activities			
1. Protection from climate change: (a) sea dykes; (b) internal embankments; (c) drains and canals, (d) water control sluices, (e) Water Management Organisations; (f) water infrastructure maintenance; (g) formation of social forestry groups; (h) tree planting on embankments, roadsides, foreshores & mudflats roadsides etc; (i) plantation caretaking			
2. Climate resilient infrastructure: (a) village and union roads and bridges; (b) cyclone shelters & killas; (c) rural markets; (g) deep tubewells; (e) drinking water ponds and rainwater collection; (f) hygienic latrines; (g) Labour Construction Societies for construction. (h) O&M user groups; (I) market management committees; (j) infrastructure maintenance			
3. Land settlement and titling: (a) Surveys to assess availability of land and current ownership status; (b) selection of target group households; (c) process of land titling; (d) computerised land record management system.			
4. Livelihood support: (a) formation of groups; (b) identification of appropriate technologies; (c) capacity building of service providers; (d) crop training and demonstrations; (e) other skill training; (f) access to livelihood opportunities and markets; (g) promotion of better health and hygiene; (h) social support and rights; (i) disaster preparedness and climate change resilience.			
5. Technical assistance and management support: (a) support from TA team for implementing agencies; (b) quality control; (c) specialised training; (d) M&E system; (e) studies of development of new chars; (f) dissemination and sharing of experiences.			

Appendix 2-B: Logical framework at PCR

The following changes have been made to the logframe indicators as revised at the MTR

1. Goal level indicator of child stunting and underweight has been replaced average annual household income. The goal statement is increase in income. Child anthropometric data is not available at completion (due to limitations in baseline data it was agreed with IFAD not to collect it at completion).

2. Purpose level indicator of 21,000 households with access to improved water supply and sanitation has been replaced with indicators of adoption of improved health practices and outcomes. The MTR indicator was repeated at outcome level, where this indicator has been retained.

3. Output indicator of reduced transport costs has been moved to outcome level.

Logframe targets are as per the MTR revised logframe. However, some of these differ with those in the appraisal report or in the last DPP revision,

Narrative summary	Indicators in logframe	Data	Data at baseline	Data at completion	Change	Source of data
Goal Reduced poverty and hunger for poor people living on newly accreted coastal chars	Increase in household income	Average annual household income	Tk71,950	Tk296,925	313% increase	Baseline and impact surveys
	50% increase in household assets	Average total value of assets per household	Tk35,162	Tk261,480	644% increase	Baseline and impact surveys
	No. hh with 5 months or more of food shortage reduced from 46% to 23%	Percent of households with acute food shortage	82%	4%	Reduction of 78 percentage points	Baseline and impact surveys
		Average period able to meet basic needs from own production	7 months	10.6 months	3.6 months (51%) increase	Baseline and impact surveys
Purpose Improved and more secure rural livelihoods for 28,000 households in coastal chars	20,000 hhs reporting increased agricultural production	Households reporting increase in paddy production			22,850 households (79% of all) report increase. Total production up 127%	Impact survey
	40,000 people in income earning occupations;	Household member generating income		83,592 person earning income (40% women)		Impact survey
	21,000 hh with improved health practices and outcomes	Had washing after use latrine	94% (26,320 hh) wash hand with plain water	95% (27,550 hh) wash hands with soap or ash		Baseline and impact surveys
		Reduction in diarrhea = reduced ORS demand	2012: 570,464 packets of ORS	2016: 157 ORS packets		NGO data in progress reports
Outcome						
1. Water resources managed effectively to protect land from tidal and storm surges, improve drainage, and enhance accretion	1a. 80% WMG rated effective/ sustainable	WMG rating from A to E		A=4%, B=46%, C= 21%, D=17%, E=13%		Assessment of WMG (TR-15) 2017
	1b. 70% empoldered land has reduced soil salinity, flooding and improved drainage	Average salinity levels in April (peak month). Farmers' perception of change	2012 - average ECe, 23.2 ds/m (extremely saline)	2016 - average ECe, 7.7 ds/m (moderately saline)	Farmers reporting reductions in salinity = 93%, flooding = 89%, waterlogging= 91%	DAE monitoring (progress reports). Impact survey at completion.
2. Improved road communication, available infrastructure for multipurpose use and ensured safe water and hygienic sanitation	Better communication in different places	Number of hh access to school and market via pucca road and travel time	No pucca or brick roads.	1.5 km to school, 2.5 km to market, 75% of these journeys use pucca or brick roads.	Journey time to school reduced by 50% and to market by 60% 60% to 80% reduction in transport cost of ag products	Baseline and impact survey Traffic and transport survey
	No. of people having access to shelter	Shelter number and capacity	Only one shelter – Uirir Char	37 shelters – capacity 92,500 people		Progress reports
	No. of children at school in shelters	Number attending shelter schools		5244 in 23 shelters		TR-14 – Rapid survey of cyclone shelters

Narrative summary	Indicators in logframe	Data	Data at baseline	Data at completion	Change	Source of data
	21,000 hh with access to safe water and hygienic sanitation	Number of hh with good water supply and distance to source	27,720 households, 345 m (dry), 418 m (wet season)	29,000 h'holds, 59 m (dry), 61 m (wet season)	Distance to source reduced by 321 m (84%)	Baseline and impact surveys
		Number of hh with hygienic latrines	1,680 households (6%)	27,442 households (98%)	92 percentage point improvement.	Baseline and impact surveys
3. Secure possession of land	Nos. of households maintaining possession of land	No of hh with land titles in CDSP I, II, III and IV areas	CDSP IV: 1.2% have land titles	CDSP I&II – 58% with title CDSP III – 87% CDSP IV – 71%	70 percentage point increase in CDSP IV	Baseline survey AOS 2017
4. Improved livelihoods and household resilience	20,000 farmers report adoption of improved agriculture	Number of adopters of specific improved practices in crops, livestock and aquaculture	CV from ag baseline	New paddy cv adopted by 20,600 households New vegetable varieties adopted by 21,200 h'holds		Impact survey 2017
	Nos. of women involved with their own IGA	No. of women earning income and managing IGA		68% women earn income 62% women have direct IGA		Impact survey 2017 PR-12, 8th round PME
	% hh using H&FP services	Contraceptive acceptance rate (CAR).	CAR = 41%	CAR = 91%	50 percentage point increase in CAR	NGO data
		Vaccination coverage,	52% children vaccinated 34% use of family planning	99% children vaccinated 100% of eligible couples use FP (23,021 couples)		Baseline and impact surveys
	% of women are aware about legal rights	Knowledge of specific key legal rights		Knowledge: 42% moderate, 58% good. Practice 72%.		2016 KAP

Outputs	Logframe target	Actual achievement	Source of data
1. Area empoldered by embankment and foreshore protected through plantation	10,000 ha of land empoldered.	Polder area December 2017 = 13,043 ha	Project data from satellite images
	41 km of embankment and 17.5 km of foreshore protected by plantation	41 km of sea and interior dyke net of loss to erosion 140 ha of foreshore plantation	Project data (PCR Annex VII)
	31 water management and 490 social forestry groups	24 WMG with 866 members (42% women) 581 SFG with 14,520 members (41% women)	TR-15 WMG assessment 2017 SFG data
2. Climate resilient infrastructure for communications, markets, cyclone protection, potable water and hygienic sanitation.	160 km road constructed	40 km bitumen road, 112.5 km brick, 135 km earth road	Project data (PCR Annex VII)
	25 bridges & 72 culverts built	4 bridges, 82 box culverts and 129 pipe culverts / U-drains	Project data (PCR Annex VII)
	9 markets constructed	7 markets completed	Project data (PCR Annex VII)
	60 cyclone shelters & 24 livestock refuges constructed.	39 cyclone shelters and 13 killas (target was revised to 42 shelters and 17 killas)	Project data (PCR Annex VII)
	1380 water supply points operational & no. of hh	1372 DTW (net of 103 lost to erosion) serving about 20,500 households	Project data (PCR Annex VII)
	26,735 hygienic latrines operational	24,929 latrines built and operational (net of 710 lost to erosion)	Project data (PCR Annex VII)
	17,600 women earning from LCS	1,734 LCS members (24% women), generate 88,724 days of employment, contract value of Tk56.8 million	Technical Report 17 (data to September 2017)
3. Secure land title granted to 20,000 households.	20,000 target group hh getting secure title to land (revised to 14,000 hh)	11,854 hh given secure title to land, plus 2,138 from CDSP III (December 2017)	Data from MoL in project progress reports
4. Improved livelihood support for the households	5,600 farmers* attending agric. extension events	1-day training for 5,400 farmers , 4-day training for 1,900 farmers, 72 tours, 84 field days, 1080 demonstration plots	Data from DAE in project progress reports
	28,000 women in 1120 NGO group	26,373 women in 984 NGO groups.	Data from PNGO in project progress reports
	28,000 women trained in IGA	21,902 women trained in farm IGA, 199 in tailoring, 112 as poultry workers, 13,520 in value-chain crops, 9432 demonstrations	Data from PNGO in project progress reports
	234 health workers & 13 clinics	13 paramedics, 39 H&FPF, 195 TBA. 13 fixed and 13 mobile clinics	Data from PNG in project progress reports
	28,000 women attend rights based training and events	39 LHR promoters, legal training for 13,173 women, 1,229 Law Implementation Committees established	Data from PNGO in project progress reports

Outputs	Logframe target	Actual achievement	Source of data
5. Knowledge management and lessons for Integrated Coastal Zone Mgt (ICZM).	Project reports, studies workshops and other events	Progress Report- 14 Technical report- 19 Mission Report- 9 KAP report-8 (in progress report) PME report- 8 (in progress report) Feasibility Study for CDSP V - 2 RIMS- 1 baseline, 1 Mid-term surveys	Project Progress reports and list of publications

Appendix 2-C: Risks reported in progress reports

PR no.	Year	1. Quality of IA staff	2. Fund availability	3. Law & order	4. Weather	5. Political support	6. Availability of materials	7. Quality of NGOs & NGO staff	8. Cooperation & coordination	9. Erosion
1	2011									
2	2011		Delay in RPA funds	Bahinis still active in Caring & Urir						
3	2012		Delay in RPA funds	Bahinis still active in Caring & Urir			High prices cause tenders to fail			Threat to Gabtail sluice in CDSP-3
4	2012		Delay as time taken to prepare WA due to inexperience				High prices cause tenders to fail			Threat to Gabtail sluice in CDSP-3
5	2013						High prices cause tenders to fail			At site of DS-3 Threat to Gabtail sluice in CDSP-3
6	2013	Lack of BWDB extension staff		Frequent hartals disrupt work		Handover of Caring mouza to the army is a setback		Not enough involvement by senior NGO staff		At site of DS-3, On Caring char, Threat to Gabtail sluice in CDSP-3
7	2014	Lack of BWDB extension staff	Reduced allocation by BWDB & DPHE	Law & order problem on Urir char			Availability and transport problem on Urir char	Not enough involvement by senior NGO staff		DS-3 site moved On CDSP-3
8	2014	Lack of BWDB extension staff				Political situation not favourable to progress of works	Availability and transport problem on Urir char	Not enough involvement by senior NGO staff		Nanulia embankment Caring and Noler chars. CDSP-3
9	2015	Lack of BWDB extension staff	Some shortage due to reduced RADP			Unrest in earlier months not favourable	Availability and transport problem on Urir char	Not enough involvement by senior NGO staff[21]		Nangulia. Noler and Caring chars, CDSP-3
10	2015	Lack of BWDB extension staff					Availability and transport problem on Urir char			Nangulia. Noler and Caring chars, CDSP-3
11	2016	Lack of BWDB extension staff			Cyclone Roanu damage DS-3 construction pit		Availability and transport problem on Urir char			Nangulia. Noler, Urir Caring chars, CDSP-3

[21] Continued to be a problem only for SDI, although this risk continued to be reported in progress reports 10 to 13

PR no.	Year	1. Quality of IA staff	2. Fund availability	3. Law & order	4. Weather	5. Political support	6. Availability of materials	7. Quality of NGOs & NGO staff	8. Cooperation & coordination	9. Erosion
12	2016	Lack of BWDB extension staff				Powerful people stole bricks from new HBB roads				Nangulia. Noler, Urir Caring chars, CDSP-3
13	2017	Lack of BWDB extension staff			Heavy rains hampered some work					Nangulia. Noler, Urir Caring chars, CDSP-3
14	2017	Lack of BWDB extension staff								Part of the project area drastically reduced and important infrastructure destroyed.

Inception report also mentioned inadequate knowledge of groundwater in coastal areas as a risk.

Appendix-3: Details of Supervision and follow-up missions

Table 1: List of IFAD Missions

Dates (from/to)	Type of mission (supervision / follow-up / ISM)	Mission members (names and positions)	Main issues and recommendations
26 May 2011	Implementation support	M E Mallorie, M&E specialist	One day training on M&E, RIMS and IFAD requirements
22 September 2011	Implementation support	Mr Niaz Apu, M&E specialist	Backstopping support for baseline survey
22-23 June 2011	Implementation support	Mr Kajal Charaborty, Financial management specialist	Project accounts, financial statements and reporting
7-20 February 2012	Annual Supervision Mission	1. Mr. Harry Denecke (Rural Infrastructure Specialist) 2. Dr. He Qibin (M&E and Project Implementation Specialist) 3. Mr. mahabubul Islam khan (Social Mobilization and Gender Specialist) 4. Mr. Md. Mosleh Uddin (Land Settlement Specialist) 5. Mr Kajal Chakraborty (Financial Management Specialist) 6. Mr. Thomas Rath (Team leader and IFAD and IFAD Country Program Manager)	**Main Issues:** 1. Assess drainage systems design 2. Rehabilitation of the displaced/ affected families 3. The current set-up of project logframe is not compatible with the present requirements of IFAD **Recommendation:** 1. Prepare contour maps 2. Compensation should be provided to displaced households. 3. Linkage between the project logframe, AWPB and M&E
13-27 March 2013	Annual Supervision Mission	1. Mr Dewan A.H. Alamgir (Mission Leader), 2. Mr Golam Hashibul Alam (Land Settlement Specialist and CPO/IFAD) 3. Mr Bram Bliek (Rural Engineer/ Hydrologist) 4. Dr Wafaa El Khoury (Agricultural Development Specialist) 5. Ms Judith D'souza (Gender and Institutions Specialist), 6. Mr Kajal Chakraborty (Financial Management Specialist) 7. Mr. Thomas Rath, IFAD Country Program Manager	**Main Issues:** 1. Revised work plan by LGED 2. Production, distribution and installation of sanitary latrines 3. Accounts management **Recommendation:** 1. Prepare work plans for the whole project period by prioritizing infrastructure to be built 2. a) immediately engage NGOs for installation of sanitary latrines, b) engage NGOs for production and installation 3. Update books of accounts and communicate to IFAD
31 August to 9 September 2013	Implementation support	Mr Ed Angeles, Financial management specialist	Project accounts, financial statements and reporting
15-28 February 2014	Annual Supervision Mission	1. Mr Bram Bliek, rural engineer /hydrologist 2. Ms Wafaa El Khoury, IFAD senior technical advisor and agriculture specialist 3. Mr Abdul Hannan, land settlement specialist 4. Mr Edilberto Angeles, financial management specialist 5. Ms Monica Romano, gender/targeting /institution specialist 6. Mr. Qibin He, team leader 7. The CPO participated in several meetings during the mission and the ACPM contributed to the drafting of the Aide Memoire and the supervision report.	**Main Issues:** 1. Slow progress of implementation 2. More M&E indicators need to developed 3. Project audit required to be compliance with Financing Agreement **Recommendation:** 1. Project Management Committee (PMC) will further coordinate with relevant agencies to accelerate the approval process of the revised DPP so as to expedite the project implementation 2. Project M&E will develop mechanisms to monitor the total number of project direct beneficiaries by gender without repeated counting and the number of beneficiaries from different households such as women-led and landless).

Dates (from/to)	Type of mission (supervision / follow-up / ISM)	Mission members (names and positions)	Main issues and recommendations
			3. The project will (i) appoint internal auditors; (ii) conduct bidding proposal of the audit services for the next year audit; and (iii) submit a consolidated audit report meeting the requirements of IFAD.
8-17 March 2015	Mid-Term Review Mission	Mr. Bram Bliek, Rural Engineer/ Hydrologist, Prof. Sattar Mondal, Agricultural Specialist, Mr. Abdul Hannan, Land Settlement specialist, Mr. Kajal Chakraborty, Financial Management Specialist, Ms. Rownok Jahan, Gender/targeting/institution Specialist, Mr. Abdul Alam, Economist, and Mr. Nicoluas Syed, IFAD CPO and Team Leader Was not able to visit the project area	**Main Issues:** 1. Erosion 2. Court order in CDSP III area 3. second round of RDPP's **Recommendation:** 1. Re-alignment and design of dykes and revision of DPP approved by 1st December 2015t; tender award for construction by 1st February 2016; closure of Mamur Khal as per new design ready by 1st July 2017. 2. Focus on land titling in CDSP IV and leave the remaining CDSP III titles to be distributed by GoB.
12-18 September 2015	Implementation Support Mission	Mr Nicolas Syed, IFAD Country Programme Officer and Mission Leader; Bram Bliek, Rural Engineer/Hydrologist,	**Main Issues:** 1. The mission made a first estimate of the river training works that would be required to stop the erosion of the river bank before it reaches the location of drainage sluice DS-2. The conclusion is that this would require immediate implementation of 3 to 6 heavy spurs with a cost for each about equal to the cost of the DS-2 sluice. So, preventing the erosion at the location of DS-2 would cost much more than the value of the sluice. And even then, risks and high maintenance in future cannot be ruled out. **Recommendations:** 1. The mission recommends not to take heavy measures to save DS-2, but that only measures be taken to build a retired embankment in the parts of Char Nangulia and Caring Char where the banks are gone.
5-16 March 2016	Annual Supervision Mission	1. Mr Nicolas Syed (Mission Leader and Rural livelihoods specialist 2. Mr Robert Delve (Agriculture Specialist, IFAD HQ) 3. Mr Bram Bliek (Water management and Infrastructure specialist 4. Ms Wanaporn Yangyuentham (Gender, M&E, KM Specialist) 5. Ms Marie-Lara Hubert-Chartier (Land tenure Specialist 6. Ms Anta Sow (Financial Management Specialist, Fiduciary aspects	**Main Issues:** 1. Erosion 2. Land title 3. Second round of RDPP's **Recommendation:** 1. Tender award for construction to be given by October 2016 latest; closure of Mamur Khal as per new design to be ready on 1st July 2017 latest 2. Project to improve the information sharing on land titling procedures and conditions and to ensure 80% of land distribution by July 2017 and 100% by the completion date. 3. The TA and IA should prepare the necessary revisions i.e. the project completion and closing date in accordance with the FA and ensure adequate follow-up for approval as soon as possible
11-23 March 2017	Annual Supervision Mission	1. Mr Julian Abrams, Mission Leader / Infrastructure Specialist	**Main Issues:** 1. Sustainability 2. M&E 3. Exit strategy

Dates (from/to)	Type of mission (supervision / follow-up / ISM)	Mission members (names and positions)	Main issues and recommendations
		2. Ms Sherina Tabassum, Co-Mission Leader, Country Programme Officer and Land Tenure Specialist 3. Mr Alban Bellinguez, Agriculture Development Specialist 4. Ms Wanaporn Yangyuentham, Gender, Targeting, M&E and Knowledge Management Specialist 5. Mr Didarul Islam, Financial Management Specialist 6. Mr. Benoit Thierry, Country Programme Manager 7. Mr Amedeo Paglione (ICT Division, IFAD Rome) 8. Ms Sheuli Shameem Ara (Knowledge Management Specialist, IFAD Bangladesh	**Recommendation:** 1. Prioritise capacity strengthening of key field-level institutions. 2. Ensure that CDSP-IV results are carefully measured and documented, including re-estimation of total project outreach 3. Continue feasibility studies for a potential CDSP-V and seek opportunities to mobilise support from GoB and DPs 4. Prepare a short exit strategy document and submit with AWPB 2017-18
12-20 November 2017	Implementation support mission	1. Ms Sherina Tabassum, Country Programme Officer, Ms Wanaporn Yanguentham, Institutional Support Specialist, Mr Didarul Islam, Financial Management Specialist.	**Recommendations** 1. Expedite all tenders and ensure completion of works by June 2018 2. Develop an action plan to reach target of 14,000 land titles distributed

Sources of info:
ASM-2012: Members pp.1, main issues & recommendations annex-1, pp. 9, annex-II, pp. 5 and annex-IV, pp.4 & 6.
ASM-2013: Members pp.1, main issues & recommendations appendix-1, pp. 17
ASM-2014: Members pp.5, main issues & recommendations appendix-1, pp. 21
MTRM-2015: Members pp.1, main issues & recommendations appendix-1, pp. 19
ISM-2015: Members pp. 1, conclusions & recommendations aspects-, pp. 17
ASM-2016: Members pp. 1, main issues & recommendations appendix-1, pp. 27
ASM-2017: Members pp. 1, main issues & recommendations appendix-1, pp. 30
Note: ASM refers to Annual Supervision Mission, MTRM refers to Mid-Term Review Mission and ISM refers to Implementation Supervision Mission

Table 2: Record of project rating scores

Indicators	2012	2013	2014	2015	2016	2017
B.1 Fiduciary Aspects						
1. Quality of financial management	4	3	4	4	3	4
2. Acceptable disbursement rate	4	4	4	4	5	4
3. Counterpart funds	4	4	4	4	4	4
4. Compliance with financing covenants	5	5	4	5	5	5
5. Compliance with procurement	4	4	5	4	4	4
6. Quality and timeliness of audits	4	4	4	4	4	4
B2. Project implementation progress						
1. Quality of project management	5	5	4	5	4	5
2. Performance of M&E	4	4	5	5	5	5
3. Coherence between AWPB & implementation	4	4	3	3	3	4
4. Gender focus	5	5	5	5	5	5
5. Poverty focus	5	5	5	5	5	6
6. Effectiveness of targeting approach	5	5	5	5	5	5
7. Innovation and learning	4	4	4	5	5	5
8. Climate and environment focus	NA	NA	5	5	5	5
B3. Outputs and outcomes						
1. Water management and social forestry	4	4	4	4	4	4
2. Internal infrastructure & water sanitation	4	4	4	4	5	5
3. Land settlement and titling	5	5	4	4	4	5
4. Agricultural, social and livelihood support	4	5	5	5	5	5
B4 Sustainability						
1. Institution building	5	5	4	4	5	4
2. Empowerment	5	5	5	5	5	5
3. Quality of beneficiary participation	5	5	5	5	5	5
4. Responsiveness of service providers	4	4	4	4	4	4
5. Exit strategy	4	4	4	4	4	4
6. Potential for scaling up and replication	5	5	5	5	4	5
C1.Physical and financial assets	4	4	5	5	5	5
C2. Food Security	4	4	4	5	5	6
C3. Quality of natural asset improvement and climate resilience	NA	NA	NA	5	5	5
C4. Overall implementation progress	4	4	4	4	4	5
C5. Likelihood of achieving development objectives	4	4	5	5	4	5

Note: Extracted these from Appendix 1 of IFAD supervision mission reports

Appendix-4: Summary of amendments to the loan agreement

There were no amendments to the loan agreement

Appendix-5: Financial: actual financial performance by financier, by component, and disbursements by category

Table 5A: Financial performance by financier

Financier	Appraisal (USD '000)	Disbursements (USD '000)	Per cent disbursed
IFAD loan	47,354.21	44,789.10	94.58%
GoN grant	19,832.99	18,489.93	93.23%
Government	15,657.06	12,883.90	82.29%
Total	**82,844.26**	**76,162.93**	91.94%

Table 5A: Financial performance by financier by component (USD'000)

	IFAD loan			GoN grant			Government			PNGO			Beneficiaries			Total		
Component	**Appraisal**	**Actual**	**%**	**Appraisal**	**Actual**	**%**	**Appraisal**	**Actual**	**%**	**Appraisal**	**Actual**	**%**	**Appraisal**	**Actual**	**%**	**Appraisal**	**Actual**	**%**
1. Protection from climate change	21,758.80	19,623.06	90	1,983.30	1,912.02	96	7,134.70	4,962.59	70							30,876.80	26,497.67	86
2. Climate resilient infrastructure	24,322.10	23,922.46	98	3,144.10	2,976.12	95	7,841.50	7,325.35	93				89.50	95.03	106	35,397.20	34,318.96	97
3. Land Settlement and titling	407.71	407.71	100	0	0	0	590.94	530.84	90							998.70	938.55	94
4. Livelihood support	865.58	835.86	97	3,995.78	3,525.41	88	89.92	65.12	72	2,000.00	2,128.57	106	700.00	1585.71	227	7,561.36	8,075.56	107
5. Technical assistance and management support	0	0		10,709.81	10,076.38	94	0	0	0							10,689.80	10,076.38	94
Total	**47,354.20**	**44,789.10**	**95**	**19,832.99**	**18,489.93**	**93**	**15,657.06**	**12,883.90**	**82**	**2,000.00**	2,128.57	106	**789.50**	**1680.74**	213	**85,523.86**	**79,907.12**	93

Note: Appraisal amounts for IFAD, GoN and government are as per second revised DPP. In the design document the PNGO contribution to component 4 was the amount of micro-credit loans outstanding less the amount in members savings accounts. However there was an arithmetic error in the design document calculation. A corrected calculation is in the table below. Beneficiary contributions are: (i) the contribution they make towards the cost of DTW; and ((ii) the balance in their savings accounts that contribute towards the PNGO credit fund.

Table 5C: Calculation of PNGO contribution

	Design document WP 6		Actual	
	Tk million	USD'000	Tk million	USD'000
Balance in member savings	49.00	700	111.00	1586
Loans disbursed	1414.00	20200	1767.00	25243
Loan balance outstanding	189.00	2700	260.00	3714
Capital provided by PNGO (error in WP)	353.50	5050		
Capital provided by PNGO (corrected)	140.00	2000	149.00	2129

Table 5D: Allocations of project funds in Government Project Document BDT'000

Component	Sub-component	Original DPP				First revision of the DPP				Second revision of the DPP			
		IFAD	GoB	GoN	total	IFAD	GoB	GoN	total	IFAD	GoB	GoN	total
Climate change	Water Manage	1,183,600	370,412	127,325	1,681,337	1,149,739	406,665	146,219	1,702,623	1,361,194	527,783	156,971	2,045,949
	Forest	301,825	16,175	363	318,363	332,717	16,175	243	349,134	314,230	21,588	244	336,062
	sub-total	1,485,425	386,587	127,688	1,999,700	1,482,456	422,840	146,462	2,051,757	1,675,424	549,371	157,215	2,382,011
CR infrastructure	Internal infra	1,555,683	499,535	280,836	2,336,055	1,798,181	524,077	221,781	2,544,038	1,689,827	562,225	218,344	2,470,396
	Water & sanitation	181,020	41,567	22,740	245,327	184,580	41,567	19,180	245,327	182,978	41,567	20,782	245,327
	sub-total	1,736,704	541,102	303,577	2,581,382	1,982,761	565,644	240,961	2,789,365	1,872,805	603,792	239,126	2,715,723
Land settlement		28,280	24,720		53,000	31,394	26,904		58,298	31,394	45,506	-	76,900
Livelihood support	Agriculture	60,592	6,925		67,516	66,650	6,924		73,574	66,650	6,924		73,574
	S&LS			379,800	379,800			320,820	320,820			307,675	307,675
	sub-total	60,592	6,925	379,800	447,316	66,650	6,924	320,820	394,394	66,650	6,924	307,675	381,249
TA & management support				695,815	695,815			763,974	763,974			823,124	823,125
Total		3,311,000	959,334	1,506,880	5,777,213	3,563,260	1,022,311	1,472,217	6,057,789	3,646,273	1,205,593	1,527,140	6,379,007

Table 5E: Expenditure by sub-component and by financial year USD'000

	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	total
1a. Water management infrastructure	2,718.50	2,720.78	2,374.07	2,534.78	2,660.63	4,812.58	3,314.15	1,328.54	22,464.03
1b. Social Forestry	234.09	466.59	335.54	679	785.87	877.89	436.44	218.22	4,033.64
2a. Internal infrastructure	1,292.48	1,166.75	6,390.33	6,702.97	7,147.71	6,440.94	1,604.15	477.29	31,222.62
2b. Water and sanitation	504.46	345.12	326.47	896.1	323.55	270.93	223.12	111.56	3,001.31
3. Land settlement & titling	82.72	73.39	94.69	200.78	182.73	104.48	49.94	149.82	938.55
4a. Agricultural support	145.65	161.2	140.06	255.18	202.85	35.08	0	0	940.03
4b. Social and livelihood support	329.24	476.6	623.61	660.82	747.18	523.48	125.44	0	3,486.37
5. Technical assistance	1,261.96	1,373.30	1,474.04	1,176.76	1,355.03	1,695.53	1,389.75	350.01	10,076.38
Total	6,569.10	6,783.73	11,758.81	13,106.39	13,405.55	14,760.91	7,142.99	2,635.44	76,162.93

Note – in all tables "actual expenditure" is actual to the end of December 2017 and estimated from January to December 2018

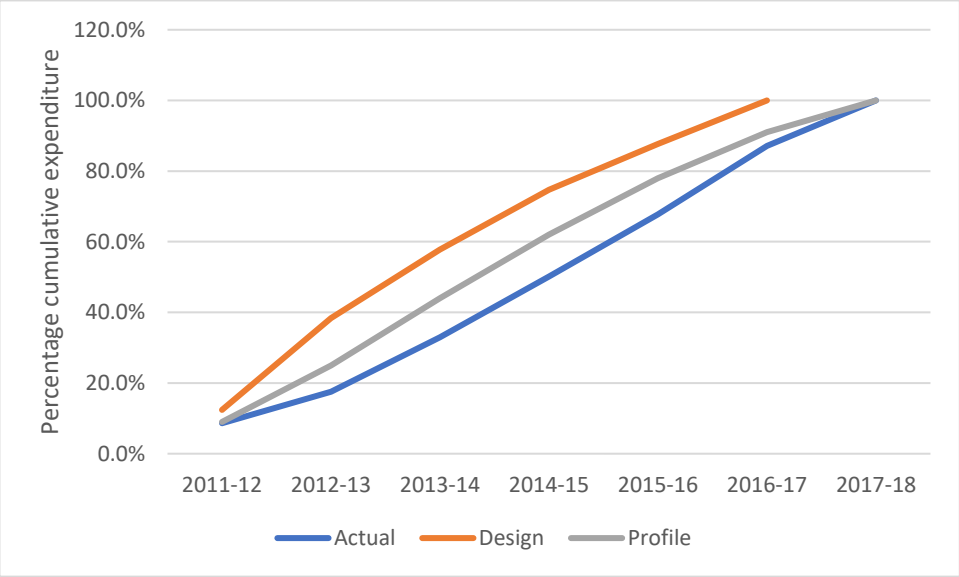
Table 5F: Expenditure by expenditure account and by year Tk million

Category	FY1 (11-12)	FY2 (12-13)	FY3 (13-14)	FY4 (14-15)	FY5 (15-16)	FY6 (16-17)	FY7 (17-18)	FY8 (18-19)	Total
1. Civil Works	254.05	279.14	561.72	837.90	709.02	625.30	396.75	164.27	**3,828.16**
2. Plantation, Establishment & Maintenance	11.32	20.57	25.81	43.46	39.96	51.41	19.68	6.30	**218.51**
3. Vehicles & Construction Equipment	18.12	1.58	11.34	9.67	6.51	-	-	-	**47.22**
4. Equipment, Furniture & Computer	5.57	3.60	13.54	4.66	0.00	-	-	-	**27.36**
5. Studies, Training, Contract Staff & Other Goods	5.14	15.95	21.16	21.50	26.34	27.42	18.97	-	**136.48**
6. Operating Costs	18.63	35.73	78.52	69.22	94.57	77.31	30.64	20.84	**425.46**
7. NGOs & Livelihoods	23.05	33.36	43.65	50.88	57.53	40.31	9.66	-	**258.44**
8. Technical Assistance	88.34	96.13	103.18	90.61	104.34	130.56	107.01	26.95	**747.12**
Total	**424.22**	**486.05**	**858.92**	**1,127.90**	**1,038.28**	**952.31**	**582.71**	**218.36**	**5,688.76**

Table 5G: Physical and financial progress

Component		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
1a. Water management infrastructure	physical	18.00%	23.00%	1.00%	16.00%	8.00%	24.00%	9.00%	0.00%
	financial	10.23%	10.24%	8.93%	9.54%	10.01%	18.11%	12.47%	5.00%
1b. Social Forestry	physical	6.00%	18.00%	20.00%	14.00%	16.00%	16.00%	5.00%	
	financial	5.36%	10.69%	7.69%	15.56%	18.01%	20.11%	10.00%	5.00%
2a. Internal infrastructure	physical	4.00%	8.00%	20.00%	27.00%	19.00%	8.00%	9.00%	0.00%
	financial	4.03%	3.64%	19.92%	20.89%	22.28%	20.08%	5.00%	1.49%
2b. Water and sanitation	physical	6.00%	15.00%	29.00%	18.00%	10.00%	2.00%	18.00%	0.00%
	financial	15.83%	10.83%	10.25%	28.13%	10.16%	8.50%	7.00%	3.50%
3. Land settlement & titling	physical	0.00%	0.00%	5.00%	10.00%	34.00%	28.00%	13.00%	6.00%
	financial	8.28%	7.35%	9.48%	20.10%	18.30%	10.46%	5.00%	15.00%
4a. Agricultural support	physical	8.00%	24.00%	30.00%	20.00%	14.00%		0.00%	0.00%
	financial	15.24%	16.87%	14.66%	26.71%	21.23%	3.67%	0.00%	0.00%
4b. Social and livelihood support	physical	12.00%	16.00%	16.00%	16.00%	16.00%	14.00%	10.00%	
	financial	8.24%	11.93%	15.61%	16.54%	18.70%	13.10%	3.14%	0.00%
5. Technical assistance	physical								
	financial	11.81%	12.85%	13.79%	11.01%	12.68%	15.86%	13.00%	3.27%
Total/overall	physical								
	financial	7.93%	8.19%	14.19%	15.82%	16.18%	17.81%	8.62%	3.18%

Figure 1: Rate of expenditure



The actual rate of expenditure was below that in the budgeted in the original appraisal report – which planned project expenditure over six rather than seven years (although the IFAD loan period was 7 years). However actual expenditure was not so far below the standard IFAD expenditure profile for an irrigation project.

Appendix-6: Physical progress (revision of 04-05-18)

Component/Sub component	Items	Unit	Project targets		Physical works completed								Less lost to erosion
			Appraisal report	Last revised	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Total	
Component 1													
SC1.1 Water management	Drainage sluice (all type)	no.	6	6	-	0.2	1.9	2.0	0.6	1.1	0.1	6	1
	Sea dyke (Dpp- 17.5Km)	km	17	32.3	-	16.8	-	-	-	5.8	4.2	26.8	12
	Interior dyke (Dpp- 23.5Km)	km	23	31.3	-	21.3	-	1.2	4.5	2.7	-	29.8	4
	Dwarf embankment (Dpp 13.25km)	km	14	13.9	-	10.9	2.3	0.7	-	-	-	13.9	3.5
	Closure of Khals	no.	8	6	-	1	0.4	0.6	1.0	3.0	-	6.0	-
	Initial excavation of drainage channel	km	205	145	-	6.2	-	69.9	10.2	37.0	17.3	140.6	5.5
	Re-excavation of drainage channel	km	205	12	-	-	-	-	-	-	3.7	3.7	-
	WMG Centre Building	no.	24	24	-	-	-	11.8	4.3	3.6	3.3	23	-
SC1.2 Social forestry	Embankment planting	km	41	50	-	-	21	-	-	14	-	35	-
	Foreshore planting on dyke	ha	250	200	-	-	-	-	30	110	-	140	-
	Mangrove plantation	ha	1800	7400	1000	1500	1500	1000	1750	650	-	7400	3800 **
	Non-mangrove block plantation	ha	140	100	-	-	35	-	27	5	-	67	35
	Canal side plantation	km	205	150		-	30	-	20	30	-	80	25
	Roadside plantation	km	300	268	-	100	48	60	54	6	-	268	19
	Institutional plantation	no.	95	95	-	14	57	20	2	2	-	95	5
	Killa planting	ha	16	16	-	6	-	-	-	10	-	16	3
	Dyke making	ha.	250	200	-	-	-	60	30	110	-	200	65
	Rehabilitation of affected households	no.	350	200	-	-	-	-	50	33	-	83	-
	Nos. of SFG	no.	490	630	40	110	124	94	100	100	37	605	49**
	Foreign study tour/Training	no.	10	17	-	10	-	-	-	7	-	17	-
	Staff workshop – 1 and 2 day	no.	18	18	14	-	-	-	4	-	-	18	-
	SFG training: initial, follow up, watcher	no.	1280	1285	40	150	155	135	235	361	121	1197	-

Component/Sub component	Items	Unit	Project targets		Physical works completed								Less lost to erosion
			Appraisal report	Last revised	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Total	
	SFG benefit agreement	no.	630	630	40	110	124	94	100	100	37	605	-
	Workshops with LGI, NGO and public	no.	110	110	5	40	8	12	12	20	4	101	-
Component 2													
SC2.1 Internal infrastructure	Rural road (BC. 3.70m pavement)	Km	28	25.61	-	11.7	4.6	6.1	2.7	-	-	25.1	-
	Rural road (BC. 2.4m pavement)	Km	14	15	-	0.8	5.6	5.7	2.8	-	-	14.9	0.5
	Rural road (HBB. 3.7m pavement)	Km	37	33	-	-	0.4	10.3	10.8	1.2	3.3	26.0	5.0
	Rural road (HBB 3m pavement)	Km	74	93	-	-	16.4	33.5	17.2	14.8	4.6	86.5	4.5
	Earthen road (5.50m) crest width	Km	129	148	-	56.8	36.1	10.3	12.9	5.3	13.3	134.7	15.0
	Bridges	no.	25	4	-	0.3	3.7	-	-	-	-	4.0	-
	Box culverts	no.	69	93	-	7.2	29.4	13.8	4.8	20.1	6.5	81.8	4
	Pipe culvert/U-drain	no.	123	140	-	43.4	25.5	20.9	11.1	27.9	-	128.8	3
	Multipurpose cyclone shelters	no.	60	42	-	2.4	8.1	11.3	9.7	5.0	2.1	38.6	1
	Rural Market	no.	7	7	-	-	0.5	2.0	3.4	0.5	-	6.4	1
	Union Parishad Complex	no.	2	2	-	0.2	0.6	0.7	0.4	-	0.1	2.0	-
	Cluster village complex	no.	2	2	-	-	-	-	-	-	0.4	0.4	-
	Killa	no.	17	17	-	2.9	1.5	0.2	7.5	0.8	-	12.9	4
	Ghat	no.	2	-	-	-	-	-	-	-	-	-	-
	Bus stand	no.	1	-	-	-	-	-	-	-	-	-	-
	Widening of road at Boyer char	Km	5	-	-	-	-	-	-	-	-	-	-
	Accommodation of women staff	no.	1	1	-	-	-	-	0.4	0.4	0.2	1.0	-
SC2.2 Water & sanitation	DTW	no	1160	1532	-	369	766	16	-	151	173	1475	103
	Test tube wells	no	6	6	-	6	-	-	-	-	-	6	-
	Pond Sand Filter Schemes	no	2	2	-	-	-	-	-	-	--	-	-
	Latrines	no	23909	26909	-	4800	6676	2630	5021	2130	4382	25639	710
	Rain Water Harvesting	no	2	2	-	-	-	-	-	-	-	-	-
Component 3					-						-	-	-

Component/Sub component	Items	Unit	Project targets		Physical works completed								Less lost to erosion
			Appraisal report	Last revised	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Total	
SC3 Land settlement and titling	Plot to Plot Survey (PTPS)	ha	17452	17452	4499	3840	4760	3252	-	-	-	16351	1422
	Land titling CDSP IV area	hh	20000	14000	-	-	705	1389	4718	3989	1143	11944	-
	Land titling CDSP III area	hh	3842	3842	1600	358	-	180	-	-	-	2138	-
	Household Benefited	no.	23842	17842	1600	358	705	1569	4718	3989	1143	14082	-
Component 4													
SC4.1 Agricultural support	Orientation meeting (FF)	no.	280	280	50	40	-	-	-	-	-	90	7
	Technical training (one day in field)	batch	1100	1100	-	267	328	275	230	-	-	1100	-
	Technical training (four day residential)	batch	72	95	-	-	25	30	40	-	-	95	-
	Motivational Tour	no.	72	72	-	18	18	18	18	-	-	72	-
	Field Days	no.	72	84	-	24	28	16	16	-	-	84	-
	High value crops demonstration	no.	360	360	-	70	90	100	100	-	-	360	-
	Low value crops demonstration	no.	720	720	-	130	160	200	190	40	-	720	-
SC4.2 Social & livelihood support	NGO Branch offices	no.	13	13	-	-	4	-	-	4	4	4	-
	NGO Staff (Male)	no.	188	188		-	-	13	12	6	6	6	-
	NGO Staff (Female)	no.	54	54	-	-	-	176	161	96	96	96	-
	NGO Groups	no.	1120	1120	-	-	-	57	48	28	28	28	-
	Members (Female)	No.	28000	28000	-	-	22	10	-	952	61	1045	-
	Health Forum	no.	737	46800	-	-	1516	1626	-	23231	1342	27715	-
	TBA trained	no.	195	195	-	-	2	20	5	30	28	28	-
	Delivery handling by TBA	no.	-	10985	-	-	13747	5446	1620	500	500	21813	-
	Couple received FF services	no.	24825	23889	-	-	22	174	223	260	115	794	-
	Nos. of TUG	no.	1154	1532	-	-	9079	9178	8379	3333	1403	31372	-
	TUG Members (Female)	no.	28000	28000	-	195	-	-	-	-	-	195	-
	Selective beneficiaries training on LHR	batch	71	221		-	2532	3956	1754	572	285	9099	-
	Training on LHR (Participants)	no.	1800	5525	-	-	13517	21120	18965	21261	2691	21261	-

Component/Sub component	Items	Unit	Project targets		Physical works completed								Less lost to erosion
			Appraisal report	Last revised	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	Total	
	LHR promoters training	batch	1	1	-	-	1	-	-	-	-	1	-
	LHR promoters training (participants)	no.	26	26	-	-	26	-	-	-	-	26	-
	Training on disaster preparedness	batch	78	78	-	-	-	-	70	-	-	70	-
	Training on disaster preparedness (participants)	no.	1950	1950	-	-	-	-	1740	-	-	1740	-
	Training on ICS	batch	13	13	-	-	-	-	-	-	-	-	-
	Training on ICS (Participants)	no.	260	260	-	-	-	-	-	-	-	-	-
	IGA Training	batch	1120	1120	-	-	347	136	65	-	572	548	-
	IGA Training (participants)	no.	28000	28000	-	-	8678	3412	1636	-	8375	22101	-

Explanation:

** Mangrove plantation eroded::Total 3800 ha, (1000 ha eroded, 1000 ha occupied by Army, 800 ha encroached by shelters)

** SFG groups lost due to serious river erosion in Caring chars

Note: project targets shown as being from appraisal report do not all match those shown in different versions of the appraisal report. Some may be derived from the DPPs.

Appendix-7: Project internal rate of return

1. Approach and methodology.

1. An economic and financial analysis has been carried out based on the following:

a) Actual project costs as incurred to date, plus an estimate for final expenditure up to December 2018. An estimate has been made of future O&M costs for project infrastructure.
b) Estimated benefits to the char population in terms of their increased income from this investment, both those that have accrued to date and those that are likely to accrue in future - the "future with project" situation (FW). To calculate the incremental benefit an estimate has been made of change in incomes that would have occurred had the project not been implemented – the "future without project" situation (FWO). The net benefit to the char population is the difference between FW and FWO.
c) Calculations have been made using constant 2017-18 prices. To convert prices to economic values the following adjustments have been made: (i) for tradeable goods (rice, soyabeans and fertiliser) to border prices using the current exchange rate; (ii) for non-tradable goods, current local prices have been adjusted by the standard conversion factor (SCF) which reflects a degree of protection in the economy and slight overvaluation of the BDT; (iii) for a few items, with a high import content, but no border value, prices have been left at market values and not adjusted downwards using the SCF; and (iv) farm labour has been adjusted by a shadow wage rate (SWR) factor reflecting a degree of under-employment in farm households and unemployment in the project area.

2. Costs and benefits

2. Costs and benefits have been projected over a 20 year period, with calculations of benefits made for the following situations:

a) Year 1: the pre-project situation, using data from the 2011 baseline survey, supplemented by information from the project design EFA from 2009, and recent farmer interviews.
b) Year 7: the current situation at project completion, using data from the 2017 impact survey plus recent farmer interviews.
c) Year 15 for the FW situation: a moderate increase over year 7 reflecting continued improvement in the project area. Evidence for this comes from the AOS that show continuing increases in production and income in the CDSP I, II and III areas after the end of CDSP interventions. The impact survey shows that CDSP IV farmers continue to have some yield reduction due to unfavourable growing conditions and the AOS show that conditions are better in the old CDSP areas, but are still continuing to improve in these areas.
d) Year 15 for the FWO situation: a modest increase over the year 1 situation. This is based on the assumption that the physical environment for agriculture will not have improved, and the area will still be cut off from other parts of the country. However, despite this, economic development in the rest of Bangladesh will provide incentives to increase production in undeveloped chars. Stress-tolerant rice varieties will enable more production in unfavourable environments
e) Year 20 for both FW and FWO situations assume no change from year 15.

3. Land area and population

3. The land area of CDSP IV is shown in Table 1. Areas and population in years 1 and 7 are as estimated at the start of the project in 2011 and in 2017. Compared to year 1, by year 7 a total of 5,220 ha had been lost on Noler, Caring and Nagulia chars, with a gain of 2,000 ha on Urir char. The year 1 and year 7 areas of Caring char have been adjusted to reflect loss of land taken over for an army base. Following a government

order, 2,709 ha was handed over in early 2013. Although this was project year 3, to simplify calculations this amount was deducted from the year 1 area. Most of this area has been lost to erosion, but by 2017 (year 7) the army was still occupying about 20% of Caring char, leaving 880 ha for CDSP activities.

Table 1. Land area of CDSP IV chars

		Nangulia	Noler	Caring	Urir	Ziar	total
Pre-project 2011	year 1	8990	2690	6850	10300	1943	30773
Completion 2017	year 7	8530	2560	2200	12300	1943	27533
Adjusted							
Pre-project 2011	year 1	8990	2690	4141	10300	1943	28064
Completion 2017	year 7	8530	2560	1760	12300	1943	27093
future area 2025							
baseline	year 15	8100	2200	880	14500	1943	27623
high erosion	year 15	6000	1350	0	12300	1943	21593

4. Two future scenarios have been projected for year 15: (i) baseline - the loss of another 1,890 ha on Noler, Caring and Nagulia chars and gain of 2,200 on Urir char; and (ii) high erosion - the loss of 8,140 ha Noler, Caring and Nagulia chars and no gain on Urir char. The high erosion scenario assumes that all of Caring char will be eroded, along with half of the 2011 area of Noler char and one third of char Nangulia.

5. Population estimates for year 1 and year 7 are the actual population for 2011 and 2017 (see section on outreach). Projections for year 15 assume a 10% increase over year 7 less a pro-rata reduction in proportion to loss of land to erosion. This results in a marginal increase in the number of households for the baseline scenario and significant reduction in the high erosion scenario.

Table 2: Number of households in CDSP IV chars

		Nangulia	Noler	Caring	Urir	Ziar	total
Pre-project 2011	year 1	12000	6000	6000	2000	2000	28000
completion 2017	year 7	15113	6152	2638	2725	2380	29008
future area 2025							
baseline	year 15	15786	5816	1451	3534	2618	29204
high erosion	year 15	11694	3569	0	2998	2618	20878

6. The area of cultivatable land is a percentage of the gross land area of each char. Non-cultivable land includes homesteads, ponds, waste, and public spaces (roads etc.). The lower percentage of cultivable land on Urir char is based on impact survey data and reflects the fact that much of this char is too immature (recently accreted) for cropping.

Table 3: Area of cultivable land

	Nangulia	Noler	Caring	Urir	Ziar	total
pre-project	4945	1480	2278	4120	1069	13890
% of gross area	55%	55%	55%	40%	55%	
year 7 FW	5118	1536	1056	5166	1166	14042
% of gross area	60%	60%	60%	42%	60%	
year 7 FWO	4692	1408	968	4920	1069	13056
% of gross area	55%	55%	55%	40%	55%	
year 15 FW (baseline)	4860	1320	528	6090	1166	13964
% of gross area	60%	60%	60%	42%	60%	
year 15 FWO (baseline)	4455	1210	484	5800	1069	13018
% of gross area	55%	55%	55%	40%	55%	
year 15 FW (high erosion)	3600	810	0	5166	1166	10742
% of gross area	60%	60%	60%	42%	60%	
year 15 FWO (high erosion)	3300	743	0	4920	1069	10031
% of gross area	55%	55%	55%	40%	55%	

4. Benefit streams

7. Projections of economic benefits are based on the following benefit streams:

a) Agriculture – this includes: (i) field crops; and (ii) homestead vegetables and fruit. Benefits for field crops are derived from changes in crop areas (including increased cropping intensity – see Tables 4 and 5) and increased yields (Table 6), leading to higher margins per ha (although input use and labour also increase – see Table 7). In addition, there are benefits for project farmers from reduced transport costs from farm to local market and from local market to outside the char (the latter applies to products sold outside and inputs bought in). Benefits from homestead vegetables and fruit are based on survey data of the value of sales. The proportion that is home consumed (around one third) is approximately the same proportion of the gross value that is absorbed by production costs for field vegetables, so the value of sales has been assumed to approximate to the margin over costs (Table 8). The annual flow of benefits is in Annex 1.

Table 4: Cropping pattern

			year 1	year 7 FW	yr 7 FWO	yr 15 FW	yr 15 FWO
Aman	local	% of cult.area	86	26	63	16	40
	HYV	% of cult.area	6	61	30	78	54
Aus	local	% of cult.area	4	0	0	0	0
Boro	hybrid	% of cult.area		16	0	8	0
Rabi	keshari	% of cult.area	7	11	7	5	7
	felon	% of cult.area		2	1.5	3	3
	soyabean	% of cult.area		5	4	13	8
	chilli	% of cult.area	1	3	2.5	6	4
Vegetables		% of cult.area		6	2	10	4
Cropping intensity		% of cult.area	104	130	110	139	120

Table 5: Crop areas (hectares)

			year 1	year 7 FW	yr 7 FWO	yr 15 FW	yr 15 FWO
Aman	local	hectares	11946	3651	8797	2234	5207
	HYV	hectares	833	8565	4189	10892	7030
Aus	local	hectares	556	0	0	0	0
Boro	hybrid	hectares	0	2247	0	1117	0
Rabi	keshari	hectares	972	1545	977	698	911
	felon	hectares	0	281	209	419	391
	soyabean	hectares	0	702	559	1815	1041
	chilli	hectares	139	421	349	838	521
Vegetables		hectares	0	843	279	1396	521
Total		hectares	14446	18254	15360	19410	15621

Keshari is grass pea, felon is cow pea
Keshari and felon are representative of all pulses, soyabean of all pulses, and chilli of all spices and tubers.
Year 15 projections are for the baseline land area assumptions (applies in all tables unless stated otherwise)

Table 6: Crop yields

		Year 1	WP yr 7	WP yr 15	WOP yr15
Paddy	Aman (local	1500	2700	3000	2000
	Aman (HYV)	1950	3800	4200	2800
	Aus (local)	1250			
	Boro hybrid)		5700	6500	
Oilseeds	Soyabeans	1800	2470	3200	2000
Spices	Chilli (dry)	900	1976	2500	1200
Pulses	Keshari (grass pea)	600	772	870	772
	Felon (cow pea)	600	1600	1900	1200
Vegetables	Cucumber		13894	15978	12782
	Snake gourd		9880	11856	9880
	Country bean (lablab bean)		14820	17784	14227

Table 7: Summary of crop budgets (financial prices)

Item	Aman (local)	Aman (HYV)	T. aus (local)	Boro (hybrid)	Soya-bean	Chili	Keshari	Felon	Field vegetable
Gross Output, Tk/ha									
Year 1	30,720	39,780	25,500		59,400	90,000	26,520	30,240	
Year 7 FW	55,296	77,520		104,424	86,450	201,552	35,666	74,240	279,419
Year 7 FWO	35,840	48,450			62,700	105,000	30,321	45,360	242,375
Year 15 FW	61,440	85,680		119,080	112,000	255,000	40,194	88,160	331,829
Year 15 FWO	40,960	57,120			66,000	120,000	34,122	60,480	242,375
Costs, Tk/ha									
Year 1	32,952	40,614	32,264		21,827	35,476	5,880	10,827	
Year 7 FW	33,548	46,473		91,057	21,631	47,121	6,894	11,870	127,032
Year 7 FWO	34,367	43,742			23,233	39,398	7,199	11,999	151,024
Year 15 FW	34,343	47,653		99,951	21,850	50,926	6,923	12,345	128,405
Year 15 FWO	35,783	46,871			24,638	43,321	8,518	13,171	151,024
Gross Margin, Tk/ha									
Year 1	(2,232)	(834)	(6,764)	-	37,573	54,525	20,640	19,413	
Year 7 FW	21,749	31,048	-	13,367	64,819	154,431	28,773	62,370	152,387
Year 7 FWO	1,473	4,708			39,468	65,602	23,122	33,361	91,351
Year 15 FW	27,098	38,028	-	19,129	90,150	204,074	33,271	75,815	203,424
Year 15 FWO	5,178	10,250	-	-	41,362	76,679	25,604	47,309	91,351

Detailed budgets are in Annex 1 of this Appendix.
Field vegetables are a combination of cucumber (25%), snake gourd (25%) and country bean (50%)

Table 8: Net income from homestead fruit and vegetables

	Net income Tk per hh per year (financial prices)			Number of h'hold*	Total income Tk million
	vegetable	fruit	Total		
Year 1	2,254		2,254	28,000	63.11
Year 7 FW	14,764	4,677	19,441	29,008	563.94
Year 7 FWO	3,500	1,000	4,500	29,008	130.54
Year 15 FW	19,193	6,080	25,273	29,204	738.09
Year 15 FWO	7,000	2,000	9,000	29,204	262.84

*number of households is the total population as net income per household is based on average sales value for all households, not just those households reporting sales.

b) Livestock: benefits are based on household models for one dairy cow, one beef animal being fattened, and backyard poultry (see Annex 2). These models show the pre-project (year 1) and present (year 7 FW) costs and benefits. Numbers of producers, number of animals/birds, production levels and output prices are based on survey data, with other information collected from producers. In the FWO situation, the margin over costs in year 7 is assumed to be 50% of the FW figure. Both FW and FWO margins are assumed to increase by 10% between year 7 and year 15 (Table 9). The annual flow of benefits is in Annex 2.

Table 9: Livestock models – number of producers and margin over costs

	Percentage of hh who produce:			Number of producers		
	poultry	milk	beef	poultry	milk	beef
year 1	90%	41%	24%	25,200	11,480	6,720
year 7 FW	98%	42%	48%	28,428	12,183	13,924
year 7 FWO	92%	42%	30%	26,687	12,038	8,557
year 15 FW	98%	50%	60%	28,620	14,602	17,523
yr 15 FWO	94%	42%	35%	27,452	12,266	10,222
	Margin over costs per producer Tk'000 (financial prices)			Total margin over costs for all producers Tk'000		
	poultry	milk	beef	poultry	milk	beef
year 1	0.05	1.96	1.51	1,260	22,501	10,161
year 7 FW	9.36	13.46	7.83	266,156	163,927	109,052
year 7 FWO	4.68	6.73	3.92	124,930	80,988	33,511
year 15 FW	10.30	14.80	8.62	294,753	216,120	150,961
yr 15 FWO	5.15	7.40	4.31	141,361	90,770	44,030

c) Aquaculture benefits are based on a household fish pond of 30 decimals, with a model of the costs and benefits for pre-project (year 1) and present (year 7 FW) – see Annex 3. Numbers of producers, size of pond, production levels and output prices are based on survey data, with other information collected from producers (Table 9). The margin over costs for year 7 FWO is assumed to be 50% of that for year 7 FW. In year 15 the margins increase by 20% for both FW and FWO (Table 10). The annual flow of benefits is in Annex 3.

Table 10: Income from pond aquaculture

	Number of fish pond producers		Margin over cost Tk'000 financial prices	
	% of all households	Number producers	Per producer	Total all producers
year 1	47%	13,160	1.80	23,685
year 7 FW	98%	28,428	28.49	809,990
year 7 FWO	64%	18,420	14.25	262,420
year 15 FW	98%	28,620	34.19	978,567
yr 15 FWO	80%	23,363	17.10	399,415

d) Non-farm enterprises. At least some of the growth in the non-farm sector can be attributed to CDSP IV interventions in agriculture. Some of these enterprises are closely linked to farming – farm input and output trading, machinery hire, and transport services. Others have been supported by the project though training (tailoring) or micro-credit (grocery shops). Most of all, they have benefited from the improved communications infrastructure. The baseline survey showed that 10% of households earned income from petty trade – with an average (for these households) of Tk71,950 per year. The impact survey shows 11% of households earn an average of Tk135,109 per year from petty trade and 8% earn an average of Tk239,921 from a business.

Taking these together (and ignoring transport, handcrafts and tailoring – the latter is only a small number of households), in the future with project scenario (year 7), petty trade / business earnings increase from about Tk72,000 for 10% of households to Tk306,000 for 11% of households. In the future without project scenario petty trade earnings are half the FW figure for year 7, and both FW and

FWO increase by a further 30% by year 15 (Table 11). The annual flow of benefits is in Annex 3.

Table 11: Income from non-farm enterprises

	Number of households with enterprises		Margin over cost Tk'000 financial prices	
	% of all households	Number households	Per producer	Total all producers
year 1	10%	2800	72.00	201,600
year 7 FW	11%	3191	306.00	976,409
year 7 FWO	11%	3191	153.00	488,205
year 15 FW	15%	4381	397.80	1,742,624
yr 15 FWO	15%	4381	198.90	871,312

e) Income from trees: Income from fruit trees planted around homesteads has been included in homestead vegetable and fruit income – part of the income from agriculture. Other income from other trees is primarily firewood (mostly for home consumption, but some is sold), poles and timber. This income has been calculated for: (i) trees planted by the social forestry sub-component; and (ii) trees planted around homesteads and fields on private land. Table 12 shows the numbers of these trees based on project reports for social forestry (after deducting losses from erosion) and trees on private homesteads (the impact survey shows 100% of households own trees, with an average of 101 timber, 83 fruit and 30 palm trees. Only timber trees are included in this calculation. Table … shows there are almost 20 million trees in CDSP IV, with 2.8 million around homesteads and on private land, and 16.75 million on social forestry plots. Of these 16.75 million, 16 million are mangroves. In theory, according to FD standards, these mangroves should produce timber/poles worth Tk80,000 per ha every 7 or 8 years. In practice they are not usually cut down except illegally when land is cleared by settlers. Although, arguably this is a still a benefit, as are the ecosystem services of mangroves, no economic value has been included for the 16 million mangrove trees.

Table 12: Numbers of trees

Ownership	Type of planting	unit	total units	trees per unit	total trees million
SFG	Road	km	249	1000	0.25
	Canal	km	55	2000	0.11
	embank	km	23	2500	0.06
	foreshore	ha	135	1456	0.20
	block	ha	52	2500	0.13
	mangrove	ha	3600	4444	16.00
	killa	no	13	210	0.00
	institutional	no	90	61	0.01
	total SFG				16.75
Private	homestead	no	28000	100	2.80
Total	total trees				19.55

Financial and economic benefits have been calculated for the non-mangrove social forestry trees and for timber trees on private land. These are based on SFG standards for the value of firewood etc. each year after planting and then a final timber value when felled after 15 years (Annex 4). In calculation of benefits

at economic prices, a nominal labour cost for collecting firewood (and any other products such as seeds) is assumed to be equal to half the value of this produce up to the point of felling, when the labour cost is reduced to 10% of the very much higher timber value. For SGF trees there is a benefit sharing arrangement, with SFGs getting a share of around 50%, and this is taken into account in calculating the increase in income resulting from social forestry. However, for calculation of economic benefits, 100% of the value (less labour costs) has been used. The annual flow of benefits is in Annex 4.

5. Increase in household income

8. Streams of incremental benefits are shown in Table 13, with details of with and without project flows in Annex 5. These benefits exclude household labour inputs – so they are the increase in what a household can earn from its own work on its land. In this respect these streams are similar to the household income reported in the impact survey. Adjusted to 2017 price levels, the impact survey recorded an increase in household income of Tk181,130 (Table 14). This is about double the increment of Tk88,017 per household calculated in the EFA. Incremental income starts accruing from year 2, with some of the results of project interventions becoming effective. This is supported by AOS, which showed a steady increase in household income and other evidence of project outcomes from 2012 onwards.

Table 13: Incremental household income

	Million Taka						Number of	Taka per
Year	Agriculture	livestock	aquaculture	Forest	Non-farm	Total	households	household
1						-	28000	
2	163	61	114	1	81	421	28168	14,930
3	326	122	229	4	163	843	28336	29,735
4	488	183	343	9	244	1,267	28504	44,457
5	651	244	457	17	325	1,695	28672	59,106
6	814	305	572	26	407	2,124	28840	73,644
7	977	366	686	36	488	2,553	29008	88,017
8	1,027	382	691	46	536	2,681	29033	92,349
9	1,076	397	696	55	584	2,808	29057	96,628
10	1,126	413	701	62	632	2,933	29082	100,861
11	1,175	428	706	70	680	3,059	29106	105,114
12	1,225	444	711	82	728	3,189	29131	109,475
13	1,274	460	716	97	776	3,322	29155	113,954
14	1,324	475	721	114	823	3,457	29180	118,469
15	1,374	491	726	542	871	4,004	29204	137,086
16	1,374	491	726	892	871	4,353	29204	149,056
17	1,374	491	726	1,605	871	5,066	29204	173,482
18	1,374	491	726	1,635	871	5,097	29204	174,515
19	1,374	491	726	953	871	4,414	29204	151,134
20	1,374	491	726	953	871	4,414	29204	151,134

Detailed calculations in Annex 5

Table 14: Incremental income in 2017

	Average household income	
	Taka per year	2017 prices
Baseline survey 2011	71,950	115,120
Impact survey 2017	296,250	296,250
increase	224,300	181,130
EFA - incremental income per HH		88,017

6. Economic analysis

9. Economic analysis aims to show if the investment is justified in terms of the economy as a whole. To convert prices to economic values the following adjustments have been made:

a) For tradeable goods (rice, soyabeans and fertiliser) to border prices using the current exchange rate, and assuming import parity (Bangladesh is a net importer of these items). As there are significant subsidies on fertiliser, the economic value of fertilisers is considerable higher than the market price, while paddy is a little lower (local market prices of paddy have increased due to poor harvest last year), while soyabean is higher than the market value.
b) For non-tradable goods, current local prices have been adjusted by the standard conversion factor (SCF) of 0.94 which reflects a degree of protection in the economy and slight overvaluation of the BDT.
c) For a few items, with a high import content (pesticides, machinery services), but no border value, prices have been left at market values and not adjusted downwards using the SCF
d) Farm labour has been adjusted by a shadow wage rate factor (SWRF) of 0.75 reflecting a degree of under-employment in farm households and unemployment in the project area.
e) Project costs have been adjusted to 2017-18 terms by application of the consumer price index. Civil works and plantation have been adjusted by the SCF but other categories of project expenditure have left unchanged. The investment in credit funds (by PNGOs including the value of group member savings) has been included in project investment costs, but as these funds will not be exhausted, their value is included as a credit item in year 20.
f) From year 8 onwards, infrastructure O&M costs are included at an annual amount of 3% of civil engineering costs. O&M during the project period is included in project investment costs.

10. A summary of financial and economic prices are in Annex 6, along with detailed crop budgets in economic prices (summarised in Table 15).

Table 15: Summary of crop budgets (economic prices)

Item	Aman (local)	Aman (HYV)	T. aus (local)	Boro (hybrid)	Soya-bean	Chili	Keshari	Felon	Field vegetable
Gross Output, Tk/ha									
Year 1	28,620	37,059	23,756		68,602	84,828	24,996	28,502	
Year 7 FW	51,516	72,218		97,280	98,793	189,969	33,617	69,973	266,909
Year 7 FWO	33,390	45,136			72,413	98,966	28,579	42,753	232,118
Year 15 FW	57,241	79,820		110,933	127,991	240,345	37,884	83,093	317,017
Year 15 FWO	38,160	53,213			76,224	113,103	32,161	57,004	232,118
Costs, Tk/ha									
Year 1	33,065	41,464	32,268		51,742	56,925	24,497	44,132	
Year 7 FW	35,973	50,224		94,314	52,382	76,867	27,813	55,261	211,670
Year 7 FWO	34,707	45,067			53,130	63,410	26,772	49,064	229,363
Year 15 FW	37,229	51,817		103,988	52,589	82,400	29,169	57,247	212,965
Year 15 FWO	36,349	48,671			54,518	69,895	29,047	53,995	229,363
Gross Margin, Tk/ha									
Year 1	(4,444)	(4,404)	(8,512)	-	16,860	27,903	499	(15,630)	
Year 7 FW	15,543	21,995	-	2,965	46,411	113,101	5,803	14,712	55,239
Year 7 FWO	(1,317)	69			19,283	35,556	1,807	(6,311)	2,756
Year 15 FW	20,012	28,003	-	6,944	75,402	157,945	8,715	25,846	104,052
Year 15 FWO	1,811	4,542	-	-	21,706	43,208	3,114	3,009	2,756

11. The economic internal rate of return (EIRR) over a 20 year period, for base case assumptions, is 38.9% (Table 16). Sensitivity analysis (Table 17) shows the EIRR remains at an acceptable level, with a positive NPV (discount rate 10%) with adverse movements in benefits – both for the base case land area and the high erosion scenarios.

Table 16: Economic Internal Rate of Return

	Project costs Tk. .m		Incremental benefits Tk million					Net benefits
Year	Project cost	O&M cost	Agriculture	livestock	aquaculture	Forest	Non-farm	Tk. Million
1	591		-	-	-	-	-	(591)
2	682		131	44	84	1	72	(348)
3	1,126		262	89	169	3	145	(458)
4	1,350		394	133	253	8	217	(345)
5	1,145		525	178	338	16	289	200
6	998		656	222	422	25	361	689
7	591		787	267	507	34	434	1,437
8	209		832	276	510	43	476	1,929
9		110	877	286	514	52	519	2,137
10		110	921	296	518	59	561	2,244
11		110	966	305	521	66	604	2,353
12		110	1,011	315	525	77	646	2,464
13		110	1,055	325	529	92	689	2,579
14		110	1,100	334	532	107	731	2,695
15		110	1,145	344	536	601	774	3,290
16		110	1,145	344	536	940	774	3,628
17		110	1,145	344	536	1,663	774	4,352
18		110	1,145	344	536	1,777	774	4,466
19		110	1,145	344	536	1,195	774	3,883
20	(306)	110	1,145	344	536	1,195	774	4,189
	Land area =	baseline		NPV @ 10%	10,083		EIRR =	38.94%

Table 17: Sensitivity analysis

		Land area: base case		Land area: high erosion	
		EIRR	NPV Tk m	EIRR	NPV Tk m
Base case		38.94%	10,083	37.07%	8,066
Change in agricultural benefits	-20%	35.68%	9,011	33.69%	7,123
	-40%	32.49%	7,939	30.38%	6,181
Change in total benefits	-20%	30.56%	7,096	28.44%	5,483
	-40%	22.30%	4,110	19.97%	2,900
Two year delay in benefits		23.77%	6,461	22.21%	5,053

At the time of project design the EIRR was calculated to be 17.2%. Reasons why the EIRR at completion is higher are:

d) A larger increase in cropping intensity: the design document assumed a 16 percentage point increase (from 144% to 160%), while this analysis uses a 24 percentage point increase (from 104% to 130%).
e) A larger switch from local varieties of paddy to HYV – with consequent bigger increase in paddy production. At design is was assumed in year 10, 75% of aman would be local varieties, in fact, at year 7, only 30% is local variety. No boro production was included in the design projections.
f) A much larger growth in homestead production of fruit, vegetables, poultry, livestock and aquaculture. At design it was assumed that these, together with non-farm enterprises, would amount to only Tk9,333 per household, while PCR estimates, based on actual data, amount to Tk55,690 per household (all at economic prices). This increase can be attributed to: (i) the catalyst that sorjon field vegetables played in expanding homestead production; and (ii) large scale implementation of activities aimed at poultry, livestock and fish producers rather than leaving this to another project (RLFDC) with very limited outreach in the CDSP IV chars.

On the other hand, EFA in the design document did not allow for any loss of land to erosion, nor did it include a FWO projection of growth in a without project situation. Farm wages were Tk100 per day at design but are now Tk450. This 350% increase is greater than for other inputs and for outputs (see Annex 6). In fact, wages may have been priced too low in the design document (Tk150 to Tk175 may have been more accurate). Even so, there has been a real improvement in favour of labour. At the time of design, one day of labour at Tk150 was equal to 10 kg of paddy (Tk15 per kg). Now one day of labour at Tk450 is equal to 22.5 kg of paddy (Tk20 per kg) – over twice as much. Daily labour is the main source of income for many families, and higher wages will have improved living standards. It cannot be claimed that growth in the char economy bought about by CDSP IV has, by itself, raised wages. Nevertheless, CDSP IV will have contributed.

149. **Non-quantified benefits.** Benefits from CDSP IV which have not been quantified and included in the economic analysis include the following:

- Palm tree products such as leaves for thatch and handicrafts not included in fruit or timber.
- Mangrove poles and timber
- Profits for production of sheep and goats
- Income generated by transport enterprises – these have flourished with the good road network

- Reduced cost of food and consumer goods purchased in the chars due to reduced transport costs
- Increased opportunities for wage labour and employment – both within the chars and, due to better transport links, in other parts of Bangladesh and abroad.
- Value of time saved due to better, faster travel.
- Benefits (both financial and welfare) stemming from improved health due to project water, sanitation and health interventions, and from better nutrition.
- Value of time saved due to reduced distance to water supplies
- Benefits from community and social empowerment, including greater gender equality
- Benefits from disaster risk reduction due to embankments, communications, cyclone shelters and disaster preparedness training.
- Benefits from improved access to education due to roads and schools in cyclone shelters
- Environmental benefits and climate change mitigation due to tree planting (including the benefits to fisheries from mangroves) and use of solar power.

Annex 1: Agricultural benefits

Table 1: Crops budgets at financial prices

		Prices:	Financial					new													
			Aman (local)				Aman (HYV)				T. Aus (local)		Boro (Hybrid)		Soyabeans				Chilli (dry)			
		Unit	Year 1	WP yr 7	WP yr 15	WOP yr15	Year 1	WP yr 7	WP yr 15	WOP yr15	Year 1		WP yr 7	WP yr 15	Year 1	WP yr 7	WP yr 15	WOP yr15	Year 1	WP yr 7	WP yr 15	WOP yr15
Yields	Main product	kg	1500	2700	3000	2000	1950	3800	4200	2800	1250		5700	6500	1800	2470	3200	2000	900	1976	2500	1200
	By-product	kg	1800	3240	3600	2400	1950	3800	4200	2800	1250		4560	5200								
Crop	Seed/Seedlings	kg	43	43	43	43	43	43	43	43	43		8	8	55	62	62	62	62	62	62	62
Inputs	Fertilizer (urea)	kg	62	124	148	93	91	154	170	135	62		309	309					31	62	62	62
	Fertilizer (TSP)	kg	0	0			45	154	170	62	0		154	154	62	93	93	71	62	93	93	62
	Fertilizer (MOP)	kg	0	0			0	0			0		39	46	31	62	62	62	0	31	31	
	Fertilizer (zinc)	kg											8	8								
	Fertilizer (boron)	kg											2	3								
	Gypsum	kg	0	0									15	15	31	62	62	62				
	Organic manure /c	kg	0	0			0	0			0		2470	2470	1235	1235	1235	1235	500	988	988	600
	Pesticide	kg	1	2	2	2	4	7	7	7	1		9	9	2	2	2	2	8	16	20	12
	Irrigation	time																				
	Sacks/baskets (used)	each	0	0			0	0			0		0	0	0	0	0	0	23	49	63	30
	Crop supports	ha																				
	Machine hire - cultivation	ha	4	4	4	4	4	4	4	4	4		4	4	4	4	4	4	4	4	4	4
	Irrigation												1.0	1.5					0.5	1	1	1
	Transport to local market	kg	1500	2700	3000	2000	1950	3800	4200	2800	1250		5700	6500	1800	2470	3200	2000	900	1976	2500	1200
	Agricultural Labour																					
	seed bed	day	8	8	8	8	8	8	8	8	8		5	5								
	plant / transplant	day	22	22	22	22	26	26	26	26	22		62	62	31	31	31	31	25	25	25	25
	fertilisation	day	2	2	2	2	4	4	4	4	2		8	8								
	weeding / earthing up	day													31	31	31	31	37	49	49	49
	insecticide application	day	1	1	1	1	2	3	3	3	1		4	4								
	harvesting	day	22.5	24.5	25	23.3	23.3	26.3	27.0	24.7	22.1		29.5	30.8	31	31	31	31	25	25	25	25
	threshing / winnowing	day	5.0	9.0	10.0	6.7	6.5	12.7	14.0	9.3	4.2		19.0	21.7					9.0	19.8	25.0	12.0
Costs	Seed/Seedlings	TK/ha	1,613	1,613	1,613	1,613	1,613	1,613	1,613	1,613	1,613		2,640	2,640	5,610	6,200	6,200	6,324	6,324	6,200	6,200	6,324
	Fertilizer (urea)	TK/ha	1,364	2,480	2,960	2,046	2,002	3,080	3,400	2,970	1,364		6,180	6,180	-	-	-	-	682	1,240	1,240	1,364
	Fertilizer (TSP)	TK/ha	-	-	-	-	1,665	5,390	5,950	2,294	-		5,390	5,390	2,294	3,255	3,255	2,627	2,294	3,255	3,255	2,294
	Fertilizer (MOP)	TK/ha	-	-	-	-	-	-	-	-	-		858	1,012	744	1,364	1,364	1,488	-	682	682	-
	Fertilizer (zinc)	TK/ha	-	-	-	-	-	-	-	-	-		1,440	1,440	-	-	-	-	-	-	-	-
	Fertilizer (boron)	TK/ha	-	-	-	-	-	-	-	-	-		400	600	-	-	-	-	-	-	-	-
	Gypsum	TK/ha	-	-	-	-	-	-	-	-	-		270	270	620	1,116	1,116	1,240	-	-	-	-
	Organic manure /c	TK/ha	-	-	-	-	-	-	-	-	-		2,470	2,470	1,235	1,235	1,235	1,235	500	988	988	600
	Pesticide	TK/ha	774	1,544	1,544	1,548	3,096	5,404	5,404	5,418	774		6,948	6,948	1,548	1,544	1,544	1,548	6,192	12,352	15,440	9,288
	Sacks/baskets (used)	TK/ha	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	920	1,960	2,520	1,200
	Machine hire - cultivation	TK/ha	6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176		6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176
	Irrigation												15,400	23,100					3,088	6,175	6,175	6,175
	Crop supports																					
	Transport to local market	TK/ha	3,000	810	900	4,000	3,900	1,260	1,260	5,600	2,500		1,710	1,950	3,600	741	960	4,000	1,800	593	750	2,400
	Hired labour																					
	seed bed	Tk/ha	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-
	plant / transplant	Tk/ha	9,900	9,900	9,900	9,900	11,700	11,700	11,700	11,700	9,900		27,900	27,900	-	-	-	-	-	-	-	-
	fertilisation	Tk/ha	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-
	weeding / earthing up	Tk/ha	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-
	insecticide application	Tk/ha	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-
	harvesting	Tk/ha	10,125	11,025	11,250	10,500	10,463	11,850	12,150	11,100	9,938		13,275	13,875	-	-	-	-	7,500	7,500	7,500	7,500
	threshing / winnowing	Tk/ha	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-
	Sub-total	TK/ha	32,952	33,548	34,343	35,783	40,614	46,473	47,653	46,871	32,264	-	91,057	99,951	21,827	21,631	21,850	24,638	35,476	47,121	50,926	43,321
	Gross Margin	TK/ha	(2,232)	21,749	27,098	5,178	(834)	31,048	38,028	10,250	(6,764)		13,367	19,129	37,573	64,819	90,150	41,362	54,525	154,431	204,074	76,679
	Labour input																					
	hired		45	47	47	45	49	52	53	51	44		92	93					25	25	25	25
	household		16	20	21	18	21	28	29	24	15		36	39	93	93	93	93	71	94	99	86
	Returns to hh labour	TK/pd	(139)	1,087	1,290	293	(41)	1,122	1,311	421	(446)		371	495	404	697	969	445	768	1,647	2,061	892
	Benefit/Costs Ratio		0.9	1.6	1.8	1.1	1.0	1.7	1.8	1.2	0.8		1.1	1.2	2.7	4.0	5.1	2.7	2.5	4.3	5.0	2.8

			Keshari				Felon (cow pea)				Cucumber			Snake gourd			Country bean		
		Unit	Year 1	WP yr 7	WP yr 15	WOP yr15	Year 1	WP yr 7	WP yr 15	WOP yr15	WP yr 7	WP yr 15	WOP yr15	WP yr 7	WP yr 15	WOP yr15	WP yr 7	WP yr 15	WOP yr15
Yields	Main product	kg	600	772	870	772	600	1600	1900	1200	13894	15978	12782	9880	11856	9880	14820	17784	14227
	By-product	kg	600	772	870	772	200	533	633	400									
Crop	Seed/Seedlings	kg	31	31	31	31	15	15	15	15	309	309	309	176	176	176	7	7	7
Inputs	Fertilizer (urea)	kg	62	62	62	62					618	618	618	155	155	155	618	618	618
	Fertilizer (TSP)	kg	0	62	62	62	31	62	73	41	463	463	463	62	62	61	618	618	618
	Fertilizer (MOP)	kg	0								62	62	62				31	31	31
	Fertilizer (zinc)	kg									15	15	15				31	31	31
	Fertilizer (boron)	kg															12	12	12
	Gypsum	kg									62	62	62				154	154	154
	Organic manure /c	kg	0	0							1235	1235	1235	494	494	494	247	247	247
	Pesticide	kg	1	1	1	1	1	2	2	2	100	100	100	100	100	100	60	60	60
	Irrigation	time																	
	Sacks/baskets (used)	each									87	100	80	62	74	62	93	111	89
	Crop supports	ha									0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	Machine hire - cultivation	ha	0	0			4	4	4	4									
	Irrigation																		
	Transport to local market	kg	600	772	870	772	600	1600	1900	1200	13894	15978	12782	9880	11856	9880	14820	17784	14227
	Agricultural Labour																		
	seed bed	day																	
	plant / transplant	day					12	12	12	12	93	93	93	93	93	93	24	24	24
	fertilisation	day									31	31	31	12	12	12	12	12	12
	weeding / earthing up	day					48	62	62	62	31	31	31	31	31	31	6	6	6
	insecticide application	day									31	31	31				62	62	62
	harvesting	day	31	31	31	31	31	31	31	31	154	154	154	124	124	124	93	93	93
	threshing / winnowing	day	24.1	31.0	34.9	31.0	9.3	24.9	29.5	18.7	12	12	12						
Costs	Seed/Seedlings	TK/ha	2,542	2,480	2,480	2,542	1,530	1,500	1,500	1,530	10,815	10,815	11,433	6,160	6,160	6,512	700	700	714
	Fertilizer (urea)	TK/ha	1,364	1,240	1,240	1,364	-	-	-	-	12,360	12,360	13,596	3,100	3,100	3,410	12,360	12,360	13,596
	Fertilizer (TSP)	TK/ha	-	2,170	2,170	2,294	1,147	2,170	2,555	1,517	16,205	16,205	17,131	2,170	2,170	2,257	21,630	21,630	22,866
	Fertilizer (MOP)	TK/ha	-	-	-	-	-	-	-	-	1,364	1,364	1,488	-	-	-	682	682	744
	Fertilizer (zinc)	TK/ha	-	-	-	-	-	-	-	-	2,700	2,700	2,730	-	-	-	5,580	5,580	5,642
	Fertilizer (boron)	TK/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,400	2,400	2,424
	Gypsum	TK/ha	-	-	-	-	-	-	-	-	1,116	1,116	1,240	-	-	-	2,772	2,772	3,080
	Organic manure /c	TK/ha	-	-	-	-	-	-	-	-	1,235	1,235	1,235	494	494	494	247	247	247
	Pesticide	TK/ha	774	772	772	774	774	1,544	1,544	1,548	77,200	77,200	77,400	77,200	77,200	77,400	46,320	46,320	46,440
	Sacks/baskets (used)	TK/ha	-	-	-	-	-	-	-	-	3,473	3,994	3,196	2,470	2,964	2,470	3,705	4,446	3,557
	Machine hire - cultivation	TK/ha	-	-	-	-	6,176	6,176	6,176	6,176	-	-	-	-	-	-	-	-	-
	Irrigation																		
	Crop supports										20,313	20,313	20,313	20,313	20,313	20,313	20,313	20,313	20,313
	Transport to local market	TK/ha	1,200	232	261	1,544	1,200	480	570	2,400	4,168	4,793	25,565	2,964	3,557	19,760	4,446	5,335	28,454
	Hired labour																		
	seed bed	Tk/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	plant / transplant	Tk/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	fertilisation	Tk/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	weeding / earthing up	Tk/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	insecticide application	Tk/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	harvesting	Tk/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	threshing / winnowing	Tk/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sub-total	TK/ha	5,880	6,894	6,923	8,518	10,827	11,870	12,345	13,171	150,949	152,095	175,326	114,871	115,957	132,616	121,155	122,785	148,077
	Gross Margin	TK/ha	20,640	28,773	33,271	25,604	19,413	62,370	75,815	47,309	126,926	167,461	54,755	132,130	180,443	94,625	175,246	232,895	108,013
	Labour input																		
	hired																		
	household		55	62	66	62	100	130	135	124	352	352	352	260	260	260	197	197	197
	Returns to hh labour	TK/pd	375	464	505	413	193	480	564	383	361	476	156	508	694	364	890	1,182	548
	Benefit/Costs Ratio		4.5	5.2	5.8	4.0	2.8	6.3	7.1	4.6	1.8	2.1	1.3	2.2	2.6	1.7	2.4	2.9	1.7

Table 2: Flow of benefits at financial prices

	Sum of gross margins						
	With project Taka million			Without project Taka million			Increment
Year	crops	homestead	total	crops	homestead	total	Tk million
1	-3.47	63.11	59.64	-3.47	63.11	59.64	0.00
2	109.82	146.58	256.41	19.23	74.35	93.58	162.83
3	223.11	230.06	453.17	41.93	85.59	127.52	325.65
4	336.41	313.53	649.93	64.63	96.82	161.45	488.48
5	449.70	397.00	846.70	87.33	108.06	195.39	651.31
6	562.99	480.47	1043.46	110.03	119.30	229.33	814.13
7	676.28	563.94	1240.22	132.73	130.54	263.26	976.96
8	737.96	585.71	1323.68	150.06	147.07	297.13	1026.54
9	799.65	607.48	1407.13	167.39	163.61	331.00	1076.13
10	861.34	629.25	1490.59	184.72	180.15	364.87	1125.71
11	923.02	651.02	1574.04	202.06	196.69	398.74	1175.30
12	984.71	672.79	1657.50	219.39	213.23	432.61	1224.88
13	1046.40	694.55	1740.95	236.72	229.76	466.48	1274.47
14	1108.08	716.32	1824.41	254.05	246.30	500.35	1324.05
15	1169.77	738.09	1907.86	271.39	262.84	534.22	1373.64
16	1169.77	738.09	1907.86	271.39	262.84	534.22	1373.64
17	1169.77	738.09	1907.86	271.39	262.84	534.22	1373.64
18	1169.77	738.09	1907.86	271.39	262.84	534.22	1373.64
19	1169.77	738.09	1907.86	271.39	262.84	534.22	1373.64
20	1169.77	738.09	1907.86	271.39	262.84	534.22	1373.64

Annex 2: Livestock benefits

Table 1: Livestock models

Dairy cow (one cow)

		Without project			With project		
		price	quantity	Tk	price	quantity	Tk
Cow cost				60000			60000
Cow shed				1000			3000
Milk production	litre/day		1			1.75	
Milk sales	litre/day		0.75			1.5	
Milk consumed	litre/day		0.25			0.25	
Lactation period	days		180			180	
Cow mortality	%/year		5%			2%	
Calving interval	months		15			12	
Calf mortality	% to sale		20%			5%	
Calf age at sale	months		18			18	
Annual sales		price Tk	quantity		price Tk	quantity	
milk (litre)		45.00	108	4860	47.00	270	12690
calf (no.)		6500	0.59	3835	15000	0.93	13950
total				8695			26640
Costs							
Feed (kg/yr)							
wheat bran				0	20.00	90	1800
oil cake				0	30.00	90	2700
total				0			4500
Other costs	misc			300			500
	vet			100			200
	service			50			500
	total			450			1200
Total costs				450			5700
Margin before labour cost				8245			20940
(financial benefit)		Tk/day	days/yr.		Tk/day	days/yr.	
Labour input & nominal cost		120	70	8400	120	80	9600
Margin after labour incl own consumption				1960			13455

Beef fattening (one animal for 90 days)

		Without project			With project		
		price	quantity	Tk	price	quantity	Tk
Purchase of bull				10000			15000
		Tk/kg			Tk/kg		
Straw		0.40	270	108	0.40	270	108
Green grass			900			900	
Farm and kitchen by-products							
	wheat						
Purchase	bran	22.00	30	660	20.00	45	900
	oil cake	32.00	10	320	30.00	22	660
Veterinary							100
	Total cost			11088			16768
Sale value				18000			30000
Margin (financial benefit)				6912			13232
		Tk/day					
Labour (nominal cost)		120	45	5400	120	45	5400
Margin net of nominal labour cost				1512			7832

Backyard poultry

Local birds			Without project		With project	
		price	quantity	amount	quantity	amount
Chickens			8		10	
Ducks			7		10	
of which adult hens			3		5	
Feed		25		0	50	1250
Repairs		100	1	100	1	100
Vet		10.00		0	20	200
	total			100		1550
Eggs produced			150		500	
Eggs for hatching			80		50	
Adult bird mortality		20%	0.6			
		5%			0.25	
Young bird mortality		70%	56			
		15%			7.5	
Sales	eggs	6.00	0	0	300	1800
	birds	450	13	6030	22	10013
Margin (financial benefit)				5930		10263
Consumed at home	eggs		70	420	150	900
	birds		10	4500	20	9000
Labour input – days		120	90	10800	90	10800
Margin including home consumption less labour				50		9363

Table 2: Flow of financial benefits

Year	Sum of margins from livestock models								Increment
	With project Tk million				Without project Tk million				
	poultry	milk	beef	total	poultry	milk	beef	total	
1	149.44	94.65	46.45	290.54	149.44	94.65	46.45	290.54	0.00
2	173.15	121.40	69.41	363.96	153.54	99.88	49.55	302.98	60.99
3	196.87	148.14	92.38	437.39	157.65	105.12	52.65	315.42	121.97
4	220.59	174.89	115.34	510.82	161.76	110.35	55.76	327.86	182.96
5	244.31	201.63	138.31	584.25	165.87	115.58	58.86	340.30	243.94
6	268.02	228.38	161.27	657.67	169.97	120.81	61.96	352.74	304.93
7	291.74	255.12	184.24	731.10	174.08	126.04	65.06	365.19	365.91
8	295.66	265.27	193.09	754.02	176.94	127.94	67.62	372.50	381.52
9	299.58	275.43	201.94	776.95	179.81	129.85	70.17	379.82	397.12
10	303.50	285.58	210.79	799.87	182.67	131.75	72.72	387.14	412.73
11	307.41	295.73	219.64	822.79	185.53	133.65	75.28	394.46	428.33
12	311.33	305.89	228.49	845.71	188.39	135.56	77.83	401.78	443.94
13	315.25	316.04	237.34	868.63	191.25	137.46	80.38	409.09	459.54
14	319.17	326.19	246.19	891.56	194.12	139.36	82.93	416.41	475.14
15	323.09	336.35	255.05	914.48	196.98	141.27	85.49	423.73	490.75
16	323.09	336.35	255.05	914.48	196.98	141.27	85.49	423.73	490.75
17	323.09	336.35	255.05	914.48	196.98	141.27	85.49	423.73	490.75
18	323.09	336.35	255.05	914.48	196.98	141.27	85.49	423.73	490.75
19	323.09	336.35	255.05	914.48	196.98	141.27	85.49	423.73	490.75
20	323.09	336.35	255.05	914.48	196.98	141.27	85.49	423.73	490.75

Annex 3: Benefits from aquaculture and non-farm enterprises

Carp and tilapia pond of 30 decimals (0.12 ha)

		Before project			With project		
	Unit	Price	quantity	Total Tk	Price	quantity	Total Tk
Inputs							
TSP	kg				35.00	8	280
Urea	kg				20.00	12	240
Lime	kg				12.00	20	240
Organic manure	kg	1.00	50	50	1.00	250	250
Fingerlings	each	2.00	150	300	2.00	600	1200
Feed (rice bran)	kg				4.00	1,000	4000
Total cost				350			6210
Ouput							
fish	kg	148.00	51	7550	150.00	279	41903
Margin (financial benefit)				7200			35693
Nominal labour input	day	120.00	45	5400	120.00	60	7200
Margin after labour cost				1800			28493

Flow of benefits from aquaculture and non-farm enterprises

Year	Aquaculture million			Non-farm enterprises Taka million		
	with	without	increment	with	without	increment
1	23.69	23.69	0.00	201.60	201.60	0.00
2	188.85	74.53	114.32	330.73	249.37	81.37
3	354.01	125.37	228.65	459.87	297.13	162.73
4	519.18	176.21	342.97	589.00	344.90	244.10
5	684.34	227.05	457.29	718.14	392.67	325.47
6	849.51	277.89	571.61	847.27	440.44	406.84
7	1014.67	328.73	685.94	976.41	488.20	488.20
8	1041.07	350.18	690.88	1072.19	536.09	536.09
9	1067.46	371.64	695.83	1167.96	583.98	583.98
10	1093.86	393.09	700.77	1263.74	631.87	631.87
11	1120.26	414.54	705.72	1359.52	679.76	679.76
12	1146.66	435.99	710.66	1455.29	727.65	727.65
13	1173.05	457.44	715.61	1551.07	775.54	775.54
14	1199.45	478.89	720.56	1646.85	823.42	823.42
15	1225.85	500.35	725.50	1742.62	871.31	871.31
16	1225.85	500.35	725.50	1742.62	871.31	871.31
17	1225.85	500.35	725.50	1742.62	871.31	871.31
18	1225.85	500.35	725.50	1742.62	871.31	871.31
19	1225.85	500.35	725.50	1742.62	871.31	871.31
20	1225.85	500.35	725.50	1742.62	871.31	871.31

Annex 4: Benefits from forestry

	Benefit from SFG tree plantations in Taka (financial prices)						
	Road	Canal	Embank.	Foreshore	Block	Mangrove	Killa
Year	km	km	km	ha	ha	ha	Nos.
2	3750	7500	9375	5625	9375		787.5
3	6250	12500	15625	9375	15625		1312.5
4	8000	16000	20000	12000	20000		1680
5	12000	24000	30000	18000	30000		2520
6	16000	32000	40000	24000	40000		3360
7	16000	32000	40000	24000	40000		3360
8	18000	36000	45000	27000	45000	80000	3780
9	20000	40000	50000	30000	50000		4200
10	24000	48000	60000	36000	60000		5040
11	30000	60000	75000	45000	75000		6300
12	36000	72000	90000	54000	90000		7560
13	40000	80000	100000	60000	100000		8400
14	40000	80000	100000	60000	100000		8400
15	2000000	4000000	5000000	3000000	5000000	80000	420000
Total	**2270000**	**4540000**	**5675000**	**3405000**	**5675000**	**160000**	**476700**

Flow of total benefits (taking account of SFG share, including trees on private land)

Year	Tk'000
2	1,056
3	3,564
4	8,685
5	16,688
6	26,391
7	36,171
8	46,081
9	54,680
10	62,119
11	70,361
12	81,953
13	97,209
14	113,739
15	542,318
16	891,897
17	1,605,224
18	1,635,410
19	952,582
20	952,582

Annex 5: Calculation economic benefits

Calculation of border prices

International prices are WB projections for 2023 in 2018 prices	Unir	Rice	Oilseed	Nitrogen	Phosphate	Potash
Source: WB commodity forecast October 2017		5% broken	Soya bean	Urea	TSP	MOP
Item		Bangkok	USA	East Eur	USA	Morocco
International price	$ per tonne	381	415	225	290	232
Quality adjustment		80%	100%	100%	100%	100%
Adjusted International/FOB price	$	304	415	225	290	232
Insurance and international freight	$	40	60	100	60	100
CIF Chittagong	$	344	475	325	350	332
Exchange rate	Taka/$	82	82	82	82	82
CIF cost	Taka/tonne	28,248	38,937	26,628	28,677	27,186
Customs, handling & transport	Taka	1,000	1,000	1,000	1,000	1,000
Storage, handling & transport to local market	Taka	320	320	320	320	320
Derived price at local market	Taka/tonne	29,568	40,257	27,948	29,997	28,506
Storage, handling & transport from farmgate	Taka	260	260	260	260	260
Processing cost	Taka	650	0	0	0	0
Processing ratio		0.65	1	1	1	1
Local farmgate economic price	Taka/tonne	18,628	39,997	27,688	29,737	28,246

Price assumptions

	Unit	PCR assumptions		Appraisal report*	
		financial	economic	financial	economic
Outputs					
Crop Production					
Aus paddy	kg	20.00	18.63	12.50	16.74
Aman paddy	kg	20.00	18.63	15.00	16.74
Boro paddy	kg	18.00	16.76		
Chili (dry)	kg	100.00	94.25	75.00	70.69
Keshari	kg	42.00	39.59	15.00	14.14
Okra (Lady's Finger)	kg	20.00	18.85	9.00	8.48
Country bean (green)	kg	20.00	18.85		
Cucumber	kg	20.00	18.85		
Snake gourd	kg	25.00	23.56		
Soyabean	kg	35.00	40.00	55.00	51.84
Felon (cow pea)	kg	45.00	42.41		
By-product					
straw	kg	0.40	0.38	0.40	0.38
Output: Livestock					
Cow Milk	lt	47.00	44.30	45.00	42.41
Chickens - desi, 6 months old	head	450.00	424.14		
Eggs	unit	6.00	5.66	4.50	4.24
Fish (pond)	kg	150.00	141.38	150.00	141.38
Inputs					
Seed					
Seed rice - open polinated	kg	40.00	37.70	37.50	34.88
Seed rice - hybrid	kg	330.00	311.03		
Seed - soyabean, cowpea	kg	100.00	94.25	12.00	11.16
Seed – keshari	kg	80.00	75.40		

	Unit	PCR assumptions		Appraisal report*	
		financial	economic	financial	economic
Seed – chilli	kg	100.00	94.25	23.50	21.86
Seed - cucumber	kg	35.00	32.99		
Seed – gourds	kg	35.00	32.99		
Seed - country bean	kg	100.00	94.25		
Machinery					
Ploughing (including diesel and labour)	ha	1,544	1,544	1,300	1,300
Peddle thresher (per ton of paddy)	percent	5	5		
Irrigation					
Boro paddy	ha	15,400	15,400		
Chilli	ha	6,175	6,175		
Crop supports (stakes, wire, net)	ha	81,250	76,580		
Labour					
Transport- farm to market - carried by hand	kg	2.00	1.50	1.00	0.93
Transport- farm to market - rickshaw van	kg	0.30	0.28	0.20	0.19
Labour - male	day	450	338	100	75
Labour - female	day	300	225	80	75
Fertilizers, Pesticdes, etc.					
Fertilizer (urea)	kg	20.00	27.69	14.00	26.03
Fertilizer (MOP) /b	kg	22.00	28.25	30.00	25.47
Fertilizer (TSP)	kg	35.00	29.74	45.00	38.61
Fertiliser (zinc)	kg	180.00	180.00	150.00	150.00
Fertiliser (boron)	kg	200.00	200.00		
Gypsum	kg	18.00	16.97	8.00	8.00
Lime	kg	12.00	11.31		
Organic matter	kg	1.00	0.94	1.00	0.93
Pesticide	kg	772	772	1,000	1,000
Bags					
Bags / baskets	unit	40.00	37.70	30.00	27.90
Investment Costs: Livestock					
Milking cow	head	60,000	56,552	20,000	18,600
Husbandry Costs: Livestock					
Straw	kg	0.40	0.38	0.40	0.37
Oil Cake	kg	30.00	28.28	30.00	27.90
Wheat	kg	22.00	20.74		
Wheat Bran	kg	20.00	18.85	20.00	18.60
Rice bran	kg	4.00	3.77	4.00	3.72
Feed (chicken)	kg	25.00	23.56	20.00	18.60
Veterinary services (backyard poultry)	bird	10.00	9.43		
Fish fingerlings	each	2.00	1.89		
Benefits from development of transport infrastructure					
Additional costs / reduced prices without project					
For outputs sold outside the chars	Tk/kg	2.00	1.89		
For inputs from outside the chars	Tk/kg	2.00	1.89		

'* appraisal report prices shown for comparison

Crop budgets at economic prices

			Aman (local)				Aman (HYV)				T. Aus (local)		Boro (Hybrid)		Soyabeans				Chilli (dry)				Keshari			
		Unit	Year 1	WP yr 7	WP yr 15	WOP yr15	Year 1	WP yr 7	WP yr 15	WOP yr15	Year 1		WP yr 7	WP yr 15	Year 1	WP yr 7	WP yr 15	WOP yr15	Year 1	WP yr 7	WP yr 15	WOP yr15	Year 1	WP yr 7	WP yr 15	WOP yr15
Yields	Main product	kg	1500	2700	3000	2000	1950	3800	4200	2800	1250		5700	6500	1800	2470	3200	2000	900	1976	2500	1200	600	772	870	772
	By-product	kg	1800	3240	3600	2400	1950	3800	4200	2800	1250		4560	5200									600	772	870	772
Crop	Seed/Seedlings	kg	43	43	43	43	43	43	43	43	43		8	8	55	62	62	62	62	62	62	62	31	31	31	31
Inputs	Fertilizer (urea)	kg	62	124	148	93	91	154	170	135	62		309	309					31	62	62	62	62	62	62	62
	Fertilizer (TSP)	kg	0	0			45	154	170	62	0		154	154	62	93	93	71	62	93	93	62	0	62	62	62
	Fertilizer (MOP)	kg	0	0			0	0			0		39	46	31	62	62	62	0	31	31		0			
	Fertilizer (zinc)	kg											8	8												
	Fertilizer (boron)	kg											2	3												
	Gypsum	kg	0	0									15	15	31	62	62	62								
	Organic manure /c	kg	0	0			0	0			0		2470	2470	1235	1235	1235	1235	500	988	988	600	0	0		
	Pesticide	kg	1	2	2	2	4	7	7	7	1		9	9	2	2	2	2	8	16	20	12	1	1	1	1
	Irrigation	time																								
	Sacks/baskets (used)	each	0	0			0	0			0		0	0	0	0	0	0	23	49	63	30				
	Crop supports	ha																								
	Machine hire - cultivation	ha	4	4	4	4	4	4	4	4	4		4	4	4	4	4	4	4	4	4	4	0	0		
	Irrigation												1.0	1.5					0.5	1	1	1				
	Transport to local market	kg	1500	2700	3000	2000	1950	3800	4200	2800	1250		5700	6500	1800	2470	3200	2000	900	1976	2500	1200	600	772	870	772
	Agricultural Labour																									
	seed bed	day	8	8	8	8	8	8	8	8	8		5	5												
	plant / transplant	day	22	22	22	22	26	26	26	26	22		62	62	31	31	31	31	25	25	25	25				
	fertilisation	day	2	2	2	2	4	4	4	4	2		8	8												
	weeding / earthing up	day													31	31	31	31	37	49	49	49				
	insecticide application	day	1	1	1	1	2	3	3	3	1		4	4												
	harvesting	day	22.5	24.5	25	23.3	23.3	26.3	27.0	24.7	22.1		29.5	30.8	31	31	31	31	25	25	25	25	31	31	31	31
	threshing / winnowing	day	5.0	9.0	10.0	6.7	6.5	12.7	14.0	9.3	4.2		19.0	21.7					9.0	19.8	25.0	12.0	24.1	31.0	34.9	31.0
Costs	Seed/Seedlings	TK/ha	1,613	1,613	1,613	1,613	1,613	1,613	1,613	1,613	1,613		2,488	2,488	5,288	5,844	5,844	5,961	6,317	6,200	6,200	6,317	2,396	2,337	2,337	2,396
	Fertilizer (urea)	TK/ha	1,834	3,433	4,098	2,750	2,691	4,264	4,707	3,992	1,834		8,556	8,556	-	-	-	-	917	1,717	1,717	1,834	1,834	1,717	1,717	1,834
	Fertilizer (TSP)	TK/ha	-	-	-	-	1,423	4,580	5,055	1,961	-		4,580	4,580	1,961	2,766	2,766	2,245	1,961	2,766	2,766	1,961	-	1,844	1,844	1,961
	Fertilizer (MOP)	TK/ha	-	-	-	-	-	-	-	-	-		1,102	1,299	934	1,751	1,751	1,868	-	876	876	-	-	-	-	-
	Fertilizer (zinc)	TK/ha	-	-	-	-	-	-	-	-	-		1,440	1,440	-	-	-	-	-	-	-	-	-	-	-	-
	Fertilizer (boron)	TK/ha	-	-	-	-	-	-	-	-	-		400	600	-	-	-	-	-	-	-	-	-	-	-	-
	Gypsum	TK/ha	-	-	-	-	-	-	-	-	-		254	254	584	1,052	1,052	1,169	-	-	-	-	-	-	-	-
	Organic manure /c	TK/ha	-	-	-	-	-	-	-	-	-		2,328	2,328	1,164	1,164	1,164	1,164	471	931	931	566	-	-	-	-
	Pesticide	TK/ha	774	1,544	1,544	1,548	3,096	5,404	5,404	5,417	774		6,948	6,948	1,548	1,544	1,544	1,548	6,191	12,352	15,440	9,287	774	772	772	774
	Sacks/baskets (used)	TK/ha	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	867	1,847	2,375	1,131	-	-	-	-
	Machine hire - cultivation	TK/ha	6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176		6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176	6,176	-	-	-	-
	Irrigation												15,400	23,100					3,088	6,175	6,175	6,175				
	Crop supports																									
	Transport to local market	TK/ha	2,250	763	848	3,000	2,925	1,188	1,188	4,200	1,875		1,612	1,838	2,700	698	905	3,000	1,350	559	707	1,800	900	218	246	1,158
	Total labour																									
	seed bed	Tk/ha	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700		1,688	1,688	-	-	-	-	-	-	-	-	-	-	-	-
	plant / transplant	Tk/ha	7,425	7,425	7,425	7,425	8,775	8,775	8,775	8,775	7,425		20,925	20,925	10,463	10,463	10,463	10,463	8,438	8,438	8,438	8,438	-	-	-	-
	fertilisation	Tk/ha	675	675	675	675	1,350	1,350	1,350	1,350	675		2,700	2,700	-	-	-	-	-	-	-	-	-	-	-	-
	weeding / earthing up	Tk/ha	-	-	-	-	-	-	-	-	-		-	-	10,463	10,463	10,463	10,463	12,488	16,538	16,538	16,538	-	-	-	-
	insecticide application	Tk/ha	338	338	338	338	675	1,013	1,013	1,013	338		1,350	1,350	-	-	-	-	-	-	-	-	-	-	-	-
	harvesting	Tk/ha	7,594	8,269	8,438	7,875	7,847	8,888	9,113	8,325	7,453		9,956	10,406	10,463	10,463	10,463	10,463	5,625	5,625	5,625	5,625	10,463	10,463	10,463	10,463
	threshing / winnowing	Tk/ha	1,688	3,038	3,375	2,250	2,194	4,275	4,725	3,150	1,406		6,413	7,313	-	-	-	-	3,038	6,669	8,438	4,050	8,131	10,463	11,791	10,463
	Sub-total	TK/ha	33,065	35,973	37,229	36,349	41,464	50,224	51,817	48,671	32,268	-	94,314	103,988	51,742	52,382	52,589	54,518	56,925	76,867	82,400	69,895	24,497	27,813	29,169	29,047
	Gross Margin	TK/ha	(4,444)	15,543	20,012	1,811	(4,404)	21,995	28,003	4,542	(8,512)		2,965	6,944	16,860	46,411	75,402	21,706	27,903	113,101	157,945	43,208	499	5,803	8,715	3,114

			Keshari				Felon (cow pea)				Cucumber			Snake gourd			Country bean		
		Unit	Year 1	WP yr 7	WP yr 15	WOP yr15	Year 1	WP yr 7	WP yr 15	WOP yr15	WP yr 7	WP yr 15	WOP yr15	WP yr 7	WP yr 15	WOP yr15	WP yr 7	WP yr 15	WOP yr15
Yields	Main product	kg	600	772	870	772	600	1600	1900	1200	13894	15978	12782	9880	11856	9880	14820	17784	14227
	By-product	kg	600	772	870	772	200	533	633	400									
Crop	Seed/Seedlings	kg	31	31	31	31	15	15	15	15	309	309	309	176	176	176	7	7	7
Inputs	Fertilizer (urea)	kg	62	62	62	62					618	618	618	155	155	155	618	618	618
	Fertilizer (TSP)	kg	0	62	62	62	31	62	73	41	463	463	463	62	62	61	618	618	618
	Fertilizer (MOP)	kg	0								62	62	62				31	31	31
	Fertilizer (zinc)	kg									15	15	15				31	31	31
	Fertilizer (boron)	kg															12	12	12
	Gypsum	kg									62	62	62				154	154	154
	Organic manure /c	kg	0	0							1235	1235	1235	494	494	494	247	247	247
	Pesticide	kg	1	1	1	1	1	2	2	2	100	100	100	100	100	100	60	60	60
	Irrigation	time																	
	Sacks/baskets (used)	each									87	100	80	62	74	62	93	111	89
	Crop supports	ha									0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	Machine hire - cultivation	ha	0	0			4	4	4	4									
	Irrigation																		
	Transport to local market	kg	600	772	870	772	600	1600	1900	1200	13894	15978	12782	9880	11856	9880	14820	17784	14227
	Agricultural Labour																		
	seed bed	day																	
	plant / transplant	day					12	12	12	12	93	93	93	93	93	93	24	24	24
	fertilisation	day									31	31	31	12	12	12	12	12	12
	weeding / earthing up	day					48	62	62	62	31	31	31	31	31	31	6	6	6
	insecticide application	day									31	31	31				62	62	62
	harvesting	day	31	31	31	31	31	31	31	31	154	154	154	124	124	124	93	93	93
	threshing / winnowing	day	24.1	31.0	34.9	31.0	9.3	24.9	29.5	18.7	12	12	12						
Costs	Seed/Seedlings	TK/ha	2,396	2,337	2,337	2,396	1,442	1,414	1,414	1,442	10,193	10,193	10,776	5,806	5,806	6,138	660	660	673
	Fertilizer (urea)	TK/ha	1,834	1,717	1,717	1,834	-	-	-	-	17,111	17,111	18,276	4,292	4,292	4,584	17,111	17,111	18,276
	Fertilizer (TSP)	TK/ha	-	1,844	1,844	1,961	980	1,844	2,171	1,297	13,768	13,768	14,641	1,844	1,844	1,929	18,378	18,378	19,543
	Fertilizer (MOP)	TK/ha	-	-	-	-	-	-	-	-	1,751	1,751	1,868	-	-	-	876	876	934
	Fertilizer (zinc)	TK/ha	-	-	-	-	-	-	-	-	2,700	2,700	2,728	-	-	-	5,580	5,580	5,638
	Fertilizer (boron)	TK/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,400	2,400	2,423
	Gypsum	TK/ha	-	-	-	-	-	-	-	-	1,052	1,052	1,169	-	-	-	2,613	2,613	2,903
	Organic manure /c	TK/ha	-	-	-	-	-	-	-	-	1,164	1,164	1,164	466	466	466	233	233	233
	Pesticide	TK/ha	774	772	772	774	774	1,544	1,544	1,548	77,200	77,200	77,389	77,200	77,200	77,389	46,320	46,320	46,433
	Sacks/baskets (used)	TK/ha	-	-	-	-	-	-	-	-	3,274	3,765	3,012	2,328	2,794	2,328	3,492	4,190	3,352
	Machine hire - cultivation	TK/ha	-	-	-	-	6,176	6,176	6,176	6,176	-	-	-	-	-	-	-	-	-
	Irrigation																		
	Crop supports										19,145	19,145	19,145	19,145	19,145	19,145	19,145	19,145	19,145
	Transport to local market	TK/ha	900	218	246	1,158	900	452	537	1,800	3,929	4,518	19,173	2,794	3,352	14,820	4,190	5,029	21,341
	Total labour																		
	seed bed	Tk/ha	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	plant / transplant	Tk/ha	-	-	-	-	4,050	4,050	4,050	4,050	31,388	31,388	31,388	31,388	31,388	31,388	8,100	8,100	8,100
	fertilisation	Tk/ha	-	-	-	-	-	-	-	-	10,463	10,463	10,463	4,050	4,050	4,050	4,050	4,050	4,050
	weeding / earthing up	Tk/ha	-	-	-	-	16,200	20,925	20,925	20,925	10,463	10,463	10,463	10,463	10,463	10,463	2,025	2,025	2,025
	insecticide application	Tk/ha	-	-	-	-	-	-	-	-	10,463	10,463	10,463	-	-	-	20,925	20,925	20,925
	harvesting	Tk/ha	10,463	10,463	10,463	10,463	10,463	10,463	10,463	10,463	51,975	51,975	51,975	41,850	41,850	41,850	31,388	31,388	31,388
	threshing / winnowing	Tk/ha	8,131	10,463	11,791	10,463	3,148	8,394	9,968	6,295	4,050	4,050	4,050	-	-	-	-	-	-
	Sub-total	TK/ha	24,497	27,813	29,169	29,047	44,132	55,261	57,247	53,995	270,087	271,168	288,141	201,624	202,648	214,548	187,485	189,021	207,381
	Gross Margin	TK/ha	499	5,803	8,715	3,114	(15,630)	14,712	25,846	3,009	(8,182)	30,023	(56,591)	45,376	93,752	(368)	91,881	146,217	33,990

Appendix-8: Environmental assessment

Potential Environmental Impact and Concerns

Impacts of CDSP IV on the environment

The project has adopted an environmentally sensitive programming and implementation approach to the components and the activities, which includes flood control and drainage infrastructure, communication infrastructure, disaster preparedness, agriculture, horticulture, livestock, fishery, afforestation, and water supply / sanitation facilities.

The project has by and large addressed potential environmental challenges in the design and construction of rural roads, flood control / drainage works and other rural infrastructures. At the same time, project activities have contributed to improving the quality of natural assets through support for social forestry.

Flood Control and Drainage: Embankments, sluices and drainage channels are reducing flooding and salinity and so improving conditions for crop production, which has increased very substantially.

However, in the short term embankments and roads, where adequate drainage channels have not yet been completed, are reported to have caused some drainage congestion on char Nangulia, preventing cultivation of aman. Although, in the impact survey, only 6% of aman growers in this char said drainage had got worse, the area under aman in Nangulia has fallen from 91% to 72% of the cultivated area.

Current works to excavate channels and install more culverts aim to reduce this problem, and some farmers have also mitigated the problem by converting land to sorjon, and many more by growing boro paddy instead of aman (which has increased from 0.7% to 34% of cultivated land in Nangulia).

Rural Roads: Road connectivity is critical to end the lack of market access that stands out as a major cause of rural poverty in this remote area. The project constructed an extensive network of all-weather and earth roads, with associated bridges and culverts. Some disturbance to the natural environment, is inevitable in building such infrastructure. However, the alignment and construction of road was done considering minimal environmental impacts. The roads were constructed with simple brick soling and metalling and proper drainage to avoid damage by rain. The maintenance of roads are under the LGED component of the project, which gives them ownership and good management.

Crop Production: The project has promoted environmentally sensitive and innovative practices to enhance crop productivity, which includes the *sorjon* method of cultivating vegetables on trellises on ridges. The improved growing environment for crops, along with access to support services and markets, have encouraged a switch to HYVs and greatly increased vegetable cultivation.

Although production and farm income are much higher, there has been increased use of fertilisers and pesticides, with consequent potential adverse impacts on the environment. CDSP IV has sought to mitigate this by promoting the use of pheromone traps and other non-chemical means of pest control, along with the use of organic manures. The major system of field vegetable production is sorjon – with vegetables grown on ridges. The impact survey shows that almost all these farmers also produce fish in the ditches between ridges – which would not be possible if large amount of toxic pesticides were being used.

A more serious concern is that reduced intrusion of saline water and protection from flooding has enabled many more farmers to take up boro production. The impact survey recorded boro being grown on 16% of cultivable land in 2016-17 but this has expanded further in the current 2017-18 season. This crop is irrigated by a combination of surface water from ponds and khals and by groundwater. As the area of irrigation expands, great reliance is placed on groundwater, and farmers are now sinking tubewells to a depth of around 300 metres to tap a deep fresh water aquifer which is below a layer of salt water. This fresh water is recharged by horizontal movement in the aquifer from a very considerable distance inland. The rate of recharge is believed to be slow and this aquifer has been

reserved for abstraction of drinking and domestic water via the hand pumped deep tubewells installed by CDSP IV. Abstraction of much larger volumes for irrigation could well damage this aquifer, resulting in saline intrusion and loss of supplies of drinking water.

Social Sector Development: One of the objectives of the project is to provide safe drinking water at household village level, which was not the case in the pre-project situation, with poor quality water only being available during the winter season at considerable distances, so the fetching of drinking water led to a large extra workload for women. The project has provided safe drinking water and sanitation to almost all households through provision of hand-pump tubewells and sanitary pit latrines.

The construction was done in selected sites using simple manual technology with minimal environmental impacts. The provision of household latrines improved the women's dignity and also provided a clean environment by minimising the chance of contamination of drinking water due to open defection.

Household lighting is another critical issue for social and economic development of rural and inaccessible villages. The villagers specially the students were dependent for light on fires or kerosene for their studies as electricity was out of reach. There has been a very great increase in the use of solar energy (68% of households have solar home systems), enabled by higher incomes, access to credit, and access to markets (shops selling panels). This reduces indoor air pollution and CO2 emissions, and improves household resilience[22].

In addition, the increased supply of firewood, resulting from homestead tree plantation, as a direct result of the security of ownership provided by the project, has led to reduced use of dried manure as a fuel, which means more manure is available to apply to the land.

Environmental Conservation: In order to strengthen the community based environmental conservation in the project area, tree nurseries have been established and an extensive social forestry plantation programme on roadsides, channel banks and in foreshores in front of sea dykes has been carried out. This latter type of plantation has reduced the energy of waves attacking the dykes during storms and so also reduced damage to the dykes. During cyclonic storm surges it also reduces the energy of the event and so the height and velocity of the surge.

Impacts of the environment on CDSP IV

Erosion of the shoreline by strong currents in the Sandwip and Hatia channels has resulted in a significant loss of land along with some of the infrastructure developed, including a sluice, a cyclone shelter, roads and plantations. This erosion has been much faster than was initially expected and, using the areas as measured in the feasibility studies of 2008 as a baseline, a total of 5,240 ha has been lost from Nangulia, Noler and Caring Chars. This represents 28% of the 2008 area of these three chars, with most land (4,650 ha) being lost on Caring Char – this being two-thirds of its area.

There has been no change in the area of char Ziauddin and the area of Urir Char has increased by 2,000 ha, so the net loss of area in the CDSP IV chars is 3,240 ha, just over 10% of the original estimate of their total area. Based on the design estimate of population (28,000 households in the five CDSP IV chars), it is estimated that around 5,000 households will have been displaced by this erosion, these households moving to other locations in the CDSP IV chars (the overall population is now estimated at just over 29,000 households), including joining relatives and squatting on embankments. Some households will have moved away altogether.

Climate change: This erosion appears to have been related to accretion of land on the other side of the Sandwip and Hatia channels. Since this is part of a very long process of accretion and erosion in the active delta[23], it is not yet possible to determine a causal link with anthropogenic climate

[22] Andrew Scott, Leah Worrall, Jesper Hörnberg and Long Seng To, December 2017,*How solar household systems contribute to resilience.* ODI Working Paper 528.
[23] With coastlines first accurately recorded in Rennell's Map of 1766.

change and the related recorded rise in mean sea level (which is exacerbated by a secular fall in land levels caused by tectonic plate movement and compaction of sediments)[24].

During some years in the project period, there has been unexpected rainfall during the dry season and some spells of cooler than normal weather, which can be attributed to the atmospheric brown cloud (ABC), that has formed over the northern part of the sub-continent due to air pollution. Farmers on Ziauddin char reported a poor harvest of okra (an important cash crop on this char) in 2016-17 due to such abnormal weather.

Environmental and Social Assessment

Actions Affecting Environmental Resource Values of the project	Environmental Impact (negative, positive, small, etc.)	Comments
Relocation or migration of people	Small	The project provided land title, infrastructure and services to families who had relocated themselves to the new chars. A small number were relocated because of changes in dyke alignments and were compensated.
Disruption of existing social systems	Positive	The formation of various Field Level Institutions (FLIs) enabled greater mobility for women and a role in planning and decision making in the village. Women's drudgery was minimised by easy access to clean water and their health and dignity improved through good sanitation.
Damage to historic sites	None	No historical sites were affected.
Inadequate resources to meet demands	Positive	The project followed an inclusive approach in identifying participating households. Close liaison with government facilitated this.
Local disputes between communities or stakeholders' disagreements due to project interventions	Small	The project followed an inclusive approach whereby all household in selected villages were eligible to participate in FLIs; a very transparent careful, systematic approach to land titling was used.
Public health or safety concerns	Positive	Better access to potable drinking water, improved hygiene through low cost latrine, access to more and better food from home garden, protein from fish & livestock have positive health impacts. Solar powered electrification enhances women and children's health especially in connection with eye related diseases.
Increased workload of local communities especially women	Positive	Improved road connectivity has reduced drudgery in transporting commodities to and from markets and from fields to their homes and to access services. Access to safe drinking water through project intervention minimise travel distance from fetching water.
Impact on traditional practices or agricultural systems in the area	Positive	Innovations have improved crop productivity. Promotions of home garden prevents reduction of crop diversity and easier access has led to food and nutrient security.

[24] See Hugh Brammer, UPL 2014, *Climate Change, Sea-level Rise and Development in Bangladesh*

		More productive farming and livestock techniques lead to higher yields. Sustainable land management reduces vulnerability.
Introduction, continued existence, or spread of non-native invasive species	None	No such species have been introduced.

Appendix-9: Stakeholder workshop findings

A. Field level workshop

Held in char Nangulia on 19 March 2018

Workshop participants divided into the following groups:

- Men living in the chars
- Women living in the chars
- Members of local government institutions and WMG
- Field staff of PNGOs
- Field staff of implementing agencies

Each group was asked to list and comment on

- Results of CDSP IV sub-components
- Impacts of CDSP IV

Each group was also invited to address the workshop regarding their overall findings and major lessons

Group No. 1: Men living in the chars

Group members: i) Md. Shameem, SFG, ii) Md. Nur Nani, SFG, iii) Md. Nurul Islam, FF
Technical assistance for the group: Mr. Radheshyam Sutradhar, Project Agriculturist

Results of CDSP IV Components and Sub-components

Intervention areas	**Achievements**	**Challenges (not so successful)**	**Lessons for the future**
Water Management (embankment, drainage, etc.)	- very successfully built-embankment, sluice gate and constructed canals	- compensation of land under embankment and canals not paid in time	- compensation for acquisitioned land should be paid
Social Forestry	- planation in the roadside, bank of canals been raised nicely	- the owner always try to stop work and raise unwanted demands	- the affected landowners should be considered as beneficiaries of the project
Internal infrastructures	- constructed roads, bridges, culverts, earthen and paved roads successfully	- the possession holders try to stop implementation of activity	- limited compensation can be paid to the affected households
Water and sanitation	- construction of DTWs and distributions of sanitary latrines done 100%	- many households could construct super structure over the latrines due lack of money	- there is a need of money to be allocated for compensation
Land title and khatians	- most of the households have received permanent land titles (khatians)	- due to having old document or papers there are still some problems	- survey should done properly and there should proper M&E activities
Agricultural development	- production of rice and vegetables increased by 2-3 times due to introduction of HYV and hybrid verities of those crops and vegetables	- introduction of new technology should be done in consultation with local char dwellers	- to combat effect of climate change more saline tolerant and drought resistance varieties need to be included
PNGOs activities	-a PNGOs formed microfinance group to generate group savings from group members - PNGOs also distributed micro credit to NGO group members without any collateral from beneficiaries	-a displacement of char dwellers due to river serious erosion	-a PNGO activities need to be continued

Impacts of CDSP IV

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
Household income (sources, amounts)	- household income increased by 3-4 times	- coordinating GoB and PNGOs and local government institutions - implementing multidiscipline training programs for poor land less char dwellers	- replacing the then land settlement procedure with new digital land title (khatians) - maintenance of embankment along eroding banks and controlling river erosion
Food security and nutrition	- production of crops and vegetables increased by 2-3 times, they can sell their production after meeting their daily needs - they are eating better than before and also taking nutritious food	- farmers are now more skilled due to trained on different income generating activities	- introduction of drought resistance and salinity tolerant varieties of crops and vegetables - inclusion of poultry and livestock departments as partners of in the next phases of CDSPs.
Household and productive assets	-a char dwellers now living tin shed houses replacing tiny huts - productive increased by 3-4 times	-a skill developed due to participation of beneficiaries into different trains, availability of micro-credit for operation of new IGAs, active participation of agri-cultural demonstrations	-a CDSP IV did not work for mechanization of agriculture too much - there is a need of formal higher educational institute - need health care/medical hospital
Knowledge and skill of household members	- knowledge and skills of households members increased (70%)	- in the past there was no formal educational institutes, now new schools have been established in each cyclone centres - women have been provided awareness on legal and human rights, women empowerment	- CDSP IV could establish high schools and other training institutes in char
Empowerment of the community	- women mobility increased, they are playing roles in democratic process, become members of local government institutes - they are actively participating in selling and buying households goods and services - increased knowledge and skills of somaj peoples	- CDSP IV formed FLIs engaging char dwellers, building leaderships of beneficiaries - CDSP IV arranged many workshops, awareness program, days observation rallies involving char households members	- need more coordination between Govt. and non-Govt. Organizations. CDSP could include more agencies especially Dept. of Fisheries and Dept. of Livestock
Status and welfare of women	- reduced women violence early marriages, divorces - women democratically being elected members of UP, participating as members of different committees of somaj, actively playing roles of decision makers in households	- CDSP IV ensured active participation of women participation (30-40%) in different FLIs and 100% in NGO group formation - Helped in raising knowledge and skills of women through IGA training	- need more women workers for counselling women char dwellers
Agricultural productivity (crops, vegetables, livestock)	- production of crops and vegetables increased 3-5 times - fish production, poultry and livestock increased 60-70%,	- CDSP IV introduced many HYV and hybrid seeds of crops and vegetables - ensured supply of inputs and other material for developing improved and special species of poultry and livestock	- to increase both agriculture inputs, demonstrations and training on HYV and hybrid crops and vegetables
Access to markets (selling and buying)	- women actively participating in buying and selling their households goods and products	-a CDSP IV's main contribution areas are construction of roads and communications in char	-a there should have separate toilet facilities in the markets

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
		areas, developing water control structures like embankment, canals, sluices	- there should be couple of women representatives in market committees

Group No. 2: Women living in the chars

Group members: i) Mrs. Rina Akhter, MF, ii) Mrs. Merina Akhter, Farmers Forum, iii) Mrs. Parul Begum, LCS, iv) Mrs. Parvin Akhter,SFG v) Mrs.. Pyara Begum, MG, vi) Mrs. Parvin Akhter-2, TUG, vii) Mrs. Sufia Begum, TUG
Technical assistance for the group: Md. Alauddin, PAC (Char Ziauddin)

Results of CDSP IV Components and Sub-components

Intervention areas	Achievements	Challenges (not so successful)	Lessons for the future
Water Management (embankment, drainage, etc.)	- removal of water logging - mitigation of cyclones, flood, salinity - high production due removal of salinity - security coastal char life due to construction of embankment	- looser of land due construction of embankment - they are not getting right compensation as par price of land - river erosion is really great challenge for char development	- before initiating any development work, if project staff discuss with project beneficiaries then many problems can be solved
Social Forestry	- social forestry - fuel wood from plantations - natural fencing to protect from cyclones and tidal water - getting plenty of oxygen - SFG members are partners of trees by agreement	-a cattle browsing too much - problems of encroachment in the plantation area - selection of right beneficiary for social forestry	- pre-discussion of community leaders/somaj leaders - forest watchers should be appointed from char somaj members
Internal infrastructures	- improvement of communication - they can now transfer serious patients to district hospitals very easily - they sell their products at doorsteps and local markets very easily - they are getting reasonable price for their products	- loss of cultivable land - poor people lose much	- to ensure timely payment of acquisitioned land - necessity of work with smooth coordination with govt. implementing agencies and local govt. institutions
Water and sanitation	- ensured safe drinking water through DTWs - incidents of water borne diseases have reduced significantly - household members using safe water in their needs	- every household demands/like to get DTWs - social elites like to influence on sinking DTWs - NGOs sometimes selects place of DTW in their relatives' house.	- DTWs are allocated and established as pre-discussion with 15-20 households members
Land title and khatians	- both male and women equally owner of land - reduced women violence - women empowered significantly - reduced multi-marriages in their somaj	- males generally do not want that women become owner of land - sometimes they try to influence women to get power of attorney for the land	- need of training on the rules and procedures of land titles - land survey should done in presence of husband and wife
Agricultural development	- food deficit no longer exists - agriculture development is far better than before - women gained better practical knowledge on homestead agriculture - women are self-sufficient in agriculture	- male farmers do not consider opinion of women in selling =-buying agricultural products - many times males takes more benefits from women labour	- women should get priority in selling and buying agri-products - women should get right into spending of their own income

Intervention areas	Achievements	Challenges (not so successful)	Lessons for the future
PNGOs activities	- increased number of income sources of women due to trained on IGAs by NGOs - women can run their own family even male members not in work - they have whole rice stock from own production and even they sell also - they are new taking IGAs using loan from NGOs	- sometimes they cannot attend training due to prohibited by their husbands - sometimes they are prevented to move alone	- IGA training should be provided need based and ensure source of investment like micro-finance

A. What should CDSP IV have done, but did not do?
   - CDSP IV could not complete as per plan and timely due to serious river erosion

B. Will these changes continue in future?
   - All the changes will continue in coastal chars except Caring Char where serious erosion is taking place.

Impacts of CDSP IV

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
Household income (sources, amounts)	- Char dwellers prepare takes their meals from their own production - in the past rice production was 30-40 mounds per acre, now they can produce 100-120 mounds per acre - they are producing more robi crops than their need	- provided training on various income generating activities - provided quality seeds of crops and vegetables - ensure micro credit through PNGOs - solved problems of water logging	- could not provide need based training - could not be able to provide seeds as per need
Food security and nutrition	- vegetables available in their reach and they can sell excess vegetable in the markets	- training provided on nutrition - training done on cooking of nutritious food - awareness built on taking nutritious food	- could not be able to provide -experienced trainer - still they need quality training on family for mother and child
Household and productive assets	- they now multiple sources income - women have received short term employment through LCS program.	- women have been trained on IGas - LCS form through inclusion of poor women from somaj - quantity household assets increased 2-3 times	- duration CDSP IV needs to increased - area of 'robi' crops did not increase
Knowledge and skill of household members	- awareness increased due to participation in training - women have short term employment as LCS member - knowledge and skills in operating IGAS and agriculture works	- practical training on tailoring - training on poultry and livestock rearing - training on fish culture - training on gender - training on disaster management and water management by CDSP IV	- could not do employment of women as expected
Empowerment of the community	- somaj more empowered as they are invited to participate local development partners - somaj leaders now can speak democratically and raise their voices - women mobility in markets and other public places like community centres, hospitals, schools etc	- gender training - CDSP IV formed different types of field level institutions like WMG, SFG, MF, TUG, FF and LCS	- could not participate training male and women together - there was no specialized training
Status and welfare of women	-a women empowered at a level of democratic participation e.g. CDSP IV's couple of beneficiaries elected as UP members	- women can move freely and easily across chars, markets and govt. depts. To have services - made special section for women in case of women	- need to increase more women representation in FLIs

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
	- increased representation of women in different committees - empowered to take decision in own family -increased percentage of girls education		
Agricultural productivity (crops, vegetables, livestock)	- productivity increased for vegetables and crops - vaccination of poultry and livestock have been made available - increased income for households	- provided many trainings - introduced new verities of crops and vegetables - CDSP IV provided HYV and hybrid seeds as input supports	-a need more training on crops and vegetables
Access to markets (selling and buying)	-a women can move one place to another alone - they can sell and buy their production in the markets	- constructed new markets with provisions of water and sanitation facilities - farmers getting reasonable price due to established couple of value chain support centres	- still there are needs of more support for marketing of produces
Others	Note: Group members told that could provide more information but, due to time limitation they to spell out concisely		

Group No. 3: Local Government Institutions and WMG Members

Group members: i) Md. Malek Forajee, WMF, ii) Md. Omar Farooq, WMA iii) Mrs. Amena Begum. UP Member, iv) Mrs. Amena Chowdhury, UP Member, v) Mrs. Yachin akter Munni, WMG
Technical assistance for the group: Md. Basedul Alam Siddikki, PAC (Noler Char)

Results of CDSP IV Components and Sub-components

Intervention areas	Achievements	Challenges (not so successful)	Lessons for the future
Water Management (embankment, drainage, etc.)	- lives of char dweller secured due to development of embankment - increased production of agriculture and fish due control of saline water intrusion - free from floods - improvement over water logging situation - communication improved due to construction of embankment - char dweller now can take shelter in the cyclone shelters in case of cyclone and disaster situation - green belt created through planting trees on the embankment	- fear of influential peoples - implementation delays due to non-payment of compensation and delayed payment - serious river erosion	- construction of infrastructure like slice gates should be built based on good study and design e.g. DS-II washed away after construction - before construction of water structure pre-consultation with local bodies like WMG, SFG should be done
Social Forestry	- very beautiful planation have been done through involving SFGs - the SFG members will be benefited economically after harvesting forest produce - SFG members and other char dwellers have benefited by fuel wood from planation and oxygen for all	- watchers do not do their duty rightly - planation is damaged by cattle browsing - there are instances that SFGs do get their benefits timely for the harvested produce	- watcher can be appointed from neighbours living nearest to the forest planation - timely payment of share of harvested produce
Internal infrastructures	- improvement of socio-economic condition due to construction infrastructure like roads, bridge, cyclone centres, sluices and markets	- political interference is a barrier for work - some roads could be developed due to lack of budget constraint	-a WMG members should be involved in internal infrastructure development works - sites for the infrastructures need

Intervention areas	Achievements	Challenges (not so successful)	Lessons for the future
	- employment created due to improvement of traffics plying over the roads and embankment - short term employment ensured through formation of labour contracting society		to be selected carefully - more LCS members need to be involved and more scope needs to be crested for them
Water and sanitation	- char dwellers now have safe water for drinking and household works due to sinking of DTWs - incidence of water borne diseases reduced due to installation of sanitary latrines I each household	- currently, a DTW is allocated for 15-20 households, if possible it should be 10-12 DTWs as national policy promotes - two latrine can be given to larger households	- orientation on benefits of use of sanitary latrines for the household members
Land title and khatians	- land settle given in the names of both male and women equally (50%) - name of women came first to empower women - women really empowered in respect of social, political and economically - reduced early marriage, divorce and women violence due to land settlement	- char dwellers sometimes suffered due to proper inquiry procedures and verification process - all settlement should be done in char areas through CDSP IV, otherwise there will be havoc	- It has been observed due lack of proper documentation and record system, settlement has been given with other names
Agricultural development	- improvement in cultivation of both HYV and hybrid rice, vegetables like cucumber, country beans, bitter gourd, snake gourd, long beans - household increased due to higher yield and return from profit thereof	- for agriculture salinity is main barrier, they were out of danger from water logging and senility due to construction of DS-II and DS-I, but now they are again in danger due to damage of DS-II by river erosion and DS-I is also is likely to be eroded by serious river erosion.	- char dwellers desire more training on agriculture - permanent Agriculture Extension Officer need to be posted in char areas - to ensure availability of fertilizer and pesticides
PNGOs activities	-a Char dwellers now have opportunity of micro-credit from CDSP IV supported PNGOs - income of women increased due to receiving IGA training on farm and non-farm activities provided by PNGOs - women trained no tailoring and got a sewing machine to operate tailoring house - women become traditional birth attendant due training under health intervention - women are successfully rearing poultry and livestock - children and pregnant mothers supported by children family planning pills and 'putikona' nutrition packet	-a lack of women service providers - stopping services provided by PNGOs - sometimes women are not allowed by male for attending training - non-inclusion of males in training along with women	-Sometimes PNGOs appointed less experienced staff members e.g. WatSan programs hampered for this reason - there were more demands of IGAs - women suffered a lot in participating training to take permission by their husbands

Impacts of CDSP IV:

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
Household income (sources, amounts)	- In the past, production of rice per acre was 10-15 mounds (price was Tk. 5000/-), but now at present production of rice is 40-50 mounds/acre (price is Tk. 20,000/-) - as LCS member, household income increased Tk. 20,000-30,000 annually due to	-a provided training after joining in LCS group and getting contract - increased knowledge and skills due to working as LCS group - they are operating good works timely due to good communication and	-a they could be able to earn good profit from cow fattening - similarly, they minimum profit from fish culture

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
	involved with LCS group for short term employment. - increased income from vegetables and fish culture yearly Tk. 50,000/- - increased household income from poultry and livestock is T. 90,000/- annually - others daily labours Tk. 20,000/- annually	infrastructure developments	
Food security and nutrition	- they can eat better (e.g. fish, egg and milk, vegetables etc. due to increase of their family income than before - They better food security than before	- improved cultivation system - CDSP IV provided DTW for drinking water, sanitary latrine for better health care	- CDSP IV could not ensure mechanized cultivation system - supply agricultural inputs at reduced rate - could not mobilize sufficient loan for agriculture
Household and productive assets	- have got land settlement - they have built new houses - increased income from selling vegetable and crops	- they have got saplings to plant into their homestead - they have been given training on IGAs - they have been received training on agri- and vegetable production	- some IGAs could not be done properly as expected. In health sectors-the services were very expensive.
Knowledge and skill of household members	- increased knowledge on legal and human rights - increased knowledge on books and accounts due to practical training - reduced rate of early marriages	- they are now more aware in regards to legal and human rights - they are more experience in utilizing micro-credit from NGOs	- they cannot keep continuity of children education due to lack of high schools - lack of modern agricultural training centre nearby
Empowerment of the community	- women are more aware due to participation into different awareness programs - women empowered and they are now very respected in their somaj - income of women increased due to operation of various IGAs - reduced cases of women violence, early marriages, divorces and multi-marriages - increased rate in women education	- CDSP IV ensured participation in all types of FLIs at least 30-40%, but 100% in micro-finance groups. - ensured participation of women into training and awareness programs	-need more training on IGAs having latest technologies - provisions of cross-visit to share experiences with similar types of projects and agencies
Status and welfare of women	- women are more aware due to participation into different types of trainings - women are empowered than before - their value in somaj increased and they are more honoured - their income has increased due to doing IGAs investing micro-credits from NGOs - educational rate of women increased - reduced early marriage, divorces and multi-marriages -they are more secured and they plan their family size using family planning methods as counselled by PNGO's health services	- participation of women all kinds of FLIs ensured - CDSP IV ensured rights types of interventions to raise awareness	-Need more training on diversified IGAs, especially non-farm IGAs - increased number of cross-visits sharing and learning experiences - need more school especially high schools
Agricultural productivity (crops,	- revolutionary improvement in vegetable production by women farmers	- to sustain and keep the continuity of such development CDSP V	- there should more number of demonstrations. These

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
vegetables, livestock)	- in case of rice, in the past production per acre was 10-15 mounds, now it is 20-40 mounds per acre - new varieties of vegetables introduced these are: cucumber, country beans, bitter gourd, long beans, water melon	project should be approved immediately - new chars are developing, so CDSP activities need to be continued into new char areas - some repair works should be provisioned into older phases of CDSPs. - To strengthen LCS, more contracts should be given to LCS	were very useful to gain practical and hand on experiences learning
Access to markets (selling and buying)	-farmers getting reasonable prices for their produces - farmers have more access to markets due development roads infrastructures - farmers can send their products to distant districts. - farmers can sell and buy very easily from their markets	-a CDSP IV has built many infrastructure in the char areas which created new opportunities of business - wholesalers and brokers can come easily - regularly different types of vehicles are plying across chars	-there are is a lack of large food storage houses - market committees are not so strong - if there is electricity line from the power development board then markets would develop

Group No. 4: Field Staff Members of PNGOs

Group members: i) Mr. Swapan Mojumder, NC, BRAC, ii) Mr. Md. Hannan Molla, NC, SSUS, iii) Mr. Subrata Kumar Biswas, NC, SDI, iv) Md. Nazim Uddin NC, DUS
Technical assistance for the group: Md. Loakot Ali Khan, PAC (Urir Char)

Results of CDSP IV Components and Sub-components

Intervention areas	Achievements	Challenges (not so successful)	Lessons for the future
Water Management (embankment, drainage, etc.)	- construction of canals and embankment developed (80%) - reduced water logging significantly - salinity reduced - increased cropping intensity	-a reduced homestead and cultivable land due to construction of roads, excavation of canals - river erosion	- embankment, canals were not built with a designs - reasonable compensation not provided to loser households due to building infrastructures
Social Forestry	- ecological balance has been restored due to raising plantations o bank of canals, embankment and remote chars mangrove areas - risks of hitting by cyclones has reduced	- social forests are disturbed by local peoples and cattle browsing - Lack of proper monitoring	- ensuring participation of local peoples in SFG and forestry works - local char dwellers should be more involved
Internal infrastructures	-a lots of development in infrastructure - sanitation improved - removed water logging - reduced rate of incidence of water borne diseases	- serious river erosion - lack of awareness - construction of infrastructures not timely -damage of roads due to heavy rainfall	- needs construction of infrastructure on priority basis
Water and sanitation	- availability of water become in reach of households - improvement of water and sanitation system - incidence of water borne diseases reduced	- river erosion - lack of awareness - delays in construction of infrastructures - construction material were not quality as expected - lack of human resources	- availability of DTWs and sanitary latrines in the beginning or inception of project - training needs on the use and safety of sanitary latrines
Land title and khatians	-a ownership of land ensured - fertility of land improved - - distribution of land settlement equitably	- recovery of possession of land from land grabbers	- improvement and administrative control on staffs responsible of land titling

Intervention areas	Achievements	Challenges (not so successful)	Lessons for the future
		- some irregularities during ptps surveys by CDSP IV and MoL staffs	- land titling process need to be shorten
Agricultural development	-a use of HYV verities of crops and vegetables - improvement of soil fertility - bumper production vegetables due to use of 'sorjon' method of cultivation	-a water logging, heavy rainfall and drought - crisis of inputs - limitation of seed preservation	- use of more composted fertilizer
PNGOs activities	-a Implementing project activities through formation of MF groups - improvement of women empowerment - improvement of awareness - increase of family income significantly - improvement of food security at household level through creating livelihood capacity	- religious superstitions - gender imbalance - lack of interests in participation of training activities	-a increase of training and other allowances for the participants - increasing training opportunities for the PNGO staffs - provision of evaluation of works performed by PNGO staff members

Impacts of CDSP IV:

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
Household income (sources, amounts)	-a opportunities created for sources of household incomes - increased household income - reduced unemployment in rural coastal char areas - increased participation of women in household income	- provided training for income generating activities - both right technologies and timely counselling were available from CDSP IV and its implementing agencies -ensured both inputs and services for health and nutrition of char dwellers	- less alternative sources of income been created
Food security and nutrition	- food security achieved - produced more than the demand of households - ability in taking more nutritious food and more aware than before	- quality and right quantity of seeds made available - knowledge of adoptable technology transferred - quality human resources been mobilized by respective agencies	- lack of availability of food storage facility locally to cope with disastrous situation - need of cold storage felt of great help
Household and productive assets	- ownership of land - owner of agri-implements - owner of rickshaw vans, auto - fish culture in own pond - rearing poultry birds and livestock	- availability of micro-finance without any collaterals - free training on different IGAs	- project beneficiaries fail to protect their assets during disastrous periods
Knowledge and skill of household members	- increased production in homestead and crop - increased knowledge and skills in the areas of legal human rights and gender	- provided training - received inputs for homestead vegetable and agriculture - use of improved technology	- lack of institutional and formal education
Empowerment of the community	- improvement of empowerment of both male and women - established opportunities of raise own rights at all levels - improved status in community and established women empowerment	- ensured participation into training courses and workshops - awareness built against social and religious superstitions - participated into many FLIs (WMG, FF, SFG, TUG, NGO, LCS)	-a lack of assistance direct legal aid supports
Status and welfare of women	- ownership of land equally with male ensuring women in the first place	- conducted many workshops and training	- in some program activities males were not

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
	- increased participation of women into various development activities of CDSP IV - increased importance in decision of women at family level	and orientation for beneficiaries - provided land titling permanently - priority to participation of FLIs	included where they could be involved
Agricultural productivity (crops, vegetables, livestock)	- increased production vegetable round the year - increased number of poultry birds and livestock at household level - improved crop diversification - increased cropping pattern	- implemented orientation, training, demonstration and workshops at different levels - integrated pest management ensured - increased production and use of composed fertilizer including vermin composed -ensured services of poultry and livestock vaccination	-more resources could be mobilized in demonstrations
Access to markets (selling and buying)	- increased participation of selling and buying goods and series by women - ensure reasonable price for the products marketed by the farmers - stashed value chain and network with distance markets located outside districts	- ensure right training and inputs -developed market and road infrastructures - developed water control and drainage infrastructure	- delayed market development - lack of required types of vehicles for establishing value chain
Others	- established primary education facilities in different cyclone centres ensuing office furniture and desk and benches for the pupils	- establish more multipurpose cyclone centres	-a lack of any educational activities for the char dwellers - lack of coordination between project and govt. health service providers

Group No. 5: Field Staff Members of GoB Implementing Agency

Group members: i) Md. Kamruzzaman, FD, ii) Md. Mazharul Islam, FD, iii) Md. Abul kalam Azad, DAE, iv) Md. Nurul Hoda, DAE, v) Mr. Subir Chakraborty, DAE, vi) Md. Ferdous Alam, LGED, vii) Md. Masud ahmed, MoL, viii) Md. Joynal Abedin, MoL, ix) Md. Jahirul Islam, MoL, x) Md. Humayon Kabir, MoL.

Results of CDSP IV Components and Sub-components:

Intervention areas	Achievements	Challenges (not so successful)	Lessons for the future
Water Management (embankment, drainage, etc.)	- mitigation of natural disaster - development of communication - increase of social forests - improvement in climate change - stopping intrusion of saline water - improvement of water logging - improvement of irrigation for agriculture - increase of water capacity due to excavation of canals - improvement of socio-economic condition	- decrease of agricultural land - households' lost their land - delayed in payment of compensation	-a have to face or work disastrous conditions -very difficult to work to keep equity for all - faster distribution of land title and - ensuring real and timely payment of compensation

Intervention areas	Achievements	Challenges (not so successful)	Lessons for the future
Social Forestry	- possible to contribute in climate change - balance in environmental change, reducing soil degradation, increasing soil fertility, supporting fuel wood consumption	-faced problems during excavating canals and construction of embankment due to non-acquisition of land - lack of timely coordination between LGED and BWDB - resistance for households during raising foreshore plantation - interruption due to natural disaster in raising plantation - getting labours for planation due to low salary/daily wages payment - there have been erosion due to proper compaction in excavation of canal, embankment and roads	-a land needs to be acquired in time - increase of daily wages of labours - proper compaction after construction of canal, embankment and roads - construction of embankment in mangrove forest areas - increase of training for social forestry group 9SFG) members - increase of salary of watcher of forests
Internal infrastructures	- improvement of communication and socio-economic situation due to development of roads and bridges - char dwellers were able to take shelters in cyclone shelters during natural disaster like 'roano' and 'mora' - students are studying in schools established in cyclone shelters - char growers have easy access to markets established by CDSP IV for buying and selling their produces - char dwellers are benefiting benefits of drainage facilities from bridges and culverts	-payment of compensation of land procrastinated	-to ensure timely payment of acquisitioned land - necessity of work with smooth coordination with govt. implementing agencies and local govt. institutions
Water and sanitation	- ensured safe drinking water through DTWs - installed sanitary latrine to every household level	- lack of awareness of char dwellers - lack of economic solvency	- to continue awareness program on necessity of fresh water and benefits of sanitary latrines in the context of coastal chars
Land title and khatians	- char dwellers helped sub-registers in preparations of nutation and khatias - distribution of khatians at field levels by CDSP IV - empowered women through inclusion women in the khatians that ensured 50% ownerships - preparation of khatians digitally - most of the land titling jobs done at field level	- due to river erosion land titles could be done in some areas -there have been some problems like fish project in preparation of khatians	- if land survey is done then khtians can be prepared more accurately and distributed timely - sufficient budget need to allocated for union land offices
Agricultural development	- production of different crops increased due to introduction of HYVs - increased cultivable land - food security status improved	- still there are water logging in some areas - production of crops was less due to heavy and prolonged rainfall - salinity increased in some areas of Char	- to increase more training for the farmers - mechanization of irrigation through use of agricultural implements like

Intervention areas	Achievements	Challenges (not so successful)	Lessons for the future
	- improved economic conditions - increased revenue income for the govt. - farmers have more access to market for buying and selling their products	Nangulia and Noler Char due to intrusion of saline water as a result of DS-II loss - lack of sufficient irrigation facility	tractors, water pumps, shallow tube wells - introduction of more saline tolerant varieties
PNGOs activities	- increased awareness in family health - benefited by IGA trainings for group members on homestead vegetables and non –farm tailoring - more aware in legal and human rights - site selection for DTW installation - installation of sanitary latrines - generation of group savings and mobilization of micro-finance for IGAs	- demand from households a tube well for each - lack of willingness in putting super structure	- Need more training on use of sanitary r and its benefits - provision of super structure in future

Impacts of CDSP IV

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
Household income (sources, amounts)	- Char dwellers prepare takes their meals from their own production - in the past rice production was 30-40 mounds per acre, now they can produce 100-120 mounds per acre - they are producing more robi crops than their need	- provided training on various income generating activities - provided quality seeds of crops and vegetables - ensure micro credit through PNGOs - solved problems of water logging	- CDSP IV could establish high school and colleges - CDSP IV could promote mechanized agriculture system if so their income would be more
Food security and nutrition	- introduced HYV types of crops that contributed more yields - increased use of composed and green manures to have more quality foods - increased production of vegetables and fruits - cropping intensity increased	- provided awareness building to take balanced diet - provided special training on cooking of nutritious food for children and pregnant mothers - arranged and observed international days - supplied improved seeds -developed markets for buying and selling quality vegetables	-a CDSP IV can establish food godown in char areas that would ensure good prices
Household and productive assets	- own homestead and cultivable land - rickshaw van, auto, CNG, trees, solar panels, power tiller, ponds, water pumps - poultry birds and cows and goats - new houses and furniture	-a provided land titles and trainings on different farm and non-farm IGAs	-a lack of high schools and colleges for their children
Knowledge and skill of household members	- increased knowledge and skills for the family members	- members benefited through the quality training given by CDSP IV and PNGOs	- lack of formal higher educational institutes
Empowerment of the community	- increased empowerment of somaj	- FLI members involved in taking care of conflicts of among peoples - early marriages reduced due to active participation of FLI members	- there is lack of coordination of GoB and NGOs at grass root levels

Impacted Areas	Changes in last 6 years	Contribution of CDSP IV	What has not improved
Status and welfare of women	- both empowerment and security of women increased	- women now understand family law proclaimed by the Government - Equality has been established in getting land titling/khatians for women	- still multi-marriage and early marriage could not stopped - Family Planning program needs more attention
Agricultural productivity (crops, vegetables, livestock)	- increased productivity for crops and vegetables achieved - increased poultry and livestock - plantation program for trees and fruit trees in homestead well recognized	- TA support and inputs could not possible due lack of both TA staff and financial resources	- farmers forum has been kept only to 90 and there has been no increase - no increase in agri-inputs though there has been lot of demands. - No. increase in dealership
Access to markets (selling and buying)	- ensure market access for buying and selling of farmers' products - legitimate price of farmers' produces ensured	-a developed and improved roads communication - Market development - constructed value chain shed	- could not be able to remove syndicate-marketing system - value chain

B. Workshop with management staff of implementing agencies and PNGOs

Held in Noakhali on 21 March 2018. Participants from each agency provided feedback.

Area for discussion and feed back	BWDB	Forest	LGED	DPHE	Ministry of Land	DAE
Relevance						
Additional interventions needed	Bank revetment works	Education, health and family planning Homestead plantation/fruit	River bank protection Education Health centres Cold stores for vegetable More markets & paved road Slab over open drain	Public toilets/community latrine Moblie water treatment Desalination plant Superstructure for hh latrine		Refreshment of support in old CDSP areas
Interventions not needed		Killa plantation	None	Pond sand filter Rainwater harvesting		Distribution of sprayers encouraged pesticide use
New in CDSP IV compared to earlier phases		Better coordination Less complexity	Cluster villages and markets			4-day training Intensive monitoring
Problems						
Problems in implementation	Land acquisition and resettlement – local people can obstruct and cause delays. Survey work delayed as TA surveyor not available.	Availability of site for planting – due to delays in infrastructure works Land tenure Land title litigation	Transport of materials to remote places. Lack of skilled /other labour Delays where works depend on BWDB completion	Irregular flow of fund Site selection for DTW & latrines Collection of hh contribution for DTW Delays in construction works due to not having list of hh	PTPS assistant were influenced by powerful local people Allotted time duration for each step encouraged malfunctions. UNO/AC Land have no financial powers – so lengthy approval process	Transport of inputs to remote locations – no vehicle provided No DAE training hall – hiring halls caused delays
Unforeseen problems	River erosion	River erosion and natural disasters	River erosion	Local leaders want more water points	Land disputes and law & order related to these disputes	
Results						
Important results	Embankment, sluice, khal excavated, WMG centres	Plantations for CC mitigation Poverty reduced via SFG	Connectivity improved Economic and social development	Good water & sanitation for every hh = better health Only project in Bangladesh to achieve 100% sanitation coverage	Land settlement/titling Perfect social community Economic growth via business	New crops and MV Increased yield and income
Results that did not happen	No control of erosion		None	Did not meet govt target of one water point / 500 person	Sometimes non-landless people got land title as PTPS based on possession.	Improved literacy

Area for discussion and feed back	BWDB	Forest	LGED	DPHE	Ministry of Land	DAE
Sustainability	If embankments and sluices are sustained	Yes	Yes	Yes – but need DTW maintenance and cater for increasing population	Yes	Yes
Management						
Support from TA team	TA gave support in every way. Mostly this was adequate.	No problems	Planning, design, supervision, billing etc.	Got full cooperation from TA team.	Accelerated progress Good documentation Skilled manpower	Was sufficient, funds released on time
What could have been done better by TA team	More IA coordination, more communication & workshop Need to spread success to CDSP at senior levels		Provide an expert for each IA	Need more help in financial management Needed more manpower	Payments were always delayed, became corrupted	
Lessons						
Success factors	Proper planning and implementation	Good coordination amongst IA is key to success Less complexity Adequate support from TA	Integration of six agencies Project Coordinating Director PMC meet every month	Project design Coordination, monitoring and cooperation from TA Evaluation by donors & GoG	Strong monitoring team Authority Professionalism	Timely and good advice from the TA team No interruptions from public leaders
Challenges	River erosion Construction on settled land	Naturals disasters and river erosion	Remote area Short working season	Audits and financial reports Change of financial report format and intervals	Strong legal authority of TA team was not enough.	No DAE training centre No transport for inputs
To be done differently in future	River bank revetment works	Update rate schedule regularly. Follow-up SFG training for 3 years.	Cyclone shelter design - with access ramp etc. More cluster villages Weather forecast centre Fresh water reservoir	Include the old CDSP areas as population is increasing	Greater involvement of government officials like AC Land and UNO in PTPS. Post-project monitoring by land officials Financial allotment for upazila Allotment not based on possession but on list of landless people from UNO.	Supply power tiller to farmer groups Organic fertilisers to reduce salinity Fresh water reservoir for irrigation Homestead fruit for nutrition

	SSUS (PNGO)	BRAC (PNGO)	DUS (PNGO)	SDI (PNGO)	Mohammadpur UP	Dept of Fisheries
Relevance						
Additional interventions needed	Education, Food security & nutrition Clinic, health camp with doctor	Pre-primary and primary education Immunization services Health services – doctors, Market linkages Breed improvement poultry and livestock	Health Education	Inputs for disaster volunteers Pipes made of asbestos replacing cemented ones would better for improved cooking system	Big ponds to conserve fresh water Depts of health and education	Department of Fisheries
Interventions not needed	Rainwater harvesting – considering its cost	Physical infrastructure if this is then lost to erosion			None	None
New in CDSP IV compared to earlier phases	Livestock Fisheries Vermicompost	Women's participation in every sector Vermicompost Long term family planning methods Food preparation and cooking Nutrition / stunting of babies Sorjon vegetable-fish system		All NGOs worked with equal status, in CDSP III BRAC was lead NGO used to maintain with EKN. NGOs service delivery more effective especially IGA training with TA support		
Problems						
Problems in implementation	Lack of coordination between WMG and NGO activities Delays in receipt of monthly funds -	Insufficient budget Monthly allocation of funds Low salary structure and lack of staff facilities / benefits Insufficient budget for group member insurance. Delays in land settlement High out-migration No legal support services BRAC excluded from planning and resource allocation process. Vaccine supply problems Delayed start of fishery and livestock support – lack of communication with DLS	Water logging Salinity	Difficulty in finding office space and accommodation for staff High rate of staff drop out due to coastal char areas Delay in allocation of operational fund Repeated appointment of staff Change of schedule of activity	People engaged in the PTPS and local land offices were taking bribes from landless people Delays in land settlement. Land officials stayed in their offices.	Supply of fish fingerlings Natural calamities Lack of training halls DoF has a vehicle problem
Unforeseen problems	Army taking land on Caring char River erosion took NGO office Waterlogging on Noler char due to embankment until khals were cleared	River erosion Natural calamity Political unrest Poor project follow-up mechanism	River erosion	In the beginning there was presence of 'bahinis' or miscreants and land grabbers		
Results						
Important results	Increased family income	Increased household income opportunities		Land settlement	LGED – cyclone shelter, bridge, road etc.	Introduction of new technology

	SSUS (PNGO)	BRAC (PNGO)	DUS (PNGO)	SDI (PNGO)	Mohammadpur UP	Dept of Fisheries
	Improved health Increased awareness, skill and knowledge	Decreased family size, lower birth rate Increase agricultural production Reduced salinity = increased fertility Land ownership Increase access to safe water and sanitation Women's economic empowerment and income Reduced violence against women and children Reduced religious superstition		Constructed hew houses, ponds Production of crops and vegetables Increased HH incomes Social forestry plantations Introduction of saline tolerant varieties Value chain development Availability of livelihood items locally Production of crops and vegetables Ensured food security for char dwellers We have opened several branches . We distribute MF and at present we have Tk. 700,000 as outstanding We were able cover 100% services. Repayment rate is 100%.	BWDB – embankment and sluice DPHE – toilet and tubewell MoL – land settlement	Increased fish production in Bangladesh
Results that did not happen		Mortality of poultry reduced but still occurs Traditional fish culture now replaced by modern technology			Land settlement staff were not sincere	
Sustainability	Yes – apart from health programme	Yes – except heath and FP	Yes-except health and FP	Yes, all activity will sustain except health program	Yes	
Management						
Support from TA team	Feedback from field visits and coordination meetings	Technical support Management skill development Monitoring and supervision including management guidelines	Excellent and quality technical services by TA Team	TA team supported nicely with timely advice.		
What could have been done better by TA team	Could have increased coordination between NGO, TA and IA Not everybody provide the same and correct information Should include people who have worked for NGOs in TA team.	No joint planning NGO working areas were not distributed properly. Financial support was not distributed properly – there was unspent money at the end. Lack of specialised technical knowledge Team spirit and fair judgement	Nutrition and medical support Provision of graduate doctors with existing medical assistants			
Lessons						

	SSUS (PNGO)	BRAC (PNGO)	DUS (PNGO)	SDI (PNGO)	Mohammadpur UP	Dept of Fisheries
Success factors	Involvement of NGOs Land titling Participatory approach	Involvement of experienced NGOs Stopping saline water in cultivable land Land titles Communications system Skill development through training Close supervision and monitoring Commitment of project staff and agencies Active community participation Risk mitigation skills Quick decisions in emergency	NGOs' motivational programs, micro-credit for women only contributes to empowering women IGA training by NGOs Good relation with all GoB agencies Human dignity	Six GoB agencies and four PNGOs worked together very cordially. This is exceptional in Bangladesh. Govt. of the Netherlands providing grant fund for CDSP since 1994. IFAD supported loan fund in CDSP IV. All donors have strongly monitored all activities of CDSP IV through supervision support missions that worked well. Formation of new chars is a continual process. Due to support of donors we are getting new land and bigger Bangladesh All activities were free from VAT/Tax. So, account section has no external pressure.	Support of landless people and local leaders in project activities Sincerity of TA team All government department served well – except MoL	Timely and proper advice from the TA team
Challenges	Difficult communications in the char area River erosion Law and order Salinity Low prices of farm products Disasters & climate change	Natural calamities Insufficient staff facilities River erosion Delays in land titling.	Stopping river erosion	The rule of the Bahini regime was a great challenge that CDSP IV overcame nicely. CDSP IV nicely built all water control and road infrastructures very nicely but, due to serious erosion we lost DS II sluice and many homesteads. Control of river erosion is a great challenge.	Owing to political pressures the quality of work is deteriorating.	No transport to take inputs to farmers
To be done differently in future	Quarterly rather than monthly fund release Training allowances need to be higher	Include a programme for disabled people Village Organisation as a service delivery point Youth skill training for employment Explore cost recovery Increase people's participation and ownership Handover to government agencies		Coastal chars are saline zone. CDSP IV could built several large water lakes which could be used as water reservoir.	Need more DTW and latrines More bridges over khal Resist political pressures	Include old CDSP areas Supply fish fry to farmers

Appendix-10: Erosion of land in CDSP IV chars

This appendix aims to provide some additional information on the extent of erosion. It has primarily been extracted from Progress Report 14.

In December 2013 the Institute of Water Modelling (IWM) completed their Assessment of Erosion Vulnerability of the East Bank of Meghna River; the study recommended a relocation of sluice DS-3, which was done accordingly. The study also gave an indication of the stability and rate of erosion of the coast from Jarirdona River in the north along Boyer Char and Noler Char up to Caring Char in the south.

As a follow up to the erosion study, and in line with discussions and advice of the 2014 Supervision Mission, TA Project Engineers have installed benchmarks along the coast line of the project for regular monitoring of the erosion. The latest measurement was taken in early December 2017 and it was found that present erosion is still alarming from the location of Chatla khal sluice at Boyer Char to the North-east of drainage sluice DS-2 through Noler Char and Caring Char. In the meantime, sluice DS-2 is engulfed. Two thirds of Caring Char is already eroded. However, the erosion rate at sluice Gabtali in Boyer Char has reduced significantly.

Average erosion at **Boyer Char** (CDSP III) during the last seven months was found to be about 10 m with maximum 13 m near Chatla sluice at the south part of the polder, and at Gabtoli sluice erosion during last seven months was 10 m at the North side and 6m at the South side where average erosion per year is 22 m.

Average **Noler Char** erosion during the last seven months was found to be about 107m. Erosion at Musapur Mosque, close to proposed sluice DS-3 was 107m. Present setback distance of DS-3 from west bank is 685m and from D/S diversion khal outfall is 573m which was more than 1000m when shifted in early 2015. The Forest Department (FD) has already completed foreshore plantation close to sluice DS-3 and at the mouth of the Hatiya River.

At **Caring Char:** Since measurement started in September 2014, up to late May 2017 total erosion at sluice DS-1 is 1,042m; in the last seven months, it was 275m. At the southern part near Bathankhali ghat it is 1,320 m in total and 126m during the last seven months. At the eastern side near Gour Nitai Mondir road it is 2,388m in total. The Forest Department completed foreshore plantation on the river side of DS-1 enclosing 15 ha. The envisaged construction sites of cyclone shelters in the southern part of Caring Char have been relocated further away from the coastline, but because of the severe recent erosion two cyclone shelters at Bathankhali Bazar, Dhanshiri Samaj became vulnerable and Gour Nitai Mondir is already engulfed. However, the decision was taken to stop construction work but not to go for auction immediately as more than 90% of work is completed and local people can get refuge during cyclones for some time at least.

In an unexpected development, from monsoon July/August 2014 onwards at **Char Nangulia**, at the coastal stretch from sluice DS-2 to Bashar Bazar, more than 11 km length of foreshore plantation and embankment have been immersed in the Hatya/ Sandwip Channel. The most likely cause of this severe erosion is the formation of a new char in the Hatya/ Sandwip Channel in front of this location, diverting the river flow towards the bank. A revised alignment for construction of a retired embankment was adopted for the eroded part of the embankment. Further development of the erosion is closely monitored by the project. Since measurement started in September 2014, up to December 2017 the average erosion was 923m, with a maximum of 1,208m in total at Sluice DS-2, which was engulfed by the river in August 2016. Average erosion in the last seven months was 49 m.

Appendix-11: Data from impact survey at project completion

Data was collected for a final impact survey in late 2017 and early 2018. It uses the same panel sample as the 2011 baseline survey and aims to measure changes in livelihoods and living standards since 2011. The sample of 1004 households was spread over the five CDSP IV chars in proportion to the estimated 2017 population of each char. This allowed some attrition of the sample since 2011 – the baseline survey sample sample was1400 households, divided between the chars based on the 2009 population estimate.

Some analysis has been done of this data in order to complete this draft PCR. It is hoped to complete a full report of this survey by mid-2018.

Table 1: Sample size

	Char	**households**
1	Ziauddin	100
2	Nangulia	518
3	Noler	219
4	Caring	77
5	Urir	90
	total	1004

Table 2: Membership of FLI

	Ziauddin	Nangulia	Noler	Caring	Urir	Total
At present time						
WMG	17%	14%	7%	6%	0%	11%
FF	24%	18%	13%	27%	19%	18%
SFG	37%	18%	32%	42%	0%	23%
NGO group	85%	74%	77%	83%	48%	74%
TUG	76%	70%	81%	56%	28%	68%
LCS	1%	1%	0%	0%	0%	0%
At some time						
WMG	17%	15%	8%	6%	0%	12%
FF	25%	21%	14%	26%	20%	20%
SFG	37%	18%	32%	42%	0%	23%
NGO group	95%	89%	89%	92%	76%	89%
TUG	79%	71%	81%	60%	29%	70%
LCS	3%	1%	0%	0%	1%	1%

Table 3: Female headed households

	impact	baseline
Ziauddin	1.0%	4.0%
Nangulia	5.0%	3.8%
Noler	3.2%	5.0%
Caring	0.0%	2.7%
Urir	11.1%	11.1%
Total	4.4%	4.3%

Table 4: Occupation of household head

	Ziauddin	Nangulia	Noler	Caring	Urir	Total
Primary						
Agric/crop farming	35%	39%	24%	44%	34%	35%
Livestock/poultry	0%	0%	0%	0%	1%	0%
Day labour	26%	27%	37%	32%	18%	29%
Salaried job	7%	5%	6%	4%	6%	6%
Fish/PL catch/dry	4%	2%	5%	1%	2%	3%
Small trade	13%	15%	13%	12%	19%	15%
Rickshaw / boat	5%	2%	4%	1%	3%	3%
Driver	2%	3%	2%	4%	0%	3%
Handicraft	0%	0%	0%	0%	0%	0%
Housekeeping	1%	3%	2%	0%	10%	3%
Tailoring	0%	0%	0%	0%	1%	0%
Other	6%	3%	5%	1%	6%	4%
Secondary						
Agric/crop farming	54%	60%	69%	62%	57%	61%
Livestock/poultry	3%	5%	5%	0%	15%	5%
Day labour	31%	30%	17%	28%	24%	26%
Salaried job	0%	1%	1%	2%	0%	1%
Fish/PL catch/dry	3%	2%	1%	0%	0%	1%
Small trade	6%	1%	2%	7%	1%	2%
Rickshaw / boat	3%	0%	1%	0%	0%	1%
Driver	1%	1%	1%	0%	1%	1%
Handicraft	0%	0%	0%	0%	1%	0%
Housekeeping	0%	1%	1%	0%	0%	0%
Tailoring	0%	0%	0%	0%	0%	0%
Other	0%	1%	2%	2%	0%	1%

Percentage of all sample hh reporting the occupation

Table 4: Occupation of spouse of household head

	Ziauddin	Nangulia	Noler	Caring	Urir	Total
Spouse						
primary						
Agric/crop farming	0%	0%	0%	0%	0%	0%
Livestock	0%	2%	2%	0%	0%	1%
Day labour	0%	0%	0%	0%	1%	0%
Salaried job	0%	1%	1%	0%	1%	1%
Fish/PL catch/dry	1%	0%	0%	0%	1%	0%
Small trade	0%	0%	0%	0%	2%	0%
Rickshaw / boat	0%	0%	0%	0%	0%	0%
Driver	0%	0%	0%	0%	0%	0%
Handicraft	2%	0%	0%	0%	0%	0%
Housekeeping	97%	97%	95%	100%	94%	97%
Tailoring	0%	0%	0%	0%	0%	0%
Other	0%	0%	1%	0%	0%	0%
secondary						
Agric/crop farming	0%	0%	0%	0%	4%	1%
Livestock	91%	96%	93%	100%	95%	95%
Day labour	0%	0%	0%	0%	0%	0%
Salaried job	0%	0%	0%	0%	0%	0%
Fish/PL catch/dry	0%	1%	2%	0%	0%	1%
Small trade	0%	0%	0%	0%	0%	0%
Rickshaw / boat	0%	0%	0%	0%	0%	0%
Driver	0%	0%	0%	0%	0%	0%
Handicraft	4%	0%	1%	0%	1%	1%
Housekeeping	2%	2%	3%	0%	0%	2%
Tailoring	2%	0%	0%	0%	0%	0%
Other	0%	0%	0%	0%	0%	0%

Percentage of all sample hh reporting the occupation

Table 5: Household composition

		Number of	Percentage of household members			
		persons	Earning	Elderly/disabled	In education	Other
Ziauddin	Men 16+	1.84	85%	3%	4%	8%
	Women 16+	1.6	61%	2%	0%	37%
	Child 5-16	2.19	1%	0%	85%	14%
	Child under 5	0.76	0%	0%	3%	97%
	Total member	6.39	40%	1%	31%	27%
Nangulia	Men 16+	1.83	90%	3%	3%	5%
	Women 16+	1.62	69%	4%	1%	26%
	Child 5-16	1.98	1%	0%	88%	11%
	Child under 5	0.77	0%	0%	3%	97%
	Total member	6.20	45%	2%	30%	24%
Noler	Men 16+	1.99	91%	6%	1%	3%
	Women 16+	1.78	70%	8%	0%	22%
	Child 5-16	1.95	0%	0%	91%	8%
	Child under 5	0.86	0%	0%	2%	98%
	Total member	6.58	46%	4%	28%	22%
Caring	Men 16+	2.06	96%	1%	1%	3%
	Women 16+	1.91	69%	4%	0%	27%
	Child 5-16	1.84	0%	1%	87%	12%
	Child under 5	0.94	0%	0%	3%	97%
	Total member	6.75	49%	2%	24%	25%
Urir	Men 16+	2.17	93%	4%	3%	1%
	Women 16+	1.81	61%	6%	1%	33%
	Child 5-16	2.09	0%	0%	100%	0%
	Child under 5	0.74	0%	0%	0%	100%
	Total member	6.81	46%	3%	32%	20%
Total	Men 16+	1.91	90%	3%	2%	4%
	Women 16+	1.69	68%	5%	1%	27%
	Child 5-16	2.00	1%	0%	90%	10%
	Child under 5	0.80	0%	0%	2%	98%
	Total member	6.40	45%	2%	29%	24%

Table 6: Acquisition and occupation of land

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Acquired by	Khatian settlement	50%	50%	92%	87%	37%	61%
	Inherited	3%	1%	2%	1%	2%	2%
Percent of	Purchased	7%	5%	7%	5%	3%	5%
households	Occupy informally	48%	50%	8%	14%	80%	41%
	Lease in	19%	28%	23%	31%	31%	27%
	Lease out	22%	8%	14%	6%	3%	10%
	n - sample size	100	516	219	77	90	1002
	Total land occupied	147	174	151	198	517	199
Acquired by	Khatian settlement	57	65	112	123	79	80
	Inherited	1	1	1	0	2	1
Average area	Purchased	3	5	5	2	2	4
per hh	Occupy informally	59	69	7	17	337	74
(decimals)	Lease in	28	35	26	56	98	39
	sub-total	147	174	151	198	517	199
	lease out	19	7	10	8	6	9
	net area operated	128	167	140	190	511	190
	Khatian settlement	39%	37%	74%	62%	15%	40%
Percent of	Inherited	0%	0%	0%	0%	0%	0%
area	Purchased	2%	3%	3%	1%	0%	2%
occupied	Occupy informally	40%	40%	5%	9%	65%	37%
	Lease in	19%	20%	17%	28%	19%	20%
	sub-total	100%	100%	100%	100%	100%	100%
	lease out	13%	4%	7%	4%	1%	4%
	net area operated	87%	96%	93%	96%	99%	96%

T**able 7: Area of land occupied** (percentage of households)

	Ziauddin	Nangulia	Noler	Caring	Urir	Total
Decimals						
0	0%	0%	0%	0%	0%	0%
1 to 49	10%	5%	8%	8%	1%	6%
50 to 99	18%	11%	16%	9%	1%	12%
100 to 149	25%	16%	26%	12%	6%	18%
150 to 249	36%	51%	39%	42%	21%	44%
over 250	11%	16%	12%	30%	71%	21%
total	100%	100%	100%	100%	100%	100%

Table 8: Land use

		Ziauddin	Nangulia	Noler	Caring	Urir	total
% of HH	homestead	100%	100%	100%	100%	100%	100%
	pond	99%	99%	99%	99%	98%	99%
	cultivated	74%	89%	82%	90%	87%	86%
	fallow	6%	5%	7%	8%	7%	6%
decimal per hh	homestead	29.00	31.41	28.46	23.17	50.16	31.57
	pond	22.15	27.42	24.37	22.39	90.97	31.54
	cultivated	76.61	105.66	85.81	141.48	349.58	123.05
	fallow	0.77	2.36	1.66	2.90	20.62	3.73
	total	128.53	166.85	140.30	189.94	511.32	189.89
percent of total area	homestead	23%	19%	20%	12%	10%	17%
	pond	17%	16%	17%	12%	18%	17%
	cultivated	60%	63%	61%	74%	68%	65%
	fallow	1%	1%	1%	2%	4%	2%
	total	100%	100%	100%	100%	100%	100%

Table 9: Housing

		Ziauddin	Nangulia	Noler	Caring	Urir	total
House size	sq.ft	432	416	481	351	546	439
floor*	mud	97.0%	99.2%	98.6%	100.0%	100.0%	99.0%
	brick	1.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	pucca	2.0%	0.8%	1.4%	0.0%	0.0%	0.9%
wall*	Leaf	0.0%	0.6%	0.5%	0.0%	0.0%	0.4%
	Straw	2.0%	2.6%	0.9%	10.8%	2.2%	2.8%
	mud	1.0%	0.4%	0.9%	0.0%	0.0%	0.5%
	bamboo	7.1%	13.9%	9.0%	25.7%	4.5%	12.2%
	tin	89.9%	82.1%	88.6%	63.5%	93.3%	83.9%
	brick	0.0%	0.4%	0.0%	0.0%	0.0%	0.2%
roof*	leaf	0.0%	0.0%	1.4%	0.0%	0.0%	0.3%
	straw	6.0%	16.3%	11.4%	52.6%	10.0%	16.4%
	tin	87.0%	83.1%	85.8%	47.4%	90.0%	82.0%
	pucca	1.0%	0.0%	0.5%	0.0%	0.0%	0.2%
	other	6.0%	0.6%	0.9%	0.0%	0.0%	1.1%
	total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	n	100	515	219	76	90	1,000

'* percentage of sample responses

Table 10: Domestic water

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Water source	shallow TW	3%	1%	2%	3%	38%	5%
	deep hand TW	97%	99%	98%	96%	62%	95%
% of HH	Dug well	0%	0%	0%	0%	0%	0%
	rainwater	0%	0%	0%	0%	0%	0%
	protected pond	0%	0%	0%	0%	0%	0%
	treated water	0%	0%	0%	0%	0%	0%
	untreated pond	0%	0%	0%	1%	0%	0%
	untreated river	0%	0%	0%	0%	0%	0%
	other	0%	0%	0%	0%	0%	0%
ownership	owned by HH	1%	1%	1%	1%	28%	3%
	jointly owned	0%	1%	0%	0%	1%	1%
% of HH	neighbour	3%	1%	0%	1%	8%	2%
	Government	8%	7%	4%	10%	26%	8%
	CDSP	88%	90%	95%	87%	38%	86%
	others(NGO)	0%	1%	0%	0%	0%	0%
distance	dry season	52	59	51	78	67	59
Metres	wet season	61	70	61	87	72	68

Table 11: Sanitation

	Ziauddin	Nangulia	Noler	Caring	Urir	total
Latrine type						
No latrine	0%	0%	0%	0%	0%	0%
Hanging / open	0%	1%	0%	1%	2%	1%
Ring slab (not hygienic)	1%	1%	1%	0%	0%	1%
Ring slab (water sealed)	99%	96%	94%	99%	98%	96%
Sanitary latrine	0%	2%	4%	0%	0%	2%
Latrine source						
Purchased in market	2%	4%	6%	3%	39%	8%
Buy through NGO /other	0%	0%	0%	0%	0%	0%
Donated by NGO / other	0%	0%	0%	0%	0%	0%
From CDSP	98%	95%	94%	97%	61%	92%

Percentage of households reporting

Table 12: Health and hygiene

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Wash before meal	Yes	99%	100%	100%	99%	100%	100%
	with only water	50%	21%	23%	39%	8%	25%
	with soap	50%	79%	77%	61%	92%	75%
	with ash	0%	0%	0%	0%	0%	0%
Wash after latrine	yes	99%	100%	100%	100%	100%	100%
	with only water	6%	4%	4%	19%	1%	5%
	with soap	76%	90%	87%	77%	98%	88%
	with ash	18%	5%	9%	4%	1%	7%
Children vaccinated	yes	100%	97%	100%	100%	100%	99%
Vaccinated at:	Upazila/Union health centre	2%	0%	0%	0%	1%	0%
	Special govt. programme	98%	100%	100%	100%	99%	100%
Health visitors	visit household	97%	98%	99%	100%	100%	99%
Family planning	used by eligible couples	100%	100%	100%	100%	98%	100%

Table 13: Percentage of households owning assets

Type of asset	Ziauddin	Nangulia	Noler	Caring	Urir	total
Cot/ *Khaat*	100%	100%	100%	100%	100%	100%
Almira	33%	27%	30%	16%	29%	28%
Showcase	35%	27%	26%	16%	52%	29%
Chair/table	91%	82%	88%	71%	91%	84%
Shinduk (wood/tin box/trunk)	64%	55%	74%	73%	59%	62%
Alna	23%	20%	17%	17%	63%	23%
Ceiling/Table Fan	10%	10%	11%	13%	24%	12%
Radio/Cassette Player	0%	1%	0%	0%	0%	0%
B&W TV	0%	0%	0%	0%	0%	0%
Color TV	2%	1%	1%	1%	1%	1%
Mobile Phone	97%	96%	97%	95%	100%	97%
Sewing machine	11%	6%	9%	9%	10%	8%
Ornaments	97%	94%	94%	91%	99%	94%
Bicycle	30%	20%	14%	4%	47%	21%
Rickshaw/Van	3%	1%	1%	1%	0%	1%
Motor cycle	8%	4%	4%	10%	9%	5%
Auto rickshaw battery operated	3%	0%	1%	0%	0%	1%
Sprayer	16%	34%	18%	31%	16%	27%
Laptop	0%	1%	0%	0%	0%	0%
Bullock cart	0%	0%	0%	0%	0%	0%
Solar	81%	66%	72%	51%	72%	68%
Shop with land ownership	16%	8%	12%	13%	13%	10%
Tractor for cultivation	4%	2%	2%	3%	3%	2%
Boat	0%	0%	1%	1%	0%	1%
Mechanized boat	2%	1%	2%	0%	1%	1%
Thresher	2%	2%	5%	12%	2%	3%
Water pump	6%	10%	2%	3%	7%	7%
Fishing net	59%	70%	74%	77%	97%	73%
Fruit/timber trees	99%	99%	97%	99%	100%	99%
Cow	61%	80%	73%	75%	90%	77%
Buffalos	1%	0%	1%	0%	18%	2%
Goat	17%	27%	27%	35%	34%	28%
Sheep	0%	0%	0%	1%	23%	2%
Chicken	96%	97%	99%	95%	100%	98%
Duck / goose	91%	94%	94%	90%	100%	94%
Pigeon	17%	13%	7%	13%	18%	13%
Rice husking machine	2%	1%	0%	1%	1%	1%
Trolley motorized	0%	0%	0%	0%	2%	0%
CNG Auto	0%	0%	0%	0%	0%	0%
Others	2%	6%	0%	0%	36%	6%

Table 14: Value of assets per household Tk'000

	Ziauddin	Nangulia	Noler	Caring	Urir	total
Cot/ *Khaat*	4.80	4.08	4.51	3.52	5.32	4.31
Almira	1.17	0.83	0.87	0.49	1.30	0.89
Showcase	1.90	1.23	1.54	0.68	3.46	1.52
Chair/table	1.96	1.43	1.67	1.43	2.05	1.59
Shinduk (Wooden box/Trunk-Tin)	2.67	2.10	3.41	3.12	2.14	2.52
Alna	0.22	0.15	0.14	0.14	0.42	0.18
Ceiling/Table Fan	0.08	0.06	0.10	0.12	0.14	0.08
Radio/Cassette Player		0.02				0.01
B&W TV		0.01				0.00
Color TV	0.08	0.06	0.03	0.08	0.09	0.06
Mobile Phone	2.89	2.71	2.84	2.90	3.06	2.80
Sewing machine	0.54	0.53	0.52	0.86	0.72	0.57
Ornaments	17.98	17.09	19.75	15.92	25.05	18.38
Bicycle	1.39	0.82	1.05	0.22	2.10	0.99
Rickshaw/Van	0.38	0.08	0.08	0.10		0.11
Motor cycle	5.05	2.52	3.20	6.62	6.67	3.61
Auto rickshaw battery operated	1.50	0.21	0.28			0.32
Sprayer	0.18	0.34	0.18	0.29	0.13	0.27
Laptop	-	0.03				0.02
Bullock cart	-	-	0.05			0.01
Solar	14.20	11.11	13.34	8.58	13.80	11.95
Shop with land ownership	33.75	23.04	28.22	12.44	54.00	27.20
Tractor for cultivation	3.00	1.45	1.32	1.95	1.83	1.65
Boat	-	0.07	4.11	0.10	-	0.94
Mechanized boat	1.80	1.45	2.56	-	3.33	1.78
Thresher	0.14	0.11	0.19	0.62	1.11	0.26
Water pump	1.72	3.53	0.71	1.43	1.29	2.37
Fishing net	2.24	1.96	8.06	5.53	3.35	3.71
Fruit/timber trees	95.20	86.78	112.41	54.88	178.41	98.98
Cow	35.78	46.98	43.85	62.79	92.51	50.48
Buffalos	1.00	0.49	7.08	-	77.11	8.81
Goat	1.11	2.18	1.89	2.49	4.41	2.24
Sheep	-	0.04	-	0.06	13.82	1.26
Chicken	2.57	3.08	3.21	2.67	4.60	3.16
Duck / goose	2.55	2.47	2.30	2.16	4.60	2.61
Pigeon	0.41	0.31	0.12	0.42	0.27	0.28
Rice husking machine	1.30	0.38	0.23	0.39	3.11	0.68
Trolley motorized		0.29			3.33	0.45
CNG Auto		1.18	3.65			1.40
Others	3.45	2.23	1.14		14.22	3.02
total	242.99	223.43	274.59	193.03	527.77	261.48

Table 15: Percentage of households growing field crops

	Ziauddin	Nangulia	Noler	Caring	Urir	total
Cereals						
aus	3.0%	0.2%	0.5%	0.0%	0.0%	0.5%
aman	72.0%	62.9%	80.4%	89.6%	85.6%	71.7%
boro	1.0%	34.4%	7.8%	0.0%	1.1%	19.6%
millet	1.0%	0.2%	0.0%	0.0%	0.0%	0.2%
Pulses						
keshari	16.0%	7.7%	3.7%	3.9%	41.1%	10.4%
mung	2.0%	0.6%	0.0%	0.0%	1.1%	0.6%
felon	6.0%	4.8%	1.4%	2.6%	3.3%	3.9%
moshuri	0.0%	0.4%	0.0%	0.0%	5.6%	0.7%
mash kolai	0.0%	0.2%	0.0%	0.0%	0.0%	0.1%
Oilseeds						
soybean	17.0%	0.8%	0.9%	5.2%	0.0%	2.7%
mustard	0.0%	0.2%	1.4%	3.9%	0.0%	0.7%
groundnut	5.0%	0.4%	0.5%	2.6%	0.0%	1.0%
sesame	0.0%	2.3%	4.6%	9.1%	3.3%	3.2%
Spices						
chilli	25.0%	11.6%	20.1%	40.3%	38.9%	19.4%
onion	1.0%	0.0%	0.0%	0.0%	0.0%	0.1%
garlic	1.0%	2.7%	1.4%	10.4%	0.0%	2.6%
coriander	0.0%	0.0%	0.0%	1.3%	0.0%	0.1%
turmeric	1.0%	0.2%	0.0%	0.0%	0.0%	0.2%
Tubers						
Sweet pot	4.0%	2.5%	6.8%	15.6%	4.4%	4.8%
Cassava	1.0%	0.6%	0.9%	0.0%	4.4%	1.0%
Vegetables						
c bean	1.0%	14.9%	3.7%	7.8%	0.0%	9.2%
long bean	1.0%	9.7%	1.4%	1.3%	0.0%	5.5%
other bean	0.0%	0.2%	0.5%	0.0%	0.0%	0.2%
bottle grd	0.0%	0.8%	0.0%	0.0%	0.0%	0.4%
sweet grd	2.0%	1.4%	0.5%	0.0%	0.0%	1.0%
bitter grd	0.0%	2.9%	0.5%	0.0%	0.0%	1.6%
ribbed grd	0.0%	2.7%	0.0%	0.0%	0.0%	1.4%
okra	2.0%	0.4%	0.0%	6.5%	2.2%	1.1%
cucumber	2.0%	9.8%	2.7%	0.0%	0.0%	5.9%
radish	1.0%	0.2%	0.9%	1.3%	0.0%	0.5%
cauliflower	2.0%	0.0%	0.0%	0.0%	0.0%	0.2%
cabbage	1.0%	0.0%	0.0%	0.0%	0.0%	0.1%
spinach	0.0%	0.0%	0.0%	1.3%	0.0%	0.1%
lal shak	1.0%	0.2%	0.5%	3.9%	1.1%	0.7%
puishak	1.0%	0.0%	0.0%	1.3%	0.0%	0.2%
tomato	2.0%	0.6%	0.9%	2.6%	7.8%	1.6%
brinjal	2.0%	0.4%	1.4%	3.9%	5.6%	1.5%

	Ziauddin	Nangulia	Noler	Caring	Urir	total
Cereals						
Melons						
Water m.	0.0%	0.2%	0.0%	3.9%	0.0%	0.4%
Musk m.	0.0%	0.0%	0.0%	1.3%	0.0%	0.1%
Other	0.0%	0.4%	0.0%	0.0%	0.0%	0.2%

Table 16: Area of field crops Percentage of cultivatable land

	Ziauddin	Nangulia	Noler	Caring	Urir	total
Cereals						
aus	3.6%	0.1%	0.6%	0.0%	0.0%	0.4%
aman	99.3%	72.4%	97.5%	98.7%	100.0%	87.2%
boro	0.5%	33.6%	8.2%	0.0%	0.3%	16.3%
maize	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
millet	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
total	103.7%	106.2%	106.2%	98.7%	100.3%	103.9%
Pulses						
keshari	14.8%	7.2%	2.5%	1.7%	25.7%	11.2%
mung	1.4%	0.4%	0.0%	0.0%	0.3%	0.3%
felon	1.7%	1.5%	0.4%	0.5%	0.6%	1.0%
moshuri	0.0%	0.1%	0.0%	0.0%	1.0%	0.3%
mash kolai	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
total	17.9%	9.1%	2.9%	2.2%	27.5%	12.8%
Oilseeds						
soybean	14.7%	0.3%	0.2%	3.0%	0.0%	1.3%
mustard	0.0%	0.1%	1.6%	2.2%	0.0%	0.5%
groundnut	2.3%	0.1%	0.1%	0.6%	0.0%	0.3%
sesame	0.0%	2.0%	3.9%	7.7%	1.2%	2.5%
total	17.1%	2.5%	5.8%	13.5%	1.2%	4.6%
Spices						
chilli	4.8%	1.7%	3.0%	4.4%	2.1%	2.4%
onion	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
garlic	0.0%	0.4%	0.1%	0.3%	0.0%	0.2%
coriander	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
turmeric	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
total	4.9%	2.1%	3.0%	4.7%	2.1%	2.6%
Roots & tuber						
Sweet pot	0.7%	0.2%	0.8%	1.0%	0.1%	0.4%
Cassasa	0.1%	0.1%	0.1%	0.0%	0.0%	0.1%
total	0.7%	0.3%	0.9%	1.0%	0.2%	0.4%
Vegetables						
c bean	0.4%	4.7%	1.4%	0.3%	0.0%	2.3%
long bean	0.4%	2.0%	0.2%	0.0%	0.0%	0.9%
other bean	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
ridge gourd	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

	Ziauddin	Nangulia	Noler	Caring	Urir	total
bottle grd	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
sweet grd	0.4%	0.1%	0.0%	0.0%	0.0%	0.1%
bitter grd	0.0%	0.5%	0.1%	0.0%	0.0%	0.2%
ribbed grd	0.0%	0.4%	0.0%	0.0%	0.0%	0.2%
sponge grd	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
okra	0.2%	0.0%	0.0%	0.3%	0.1%	0.1%
cucumber	0.5%	3.6%	1.1%	0.0%	0.0%	1.8%
radish	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%
carrot	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
cauliflower	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%
cabbage	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
spinach	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
lal shak	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
puishak	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
tomato	0.1%	0.0%	0.1%	0.1%	0.2%	0.1%
brinjal	0.1%	0.0%	0.2%	0.1%	0.1%	0.1%
total	2.9%	11.4%	3.1%	1.1%	0.3%	5.9%
Water m.	0.0%	0.1%	0.0%	1.3%	0.0%	0.2%
Musk m.	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
total	0.0%	0.1%	0.0%	1.3%	0.0%	0.2%
Other	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%
Total	147.2%	131.9%	121.9%	122.5%	131.6%	130.4%

Table 17: Percentage of households growing homestead vegetables

	Ziauddin	Nangulia	Noler	Caring	Urir	total
Spices						
chilli	18%	16%	21%	14%	19%	18%
onion	0%	1%	1%	0%	0%	0%
garlic	7%	4%	11%	8%	3%	6%
coriander	24%	15%	14%	12%	9%	15%
turmeric	28%	17%	18%	8%	41%	20%
Roots & tuber	0%	0%	0%	0%	0%	0%
Sweet pot	6%	3%	4%	4%	6%	4%
Cassasa	2%	2%	1%	3%	2%	2%
Vegetables						
c bean	99%	94%	94%	88%	96%	94%
long bean	86%	86%	86%	75%	89%	85%
other bean	1%	2%	2%	4%	1%	2%
ridge gourd	11%	6%	5%	6%	7%	7%
bottle grd	54%	50%	52%	42%	48%	50%
sweet grd	51%	46%	43%	40%	39%	45%
bitter grd	32%	46%	52%	34%	43%	45%
ribbed grd	59%	60%	65%	55%	66%	61%
sponge grd	46%	43%	47%	42%	42%	44%
okra	17%	14%	15%	9%	13%	14%
cucumber	68%	59%	63%	45%	88%	62%
radish	39%	28%	30%	22%	17%	28%
carrot	2%	2%	1%	1%	0%	1%
cauliflower	0%	0%	1%	1%	1%	1%
cabbage	0%	0%	1%	1%	2%	1%
spinach	22%	7%	7%	5%	10%	9%
lal shak	58%	43%	46%	39%	20%	43%
puishak	27%	16%	12%	5%	19%	16%
tomato	59%	52%	62%	39%	43%	53%
brinjal	54%	52%	61%	45%	41%	52%
Melons						
Water m.	1%	0%	0%	1%	0%	0%
Musk m.	0%	0%	0%	0%	0%	0%

Table 18: Paddy production and utilisation

		Ziauddin	Nangulia	Noler	Caring	Urir	Total
Yield tons/ha	aus local	1933					1933
	aus hyv		3529	1482		1235	1509
	aman Razashail	3162	2070	3023	2005	3141	2825
	Aman HYV	3377	3819	3592	3437	4325	3739
	Aman other LV		3125				3125
	Boro	4940	5804	4689		6916	5731
	All paddy	3332	4243	3627	3089	3470	3804
Production mds/hh	producers	36.3	55.9	40.5	49.5	136.9	57.9
	all households	27.0	47.9	33.9	44.0	119.6	48.9
Production 5 yrs ago	producers	22.6	26.6	29.3	28.5	105.7	34.3
	all households	16.3	22.8	24.1	26.6	91.6	28.9
Increase	producers	61%	110%	38%	74%	29%	69%
	all households	66%	110%	40%	65%	31%	69%
HH reporting change	increase	95.8%	97.7%	94.4%	91.7%	66.7%	93.5%
of those reporting	same	1.4%	2.0%	2.8%	6.9%	33.3%	5.4%
	decrease	2.8%	0.2%	2.8%	1.4%	0.0%	1.1%
for all household	increase	69%	84%	78%	86%	58%	79%
Average net increase	hh reporting	80%	164%	104%	101%	37%	127%
Home consumption	% of all h'holds	74%	87%	83%	94%	88%	86%
	Mds per hh	26.5	32.9	32.1	36.6	43.9	33.5
	Mds per hh (all)	19.6	28.7	26.7	34.2	38.6	28.7
Paddy sales	% of all h'holds	20%	53%	26%	44%	70%	44%
	Mds per hh	34.9	37.7	28.2	24.3	113.7	46.0
	Mds per hh (all)	7.0	19.8	7.3	10.7	79.6	20.5
Share of production	consumed	73%	59%	78%	76%	32%	58%
	Kept for seed	1%	0%	1%	0%	1%	1%
	sold	26%	41%	21%	24%	66%	41%
	total	100%	100%	100%	100%	100%	100%
Income Tk/maund		799	781	893	698	780	793

Data on yields for different types of paddy on individual chars may not be reliable due to small size of sub-samples. The small number of aus growers means this data is of little value. Razashail is a popular local variety of aman.

Mds = maunds = 40 kg

Table 19: Non-rice field crops

	Number growers	% of total h'hold	area per grower(dec)	% growers selling	Sales Tk/hh	Sale Tk/grower	production % sold
Ziauddin							
Wheat, maize, millet	2	2.0%	20.0	50%	10	500	35%
Pulses	20	20.0%	68.7	95%	1502	7508	60%
Oilseeds	21	21.0%	66.5	100%	1973	9395	89%
Root crops	4	4.0%	13.0	50%	46	1150	15%
Spices	24	24.0%	15.3	63%	518	2158	27%
Field vegetables	8	8.0%	28.4	100%	2565	32063	68%
Nangulia							
Wheat, maize, millet	7	1.4%	35.4	57%	28	2036	41%
Pulses	59	11.4%	82.5	93%	760	6675	65%
Oilseeds	16	3.1%	84.3	94%	198	6416	86%
Root crops	15	2.9%	11.3	80%	226	7820	47%
Spices	69	13.3%	22.2	80%	1300	9761	46%
Field vegetables	76	14.7%	54.7	100%	8464	57691	75%
Noler							
Wheat, maize, millet	0						
Pulses	10	4.6%	44.4	100%	190	4160	63%
Oilseeds	13	5.9%	80.7	100%	192	3238	77%
Root crops	17	7.8%	10.6	94%	765	9853	54%
Spices	47	21.5%	15.9	85%	1187	5530	48%
Field vegetables	8	3.7%	24.3	113%	507	13875	61%
Caring							
Wheat, maize, millet	0						
Pulses	5	6.5%	48.0	100%	260	4000	68%
Oilseeds	15	19.5%	98.3	100%	556	2853	91%
Root crops	12	15.6%	9.8	67%	458	2938	39%
Spices	31	40.3%	16.3	100%	1679	4169	58%
Field vegetables	13	16.9%	23.2	100%	1903	11269	68%
Urir							
Wheat, maize, millet	1	1.1%	150.0	100%	40	3600	50%
Pulses	42	46.7%	202.5	100%	3921	8402	65%
Oilseeds	3	3.3%	126.7	100%	171	5133	85%
Root crops	9	10.0%	10.8	100%	488	4878	56%
Spices	32	35.6%	18.8	100%	1974	5553	55%
Field vegetables	9	10.0%	14.9	100%	1330	13300	71%
All five chars							
Wheat, maize, millet	10	1.0%	43.8	60%	19	1885	41%
Pulses	136	13.5%	113.5	96%	955	7048	64%
Oilseeds	68	6.8%	83.1	99%	399	5886	86%
Root crops	57	5.7%	10.8	82%	367	6466	46%
Spices	203	20.2%	18.4	85%	1287	6365	47%
Field vegetables	114	11.4%	44.0	101%	4998	44019	72%

The small number of growers of individual crops in some chars means data on individual chars may not be statistically valid.

Table 20: Vegetable production and sales

	Ziauddin	Nangulia	Noler	Caring	Urir	All chars
Households growing homestead vegetables as percent of all households	100%	98%	99%	97%	97%	98%
Households selling homestead vegetables as percent of all growers	97%	98%	99%	93%	100%	98%
Average sales per grower per year – Taka	8852	17082	13132	10740	18201	15003
Average percentage of homestead production that is sold	52%	65%	64%	64%	48%	62%
Average sales of homestead vegetables – average for all sample households	8852	16819	12952	10461	17594	14764
Average sales of field vegetables – average for all sample households	2565	8464	507	1903	1330	4998
Average total sales of vegetables – average for all sample households	11417	25283	13459	12364	18924	19762
Homestead sales as percentage of total sales	78%	67%	96%	85%	93%	75%

Table 21: Adoption of improved practices

		growers	tried	adopted	tried	adopted
Paddy	New paddy cv	839	799	788	95%	99%
	Line sowing	839	36	35	4%	97%
	Young seedling	839	796	776	95%	97%
	Zinc	839	492	482	59%	98%
	TSP	839	839	814	100%	97%
	Potash	839	559	548	67%	98%
	Perching	839	545	535	65%	98%
Fruit & vegetable	New varieties	988	754	734	76%	97%
	Pheremone traps	988	126	125	13%	99%
	Soap spray	988	126	125	13%	99%
	Neem leaf spray	988	166	165	17%	99%
	Bordeaux mixture	988	25	25	3%	100%
	Cow urine spray	988	259	255	26%	98%
	Vermicompost	988	328	326	33%	99%
	Quick compost	988	186	184	19%	99%
	Organic/compost	988	778	763	79%	98%
Cattle/goats	Vaccination	770	770	755	100%	98%
	Deworming	770	770	193	100%	25%
	Improved breed/AI	770	43	43	6%	100%
Poultry	Vaccination	981	776	758	79%	98%
	Improved shed	981	838	161	85%	19%
	Improved breed	981	185	144	19%	78%
Aquaculture	Single sex tilapia	982	110	110	11%	100%
	Mixed carp	982	736	721	75%	98%

This data needs to be treated with caution. Respondents may overstated their involvement with some improved practices. However there is no doubt that there has been widespread adoption of improved varieties of paddy and vegetables.

Table 22: Mechanisation

		Ziauddin	Nangulia	Noler	Caring	Urir	All
Land prepare	Power-tiller	100%	99%	99%	100%	100%	99%
	Animals	0%	1%	1%	0%	0%	1%
Pest control	Hand sprayer	22%	20%	17%	31%	35%	22%
	Knapsack	35%	38%	40%	28%	34%	37%
	Power sprayer	6%	6%	6%	21%	1%	7%
	No pest control	38%	35%	36%	19%	30%	34%
Weed control	Push weeder	4%	3%	3%	12%	0%	3%
	Herbicide	7%	7%	7%	12%	0%	7%
	Manual weeding	89%	91%	90%	76%	100%	90%
Post harvest	Power thresher	6%	3%	2%	0%	41%	8%
	Pedal thresher	61%	60%	72%	79%	12%	58%
	Power tiller	5%	17%	9%	0%	47%	17%
	Manual/animal	28%	20%	17%	21%	0%	18%

Percentage of responses

Table 23: Damage to crops

		Ziauddin	Nangulia	Noler	Caring	Urir	All total
Salinity damage							
Aus	no damage	0%	0%	0%			0%
	slight	100%	100%	100%			100%
	moderate	0%	0%	0%			0%
	heavy	0%	0%	0%			0%
	total loss	0%	0%	0%			0%
	total	100%	100%	100%			100%
	no. reporting	3	1	1	0	0	5
Aman	no damage	8%	6%	7%	9%	3%	7%
	slight	80%	90%	87%	79%	90%	87%
	moderate	7%	3%	4%	13%	8%	5%
	heavy	4%	0%	2%	0%	0%	1%
	total loss	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	71	326	176	70	77	720
Boro	no damage	0%	7%	0%		0%	6%
	slight	100%	90%	100%		100%	91%
	moderate	0%	3%	0%		0%	2%
	heavy	0%	1%	0%		0%	0%
	total loss	0%	0%	0%		0%	0%
	total	100%	100%	100%		100%	100%
	no. reporting	2	182	17	0	1	202
Rabi crops	no damage	0%	4%	2%	9%	0%	3%
	slight	93%	80%	89%	68%	82%	82%
	moderate	5%	13%	2%	21%	16%	12%
	heavy	2%	3%	6%	3%	2%	3%
	total loss	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	41	135	47	34	61	318

		Ziauddin	Nangulia	Noler	Caring	Urir	All total
Homestead vegetable	no damage	5%	4%	6%	4%	0%	4%
	slight	91%	93%	93%	88%	98%	93%
	moderate	3%	3%	1%	8%	2%	3%
	heavy	0%	0%	0%	0%	0%	0%
	total loss	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	94	505	212	73	88	972
Trees	no damage	24%	16%	22%	38%	7%	19%
	slight	75%	81%	77%	55%	92%	79%
	moderate	2%	3%	1%	7%	1%	3%
	heavy	0%	0%	0%	0%	0%	0%
	total loss	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	63	341	159	56	89	708
Flood damage							
Aus	no damage	0%	0%	0%			0%
	slight	100%	100%	100%			100%
	moderate	0%	0%	0%			0%
	heavy	0%	0%	0%			0%
	total loss	0%	0%	0%			0%
	total	100%	100%	100%			100%
	no. reporting	2	1	1	0	0	4
Aman	no damage	7%	4%	2%	1%	1%	3%
	slight	59%	77%	83%	80%	64%	76%
	moderate	26%	16%	11%	16%	8%	15%
	heavy	7%	3%	4%	3%	27%	6%
	total loss	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	69	325	174	70	77	715
Boro	no damage	0%	8%	10%		0%	8%
	slight	100%	87%	80%		100%	86%
	moderate	0%	5%	0%		0%	4%
	heavy	0%	1%	5%		0%	1%
	total loss	0%	0%	5%		0%	0%
	total	100%	100%	100%		100%	100%
	no. reporting	2	181	20	0	1	204
Rabi crops	no damage	2%	5%	0%	0%	0%	3%
	slight	73%	77%	91%	76%	64%	76%
	moderate	15%	10%	4%	21%	13%	11%
	heavy	10%	7%	4%	3%	23%	10%
	total loss	0%	1%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	41	133	46	34	61	315
Homestead vegetable	no damage	5%	5%	5%	0%	1%	4%
	slight	92%	93%	93%	90%	64%	90%
	moderate	3%	2%	1%	10%	10%	3%
	heavy	0%	1%	1%	0%	24%	3%
	total loss	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%

		Ziauddin	Nangulia	Noler	Caring	Urir	All total
	no. reporting	95	502	211	72	87	967
Trees	no damage	39%	16%	19%	33%	3%	19%
	slight	61%	81%	79%	55%	63%	74%
	moderate	0%	2%	2%	12%	10%	4%
	heavy	0%	1%	0%	0%	24%	4%
	total loss	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	59	344	156	58	88	705
Waterlogging							
Aus	no damage	67%		0%			40%
	slight	33%		50%			40%
	moderate	0%		50%			20%
	heavy	0%		0%			0%
	total loss	0%		0%			0%
	total	100%		100%			100%
	no. reporting	3		2			5
Aman	no damage	23%	15%	16%	19%	18%	17%
	slight	52%	62%	69%	80%	40%	62%
	moderate	17%	19%	13%	0%	36%	17%
	heavy	8%	5%	2%	1%	5%	4%
	total loss	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	71	327	174	70	77	719
Boro	no damage	0%	24%	29%		0%	24%
	slight	100%	60%	59%		100%	60%
	moderate	0%	11%	12%		0%	11%
	heavy	0%	5%	0%		0%	5%
	total loss	0%	0%	0%		0%	0%
	total	100%	100%	100%		100%	100%
	no. reporting	2	176	17		1	196
Rabi crops	no damage	29%	18%	30%	21%	10%	20%
	slight	61%	63%	65%	79%	52%	63%
	moderate	7%	13%	4%	0%	33%	13%
	heavy	2%	5%	0%	0%	5%	4%
	total loss	0%	1%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	41	130	46	34	61	312
Homestead veg	no damage	20%	14%	15%	20%	9%	15%
	slight	73%	77%	81%	80%	46%	75%
	moderate	6%	7%	4%	0%	36%	8%
	heavy	0%	2%	0%	0%	9%	2%
	total loss	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%
	no. reporting	98	497	211	71	87	964
Trees	no damage	47%	27%	34%	60%	13%	31%
	slight	45%	62%	61%	40%	43%	56%
	moderate	9%	7%	5%	0%	34%	10%
	heavy	0%	3%	0%	0%	9%	3%
	total loss	0%	0%	0%	0%	0%	0%

	Ziauddin	Nangulia	Noler	Caring	Urir	All total
total	100%	100%	100%	100%	100%	100%
no. reporting	58	339	155	60	90	702

Table 24: Change in crop damage

		Ziauddin		Nangulia		Noler		Caring		Urir		Total area	
		last year	5 year trend	last year	5 year trend	last year	5 year trend	last year	5 year trend	last year	5 year trend	last year	5 year trend
Salinity damage													
Aus	reducing	33%	100%	100%	100%	100%	100%					60%	100%
	no change	67%	0%	0%	0%	0%	0%					40%	0%
	increasing	0%	0%	0%	0%	0%	0%					0%	0%
	total	100%	100%	100%	100%	100%	100%					100%	100%
	no. reporting	3	3	1	1	1	1					5	5
Aman	reducing	56%	99%	70%	95%	65%	97%	40%	81%	13%	75%	58%	93%
	no change	42%	1%	30%	5%	34%	3%	60%	19%	87%	25%	41%	7%
	increasing	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	71	71	326	327	176	175	70	69	77	77	720	719
Boro	reducing	50%	100%	71%	99%	65%	100%			0%	100%	70%	99%
	no change	50%	0%	29%	1%	35%	0%			100%	0%	30%	1%
	increasing	0%	0%	0%	0%	0%	0%			0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%			100%	100%	100%	100%
	no. reporting	2	2	182	182	17	17			1	1	202	202
Rabi crops	reducing	46%	100%	56%	87%	57%	94%	21%	71%	8%	61%	42%	83%
	no change	54%	0%	44%	13%	40%	4%	79%	29%	92%	39%	58%	17%
	increasing	0%	0%	0%	0%	2%	2%	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	41	41	135	135	47	47	34	34	61	61	318	318
Homestead vegetables	reducing	62%	98%	73%	95%	68%	98%	41%	82%	11%	74%	63%	93%
	no change	38%	2%	27%	5%	32%	2%	59%	18%	89%	26%	37%	7%
	increasing	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	94	93	504	503	212	212	73	72	88	88	971	968
Trees	reducing	60%	97%	71%	94%	72%	99%	54%	77%	26%	74%	63%	91%
	no change	40%	3%	29%	6%	28%	1%	46%	23%	74%	26%	37%	9%
	increasing	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	63	64	341	340	159	159	56	56	89	89	708	708

		Ziauddin		Nangulia		Noler		Caring		Urir		Total area	
		last year	5 year trend	last year	5 year trend	last year	5 year trend	last year	5 year trend	last year	5 year trend	last year	5 year trend
Flood damage													
Aus	reducing	100%	100%	100%	100%	100%	100%					100%	100%
	no change	0%	0%	0%	0%	0%	0%					0%	0%
	increasing	0%	0%	0%	0%	0%	0%					0%	0%
	total	100%	100%	100%	100%	100%	100%					100%	100%
	no. reporting	1	1	2	3	1	1					4	5
Aman	reducing	55%	97%	64%	93%	65%	97%	45%	81%	21%	49%	57%	89%
	no change	41%	3%	32%	7%	33%	1%	54%	19%	51%	51%	37%	11%
	increasing	4%	0%	4%	0%	2%	2%	1%	0%	28%	0%	6%	1%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	69	69	325	322	173	172	69	69	76	76	712	708
Boro	reducing	50%	100%	71%	97%	60%	90%			0%	100%	70%	97%
	no change	50%	0%	29%	3%	35%	5%			100%	0%	30%	3%
	increasing	0%	0%	0%	0%	5%	5%			0%	0%	0%	0%
	total	100%	100%	100%	100%	100%	100%			100%	100%	100%	100%
	no. reporting	2	2	181	181	20	20			1	1	204	204
Rabi crops	reducing	46%	100%	61%	89%	59%	89%	21%	79%	21%	44%	47%	81%
	no change	54%	0%	39%	11%	37%	7%	79%	21%	54%	56%	48%	19%
	increasing	0%	0%	0%	0%	4%	4%	0%	0%	25%	0%	5%	1%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	41	41	133	133	46	46	34	34	61	61	315	315
Homestead vegetables	reducing	71%	97%	75%	96%	69%	98%	46%	82%	18%	51%	66%	91%
	no change	28%	3%	25%	4%	30%	2%	54%	18%	59%	49%	31%	9%
	increasing	1%	0%	0%	0%	1%	0%	0%	0%	24%	0%	2%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	95	95	501	501	211	211	72	72	85	87	964	966
Trees	reducing	78%	97%	73%	95%	69%	99%	55%	78%	20%	52%	64%	89%
	no change	22%	3%	26%	5%	31%	1%	45%	22%	57%	48%	32%	11%
	increasing	0%	0%	0%	0%	1%	0%	0%	0%	23%	0%	3%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	59	59	344	344	156	155	58	58	87	87	704	703
Waterlogging													
Aus	reducing	100%	100%			100%	100%				100%	100%	100%
	no change	0%	0%			0%	0%				0%	0%	0%

		Ziauddin		Nangulia		Noler		Caring		Urir		Total area	
		last year	5 year trend	last year	5 year trend	last year	5 year trend	last year	5 year trend	last year	5 year trend	last year	5 year trend
	increasing	0%	0%			0%	0%				0%	0%	0%
	total	100%	100%			100%	100%				100%	100%	100%
	no. reporting	3	3			3	3				1	6	7
Aman	reducing	66%	93%	63%	91%	62%	99%	56%	94%	30%	70%	59%	91%
	no change	27%	7%	31%	9%	37%	1%	43%	6%	65%	30%	37%	9%
	increasing	7%	0%	6%	0%	1%	0%	1%	0%	5%	0%	4%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	71	71	326	323	173	172	70	70	77	76	717	712
Boro	reducing	50%	100%	65%	94%	59%	100%			100%	100%	64%	94%
	no change	50%	0%	30%	6%	41%	0%			0%	0%	31%	6%
	increasing	0%	0%	5%	0%	0%	0%			0%	0%	5%	0%
	total	100%	100%	100%	100%	100%	100%			100%	100%	100%	100%
	no. reporting	2	2	176	176	17	17	0	0	1	1	196	196
Rabi crops	reducing	66%	98%	62%	86%	74%	100%	38%	88%	25%	62%	54%	85%
	no change	34%	2%	35%	14%	26%	0%	62%	12%	70%	38%	44%	15%
	increasing	0%	0%	3%	0%	0%	0%	0%	0%	5%	0%	2%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	41	41	130	130	46	46	34	34	61	61	312	312
Homestead vegetables	reducing	77%	93%	72%	94%	67%	98%	59%	94%	24%	63%	66%	92%
	no change	22%	7%	25%	6%	32%	2%	41%	6%	67%	37%	31%	8%
	increasing	1%	0%	3%	0%	0%	0%	0%	0%	9%	0%	2%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	98	98	496	496	211	211	71	71	87	86	963	962
Trees	reducing	79%	91%	67%	92%	68%	100%	78%	95%	30%	67%	64%	91%
	no change	19%	9%	29%	8%	32%	0%	22%	5%	61%	33%	32%	9%
	increasing	2%	0%	4%	0%	0%	0%	0%	0%	9%	0%	3%	0%
	total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	no. reporting	58	58	339	339	155	155	60	60	90	90	702	702

Table 25: Poultry

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Percentage of all households							
Chickens	owning birds	97%	97%	99%	97%	100%	98%
	produce eggs	97%	98%	99%	97%	100%	98%
	consume eggs	86%	82%	84%	81%	100%	84%
	sell eggs	96%	98%	99%	96%	99%	98%
	Consume birds	98%	98%	100%	97%	100%	98%
	Sell birds	95%	96%	97%	97%	99%	97%
Ducks	owning birds	92%	94%	93%	90%	100%	94%
	produce eggs	91%	95%	95%	95%	100%	95%
	consume eggs	90%	94%	94%	95%	100%	94%
	sell eggs	91%	94%	93%	94%	100%	94%
	Consume birds	92%	96%	96%	97%	100%	96%
	Sell birds	93%	93%	94%	95%	98%	94%
Pigeon	owning birds	17%	12%	7%	12%	19%	12%
	Consume birds	13%	10%	5%	9%	19%	10%
	Sell birds	14%	10%	5%	9%	18%	10%
Average per household							
Chickens	number of birds	11.1	14.4	11.3	11.0	12.7	13.0
	eggs produced	291	232	225	189	397	248
	eggs consumed	127	72	66	55	173	84
	eggs sold	164	160	159	134	225	164
	price per egg	8.96	8.92	12.38	8.59	12.00	9.94
	Egg income Tk	1460	1430	1396	1173	2694	1519
	Birds consumed	9.6	8.5	8.3	7.9	8.0	8.5
	Birds sold	8.4	13.8	10.6	9.9	10.4	12.0
	Price per bird	242	254	255	253	300	257
	Bird income	1993	2800	2655	2510	3113	2694
Ducks	number of birds	7.8	7.6	6.3	6.2	11.6	7.6
	eggs produced	269	299	296	259	422	303
	eggs consumed	109	108	116	107	163	115
	eggs sold	160	191	180	156	259	189
	price per egg	8.24	8.04	8.06	8.15	10.00	8.26
	Egg income Tk	1282	1532	1439	1271	2591	1562
	Birds consumed	6.5	6.6	6.1	6.1	7.5	6.5
	Birds sold	6.6	8.5	8.1	7.3	10.1	8.2
	Price per bird	326	324	313	324	401	329
	Bird income	2136	2496	2497	2347	4036	2587
Pigeon	number of birds	1.1	0.9	0.5	1.0	1.3	0.9
	Birds consumed	0.7	0.5	0.2	0.6	0.7	0.5
	Birds sold	0.9	0.8	0.4	1.1	0.6	0.7
	Price per bird	224	222	192	204	212	216
	Bird income	194	197	72	184	133	163

Table 26: Cattle and buffalo

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Percent households	Owning cattle	42%	49%	53%	62%	62%	52%
(all households)	Sharing cattle	21%	34%	22%	16%	31%	28%
	Owning buffalo	1%	0%	1%	0%	16%	2%
	Sharing buffalo	0%	0%	0%	0%	0%	0%
	Keeping bovines	62%	79%	72%	75%	92%	77%
	Have milking animals	22%	34%	26%	39%	79%	35%
	Producing milk	28%	38%	28%	40%	79%	39%
	Consuming milk	28%	37%	27%	38%	79%	38%
	Selling milk	28%	36%	28%	39%	76%	37%
	Kill animals at home	0%	0%	1%	0%	8%	1%
	Sell animals	34%	50%	39%	43%	78%	48%
Average number	Own cattle	1.84	1.83	1.93	2.91	2.96	2.05
(per bovine keeper)	Shared cattle	0.66	1.07	0.63	0.48	1.31	0.93
	Own buffalo	0.03	0.01	0.29	0.00	1.75	0.26
	Shared buffalo	0.00	0.00	0.00	0.00	0.00	0.00
	All bovines	2.53	2.91	2.85	3.40	6.02	3.24
	Milk animals	0.50	0.55	0.47	0.79	1.60	0.66
Average per year	Milk produced (litres)	309	271	266	327	546	328
(per milk producer)	Milk consumed (litre)	119	99	85	108	176	113
	Milk sold (litres)	191	171	181	219	371	215
	Average milk price Tk	47	44	45	39	61	47
	Milk income (Taka)	9138	8144	8302	8655	24492	11281
Average per year	Animals killed at home	0.00	0.00	0.03	0.00	0.08	0.02
(per bovine keeper)	Animals sold	2.32	2.53	2.73	2.27	2.01	2.42
	Income from sales Tk	45196	51823	66903	57710	66197	56868

Table 27: Sheep and goats

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Percentage	Own goats	14%	22%	23%	32%	30%	23%
of all	Share goats	3%	5%	4%	1%	1%	4%
households	Own sheep	0%	0%	0%	1%	20%	2%
	Share sheep	0%	0%	0%	0%	0%	0%
	Keeping ovines	17%	27%	26%	34%	42%	28%
	Consume at home	0%	0%	0%	0%	1%	0%
	Sell sheep/goats	8%	11%	11%	14%	31%	13%
Average	Own goats	1.41	1.86	1.93	1.88	1.82	1.84
number	Share goats	0.24	0.38	0.24	0.08	0.11	0.28
per ovine	Own sheep	0.00	0.03	0.00	0.04	5.87	0.82
household	Share sheep	0.00	0.00	0.00	0.00	0.00	0.00
	Total ovines	1.65	2.27	2.17	2.00	7.79	2.94
	Number consumed	0.00	0.01	0.00	0.00	0.03	0.01
	Number sold	0.88	0.78	0.97	0.88	1.68	0.96
	Total income Tk	3194	3271	3402	3423	8763	4059

Table 28: Aquaculture

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Percentage	Fish pond	97%	99%	98%	99%	98%	98%
of all	Fish in sorjon	1%	10%	1%	0%	0%	5%
households	cultivated pond	97%	98%	98%	96%	98%	98%
	Produce fish	97%	97%	96%	94%	98%	97%
	Consume fish	97%	97%	96%	94%	98%	97%
	Sell fish	87%	81%	53%	51%	97%	75%
Average	Pond area decimals	22.6	28.6	25.0	22.4	92.3	32.4
per fish	Sorjon decimal	0.3	5.1	0.7	0.0	0.0	2.8
pond	total area decimals	22.9	33.7	25.7	22.4	92.3	35.2
household	cultivated decimals	18.1	26.1	20.0	17.0	78.3	27.9
	Production kg/year	148	196	159	108	545	208
	Consumption kg/yr	66	73	76	52	191	82
	Sales kg/year	46	73	37	33	211	72
	Avg price Tk/kg	149	146	143	174	151	148
	Income Tk/year	6803	10496	5253	4886	31675	10447
	Stock kg	36	50	46	23	143	54
	Yield kg /dec	10.17	9.43	10.25	7.72	8.79	9.37
	= kg/ ha	2511	2330	2532	1908	2171	2313

Table 29: Percentage of households reporting income from different sources

	Ziauddin	Nangulia	Noler	Caring	Urir	total
Farm						
Field crops	75%	91%	84%	94%	89%	88%
Homestead veg.	98%	96%	97%	94%	100%	97%
Livestock	48%	63%	54%	64%	94%	62%
Poultry	97%	98%	98%	97%	99%	98%
Aquaculture	87%	80%	53%	47%	92%	73%
Forestry/trees	18%	7%	10%	23%	4%	9%
Date juice	5%	17%	22%	4%	63%	20%
Non-farm						
Daily labour	66%	67%	66%	71%	62%	67%
Jobs	19%	15%	15%	22%	19%	16%
Skilled work/driver	4%	7%	6%	9%	11%	7%
Petty trade	17%	12%	11%	6%	9%	11%
Business	2%	8%	8%	6%	20%	8%
Fishing	37%	25%	21%	30%	64%	29%
Rickshaw etc	6%	4%	5%	1%	4%	4%
Tailoring	7%	4%	5%	1%	6%	5%
Remittance	8%	6%	12%	12%	13%	9%
Handicrafts	65%	46%	48%	45%	93%	52%
Pension & social	1%	1%	1%	3%	4%	1%
Begging & relief	0%	1%	1%	1%	0%	1%
Other	36%	38%	39%	51%	88%	44%

Table 30: Average income per household by source

	Ziauddin	Nangulia	Noler	Caring	Urir	total
Farm						
Field crops	29,257	50,138	29,097	38,601	101,422	47,181
Homestead veg.	14,464	22,240	18,535	14,081	41,822	21,787
Livestock	15,557	23,651	22,143	27,549	75,646	27,476
Poultry	10,414	8,597	8,766	9,429	14,573	9,414
Aquaculture	11,984	10,598	5,090	4,483	32,456	11,025
Forestry/trees	221	254	147	355	1,116	312
Date juice	137	1,070	1,285	468	3,750	1,218
sub-total	82,033	116,547	85,064	94,965	270,785	118,413
Non-farm						
Daily labour	73,826	71,080	78,764	78,221	64,289	72,968
Jobs	9,612	17,642	15,941	22,072	17,178	16,769
Skilled work/driver	4,840	10,089	7,717	8,648	16,156	9,482
Petty trade	26,100	14,809	15,563	7,870	13,800	15,476
Business	3,300	16,650	23,429	4,649	58,111	19,595
Fishing	8,787	5,708	18,968	6,343	10,800	9,412
Rickshaw etc	4,760	3,946	4,900	779	7,111	4,276
Tailoring	3,050	1,313	2,375	65	2,027	1,686
Remittance	12,900	12,681	25,178	30,779	29,289	18,305
Handicrafts	3,652	2,034	2,315	3,056	3,510	2,467
Pension & social	22	49	39	240	493	99
Begging & relief	-	204	446	52	-	207
sub-total	150,849	156,204	195,635	162,775	222,764	170,742
Other	8,331	5,337	11,623	2,865	15,964	7,769
Total	**241,213**	**278,089**	**292,322**	**260,604**	**509,514**	**296,925**

Average is for all households, not just households with the income source

Table 31: Share of total income

	Ziauddin	Nangulia	Noler	Caring	Urir	total
Farm						
Field crops	12.1%	18.0%	10.0%	14.8%	19.9%	15.9%
Homestead veg.	6.0%	8.0%	6.3%	5.4%	8.2%	7.3%
Livestock	6.4%	8.5%	7.6%	10.6%	14.8%	9.3%
Poultry	4.3%	3.1%	3.0%	3.6%	2.9%	3.2%
Aquaculture	5.0%	3.8%	1.7%	1.7%	6.4%	3.7%
Forestry/trees	0.1%	0.1%	0.1%	0.1%	0.2%	0.1%
Date juice	0.1%	0.4%	0.4%	0.2%	0.7%	0.4%
sub-total	34.0%	41.9%	29.1%	36.4%	53.1%	39.9%
Non-farm						
Daily labour	30.6%	25.6%	26.9%	30.0%	12.6%	24.6%
Jobs	4.0%	6.3%	5.5%	8.5%	3.4%	5.6%
Skilled work/driver	2.0%	3.6%	2.6%	3.3%	3.2%	3.2%
Petty trade	10.8%	5.3%	5.3%	3.0%	2.7%	5.2%
Business	1.4%	6.0%	8.0%	1.8%	11.4%	6.6%
Fishing	3.6%	2.1%	6.5%	2.4%	2.1%	3.2%
Rickshaw etc	2.0%	1.4%	1.7%	0.3%	1.4%	1.4%
Tailoring	1.3%	0.5%	0.8%	0.0%	0.4%	0.6%
Remittance	5.3%	4.6%	8.6%	11.8%	5.7%	6.2%
Handicrafts	1.5%	0.7%	0.8%	1.2%	0.7%	0.8%
Pension & social	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%
Begging & relief	0.0%	0.1%	0.2%	0.0%	0.0%	0.1%
sub-total	62.5%	56.2%	66.9%	62.5%	43.7%	57.5%
Other	3.5%	1.9%	4.0%	1.1%	3.1%	2.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 32: Migration

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Percent of households	member migrates	52%	58%	72%	78%	33%	57%
	men migrate	52%	58%	71%	78%	33%	56%
	women migrate	2%	1%	2%	0%	0%	1%
Average number per household (all households)	men migrate	0.75	0.78	0.97	1.17	0.40	0.78
	women migrate	0.02	0.01	0.07	0.00	0.00	0.02
	total migrate	0.77	0.79	1.05	1.17	0.40	0.80
Adult men	total per hh	1.84	1.83	1.99	2.06	2.17	1.91
	percent migrate	41%	43%	49%	57%	18%	41%

Table 33: Wealth ranking

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Now	Rich	17%	13%	9%	10%	52%	16%
	Medium	79%	79%	75%	68%	43%	74%
	Poor	4%	8%	15%	22%	5%	10%
	Very poor	0%	0%	1%	0%	0%	0%
		100%	100%	100%	100%	100%	100%
5 years ago	Rich	0%	0%	0%	0%	0%	0%
	Medium	3%	1%	2%	6%	9%	3%
	Poor	67%	73%	64%	58%	65%	69%
	Very poor	30%	26%	34%	35%	26%	29%
		100%	100%	100%	100%	100%	100%
	n	100	515	217	77	88	997

Table 34: Travel to school and market

		Ziauddin	Nangulia	Noler	Caring	Urir	total
Distance to	School km	1.05	2.28	0.66	0.51	0.59	1.52
Time to travel	wet season	25.94	22.28	14.76	14.14	17.36	20.02
minutes	dry seasom	20.91	16.95	10.85	10.31	13.73	15.29
Road type	No road	0%	4%	1%	5%	0%	3%
	Earth	19%	72%	41%	52%	84%	60%
	Brick	58%	22%	49%	74%	59%	39%
	Bitumen	46%	44%	29%	0%	54%	38%
	Travel by water	0%	8%	1%	0%	1%	4%
Distance to	Market km	1.48	3.82	0.98	0.79	0.71	2.46
Time to travel	wet season	29.78	24.22	20.55	17.51	22.09	23.27
minutes	dry seasom	25.13	18.07	15.06	13.18	17.24	17.67
Road type	No road	0%	4%	1%	4%	1%	3%
	Earth	17%	71%	41%	41%	84%	58%
	Brick	48%	13%	39%	49%	15%	25%
	Bitumen	35%	18%	21%	7%	45%	22%
	Travel by water	0%	9%	0%	0%	7%	5%

Appendix-12: PME and KAP results

This appendix has results from Progress Report 12 on PME and KAP.

Participatory Monitoring and Evaluation

The overall objective of PME is to provide a quick and flexible insight into the progress of the project. Details of the PME objectives are as follows:

1. To provide valuable feedback to project management, implementing agencies and partner NGOs on the implementation of activities and delivery of outputs
2. To give project management an initial indication of the effectiveness of components in terms of economic empowerment and poverty reduction and also
3. To generate feedback from project participants on a range of topics.

During this reporting period the 8th cycle of PME has been conducted by the MEOs through 41 PME sessions in 6 FLIs (NGO, TUG, WMG, Marker Committee, FF and SFG). MEOs used PME tools/ FGDs having different key checkpoints/ issues for each FLIs. Sessions were held in the meeting places of each type of group. Group members were informed and gathered by Managers, Coordinators and Credit Officers of respective PNGOs. The group leaders of FLIs have played a vital role in gathering their group members. In case of WMA, WMG, FF, Market Committee and the respective President and Secretary have organized their members. There were 5 sessions for SFG, FF and Market committee, 11 sessions for TUG and NGO groups, and 4 sessions for Water Management Groups (WMG) in different chars of the CDSP IV areas. A total of 654 (71% out of 926) group members from the 6 types of FLIs actively participated in the sessions and on average 16 participants were present per session. For detailed information please refer to the table and the short write ups below.

Overview of 8th cycle PME

Groups	No. Of sessions	Group members		Issues/ checkpoints for discussion
		Total	Present (%)	
NGO group	11	267	178 (67%)	(i) Sources of micro-credit/loans, (ii) production and consumption of homestead gardening, (iii) rearing poultry birds and animals, (iv) health and family planning, (v) income earning by women, (vi) enterprises owned/operated by women, (vii) household food security, (viii) socio-economic condition, (xi) education & communication.
TUG	11	177	134 (76%)	(i) Hygienic and sanitation conditions, (ii) sources of safe water and distance thereof, (iii) sanitary latrine and impact of use of contaminated water and (v) health and nutrition.
WMG	4	137	69 (50%)	(i) Formation of WMG, (ii) development of com- munication system, (iii) water drainage & removal of cross-dams, (iv) educational institutions, (v) active participation of women in water management and society and (vi) social and family conditions.

Groups	No. Of sessions	Group members		Issues/ checkpoints for discussion
		Total	Present (%)	
Market committee	5	59	42 (71%)	(i) Establishment of markets/ value chain centres and development of market, (ii) communication systems in place, (iii) forward and backward linkages, (vi) encourages local producers to sell their products, (v) marketing imported products, (vi) dealing with local & external wholesalers and (vi) participation of women in weekly market days.
FF	5	150	111 (74%)	(i) Conditions of agricultural land, (ii) flood and water logging, (iii) sources & preservation of seeds, (iv) knowledge about HYV crops, (v) production & utilization of organic fertilizer, (vi) utilization pesticides, (vii) cropping intensity, (viii) homestead gardening and (ix) cost of cultivation & incomes from farming.
SFG	5	136	120 (88%)	(i) Process of participation into social forestry groups (SFG), (ii) concept and usefulness of SFG, (iii) knowledge about environment and climate, (iv) knowledge about social forestry guidelines and laws thereof, (v) benefits available from social forestry, (vi) share of benefits from social forestry as per agreement with Forest Department (FD) and (vii) signing social forestry agreement with FD and receiving the copy of agreement
Total	41	926	654 (71%)	

PME of PNGO Groups

Main objectives of formation of NGO groups are (i) to empower women char dwellers, (ii) to encourage group savings, and (iii) to generate income through utilizing of microcredit available from PNGOs. 984 PNGO groups have been formed. The group members (26,373 no's) have made net savings of Tk. 9,55,79,754 in total till Dec 2016, so on average each group member has generated Tk.905 per year.

After joining with CDSP IV, PNGO group members have been provided training on both farm- IGAs like homestead vegetables, fruit crops nursery plant production and non-farm IGAs like tailoring and cap sewing by PNGO Agricultural Coordinators of PNGOs and TA Team members. Now-a-days demonstration is considered as one of the best method of practical and appropriate technology transfer. The project has successfully established 7,278 demonstrations on mixed fruit gardening, vertical gardening, vermin compost, quick compost and homestead gardening. Besides, DAE also conducted 360 high value crop and 720 low value crop demonstrations for the farmers. In the PME sessions, it has been found that many women members are regularly participating in group savings and they have access to micro-credit from PNGOs, which is much preferred than from traditional money lenders. They have invested their microcredit funds to profitable income generating activities like homestead gardening, plant nursery production, small business, poultry birds rearing, tailoring shop, and cowrearing.

Observed Values Obtained from PME Sessions of NGO Groups

Observations: No. or Percent	No. of PME Sessions	No. of HH/Members	No. HH/Members-Present	No. of HH with Increased-Prod	No. of HH with Increased- Consumption	No. of HH with Increased- Sales	No. of HH Owning-Duck	No. of HH Owning-Chicken	No. of HH Owning-Cow	No. of HH Owning-Goat	No. of HH with Increased-Duck	No. of HH with Increased- Chicken	No. of HH with Increased-Cow	No. of HH with Increased-Goat	No. of HH Received H&FP Services	No. of Women with Direct IGAs	No. of HH with Improved Food Security
Nos.	11	267	178	178	178	171	175	178	149	32	105	125	83	6	178	110	146
%			67	100	100	96	98	100	84	18	59	70	47	3	100	62	82

Eighth PMEs for PNGO groups have been conducted with 11 PNGO groups with the presence of 178 (67% of 267) members. PME data reveal that homestead vegetable production and consumption thereof increased by 100% and sales by 96% respectively. About 82% Women are directly involved with income generating activities and 16% women involved newly with IGAs. Nearly all families (99%) are rearing poultry chicken and ducks (chicken 100% and duck 98%). PME data show that families with cows have 47% increase and 59% increase in case of poultry birds. PME data reveal that the food deficit period of 82% families has reduced and 77% families are enjoying better quality food items than before. Now, 70% families are living in newly built houses. Health condition of 77% families has improved. All families have reported that they send their school going kids to nearby schools. Some schools are in place in the newly built cyclone shelters. The PME participants have gratefully acknowledged for the development infrastructures built and interventions taken by CDSP IV.

PME of TUG groups

Key objectives of formation of TUG are (i) to establish at all levels that installed DTWs are for common use and not the property of any individual or private bodies, (ii) to ensure proper repairing and maintenance Collectively and (iii) to ensure implementation of joint decisions in all kinds of issues related to water and sanitation. TUGs have been established by PNGOs supported by CDSP IV. 1,138 DTWs have been installed till December 2016 and all DTWs are being looked after by 2,255 women Care Takers, selected from the TUGs. All women Care Takers have been trained by the project.

Observed Values Obtained from PME Sessions of TUG Groups

Observations: No. or Percent	No. of PME Sessions	No. of HH/Members	No. HH/Members-	No. of HH with Training	No. of HH Practice Training	No. of HH Collecting Water less than 500 m Distance	No. of HH with Sanitary	No. of HH Using Latrines Use Hygienicall	No. of HH with Improved
Nos.	11	177	134	134	122	134	134	123	128
%	-	-	76	100	91	100	100	92	96

Eighth PME cycles for TUGs have been conducted, involving 11 TUGs. Eleven PME sessions have been conducted with the presence of 134 (76%) TUG members. Currently 100% TUG group members are practicing good hygienic and sanitation behaviour to keep them clean, well and healthy. Now 100% families have hygienic toilets, but 92% families use toilets hygienically and they do not have to face any shyness socially and awkward situation before guests for toilet usage. They (100%) are

using fresh water in household works and drink safe water due to installation of DTWs at different locations i.e. at 50, 100 and 200 meter distance. They keep their children clean and safe. Incidence of water borne diseases like diarrhoea, jaundice, scabies have reduced and they are not suffering from it frequently like in the past and 96% HHs reported to be with better health status. It has been observed that less than 1% DTW - platforms found cracked and broken which have been repaired by the Care Taker Family members.

PME of Water management Group (WMG)

Key objectives of formation of WMG are (i) to increase peoples' active participation in the areas of water management (i.e. reducing loss of water, optimum utilization of water in irrigation, conservation water, infiltration of saline water and drainage of excess water), (ii) maintenance & smooth operation of water control drainage infrastructures built by BWDB and other agencies, and (iii) to keep informed respective agencies about problems identified in existing water control infrastructures.

Eighth PMEs for WMGs have been conducted with 4 WMGs with 137 members and of these 69 (50%) members were present at the PME sessions. The members thankfully mentioned that many WMGs meetings are being held in their Water Management Centres, recently established by CDSP IV project. They reported also that due to development of water management structures like drainage canals, sluices, flood protection embankments, bridges and culverts, they can now move from one place to another, like markets, schools and health centres very easily. They can export their crops and vegetables to other districts transported by light and heavy duty trucks and pick-ups. As WMG members they look after various water management structures and do repairs and maintenance where needed voluntarily. Due to establishment of 22 new cyclone centres and establishment of schools inside of those, they are sending their kids to schools. In the past (pre-project period) there very were few schools and they were running in temporary tin-shed structures. Many times BWDB provides repairs and maintenance works to them on contract basis. Some WMGs management committees are still weak and keep groups savings and other funds in their hands and do not deposit these to the bank. In such WMGs, attendance of members in monthly meetings is poor and democratic change process is not at a satisfactory level and members are very irregular in depositing monthly group savings.

PME of Market committees

The objective of formation of market committee is (i) to create better marketing facilities, (ii) to strengthen forward and backward linkages, (iii) to promote hygienic conditions in and around the market, (iv) to promote one stop shopping from farm to the wholesalers, retailers/ customers. In the early days and in the years 2001-2005, there were a very limited number of shops (2 to 5 shops), and hardly one or two markets on each char. The number of shops increased in time, based on demand of commodities consumed by char dwellers. There are more than seven markets built by the project where more than 1,200 shops are operational. Every market has its own market committee to look after its management and onward development. 5 Market committees were assessed. There were 42 members (71%) present out 59 members. The market committee members mentioned that due to development of road and other communication infrastructures, both sellers and buyers have increased significantly. Most markets have their own weekly market days when many wholesale and retailers come to the market to sell and buy their goods. Now farmers sell their products such as seeds of country beans and beans, cucumber, bottle gourd, papaya, sweet cucumber, coconuts, okra, rabi crops and rice. They also sell and buy poultry birds, cows and goats. The market

committee members mentioned that nearly 27 wholesalers use to visit markets for buying goods and products directly from farmers. Participating members reported that usually more women come to the weekly market days than at normal market days to sell their produces and also to purchase daily livelihoods and clothes. The markets are contributing in development of value chain and exporting local products to distant markets, located in other districts or even in the capital city.

PME of Farmers Forum (FF)

The key objectives of organizing Farmers Forum (FF) are (i) to enable farmers to make better use of their land, to support increasing family income through agricultural IGAs, (iii) to increase capability of women through training in the fields of homestead gardening & post-harvest technologies and (vi) to make women farmers active earning members of their families. Ninety 90 Farmers Forums (FFs), 6 FF associations and one FF federation have been successfully formed, which are now functional. The members of these FLIs have been drawn from 5,400 farming families (each owing at least 30 decimal of cultivable land) and are spread over five chars under CDSP IV command areas. Department of Agricultural Extension (DAE) has promoted agricultural technologies adapted to saline conditions and resilient to climate change.

Observed Values Obtained from PME Sessions of FFs

Observations: No. or Percent	No. of PME Sessions	No. of HH/Members	No. HH/Members-Present	No. of HH reported on Salinity declining (out of (25%)-Yes	No. of HH reported on Salinity declining (out of (50%)-Yes	No. of HH reported on Salinity declining (out of (75%)-Yes	No. of HH reported on declining water logging-Yes	No. of HH reported on declining flood-Yes	No. of HH reported increase of production	No. of HH reported increase of sales	No. of HH reported reducing food insecurity	No. of HH reported intake of quality food	No. of HH reported use of Micro-finance
Nos.	5	150	111	37	47	27	77	26	106	78	84	83	90
%			74	33	42	24	69	23	95	70	76	75	81

For 2nd part (FF): There were 55 FFs having 150 farmers as members, but out of 150 members, 111 members were present during PME sessions. I have calculated as:

= 111/150*100=74%

Eight PME cycles for FFs have been conducted with 5 FFs, with 150 farmers each; 111 (74%) farmers were present in 5 PME sessions. Most families have about 150 decimal of khas land. Char dwellers had very limited knowledge about HYV crops. At present, 97% of surveyed farming families are using knowledge about HYV and related HYV varieties of seeds. PME data reveal that 95% farming families have increased crop production and 70% families have increased production for sales after own consumption. Farmers have better knowledge and skills and due to training activities supported by CDSP farmers now can produce vermin, composted fertilizer and they are using these in their land. As a result

they do not need to purchase chemical fertilizer. Few of them are using stored rain water for farming from their rain water harvester. Farmers reported that in the past cultivation cost was cheaper, now-a-days they have to spend more money than before due to use of mechanized farming, e.g. use of tractor and power tiller. About 76% participants mentioned that due to practice of homestead gardening they are better and secure in respect of seasonal food security. About 75% farming families responded with improved and quality food intake by themselves than before and 81% farming households are using micro-credit for purchase of agricultural implements like power tiller, shallow water pumps for dry season irrigation, paddle thresher for paddy The interviewed farmers opined that still there is lack of salinity tolerant verities.

PME of Social Forestry Groups (SFGs)

The key objectives of organizing Social Forestry Group (SFG) are (i) to improve the socio-economic well-being of rural people, (ii) to plant more trees or manage forests through the participation of stakeholders, and (iii) to reduce forest depletion and maximize land productivity. The social forestry approach has been fully adopted under CDSP IV with specific objectives of (i) establishment of shelter belts to protect chars from storms and cyclones, (ii) generation of benefits for members of Social Forestry Groups, both from employment by the Forest department in plantation activities and from a share in the income generation by selling of tree products and production of fuel wood to alleviate the severe fuel shortages that exist in the project areas. Till December 2016, 484 SFGs have been formed by Department of Forestry which are now fully operational and SFGs having 12,095 members.

Observed Values Obtained from PME Sessions of SFGs

Observations: No. or Percent	No. of PME Sessions	No. of HH/Members	No. HH/Members-Present	No. of HH collected grass for cows from Social	No. of HH collected fuel wood for cooking from Social Forests	No. of HH received Sharing
Nos.	5	136	120	44	73	120
%			88	37	61	100

First PME cycle for SFG has been conducted with 5 SFGs where there were 136 farmers and 120 (88%) farmers were present in the 5 PME sessions. SFGs have tri-parties benefit sharing agreements that allow them to enjoy both short term benefits like collection of fuel wood and produces like vegetables and fruits, temporary employment as labours for raising nurseries and planting trees and long term benefit from final cuts of plantations. The agreement allows them 45% benefit from mangrove plantations and 55% from other types of plantations over dykes and road sides. PME shows that 89 (75% of 120) members are well aware about 55% and 45% benefits, on the other hand 31 (26% of 120) members are little bit less aware about the benefit shares. PME data show that 44 (37% of 120) members have collected fodder grass for their cattle. All members have received benefit sharing agreements. 73 members (61% of 120) have collected fuel wood from social forestry plantation sites for cooking.

Knowledge Attitude and Practice (KAP) Survey

Knowledge, Attitude and Practice (KAP) surveys are a method of evaluating the effectiveness of training or other forms of knowledge transfer. It is a brief and focused assessment tool which aims to show if respondents who have attended training or other skill development events:

1. Have retained Knowledge of the technology (K)
2. Have a positive Attitude towards the technology (A)
3. Actually Practise the technology (P).

CDSP IV is working with six GoB agencies and four Partner NGOs (brac, DUS, SDI & SSUS) for the development of newly accreted char lands and changing socio-economic conditions of char dwellers. Hugehands on training and counselling have been provided through formation of field level institutions including NGO groups. If the trainees (members of such groups) are not using (or practising) new techniques or technologies provided through training, that would indicate that there exist some problems and barriers which need to be identified. Any knowledge problems indicate that the training was not effective in allowing trainees to retain the knowledge, and there is a need to improve training methodologies or training delivery. Should there be an attitude problem re-examination of viability of the technical information is required.

M&E team of CDSP IV has been conducting KAP surveys every six months since January 2013 and onwards. In this reporting period 495 randomly selected farmers from the list of training participants provided by the four partner NGOs were interviewed. In this connection questionnaires on different activities have been developed with the help of concerned of TA team (Project Agriculturalist, NGO Sector Specialists). The areas where KAP surveys have been conducted are:

- Technical training on field crops with 55 participants from Farmers Forums
- Technical training on IGA (Homestead gardening, Poultry rearing, Cow rearing, Goat rearing and Fish culture) with 275 participants from NGO groups
- Training on Legal and Human Rights with 55 participants from NGO groups
- Health and Family Planning with 55 participants from NGO groups
- Disaster response planning with 55 participants from NGO groups.

For KAP surveys farmers/ participants are randomly selected from the training registers available with the Managers of PNGOs. If it is observed that a farmer due to random selection has been a respondent of previous KAP surveys then he has been dropped and another farmer is selected. The staff members of PNGOs have been very helpful for the two M&E Officers in locating household/ farmers. Till December 2016, 8 cycles of KAP surveys have been conducted on different intervention groups.

KAP Cycles from 2013 to December 2016

Intervention (FLI)	Field crops & homestead gardening (FF)	Homestead Gardening	Poultry Rearing (NGO)	Goat Rearing,(NGO)	Cow Rearing (NGO)	Legal & Human Rights (NGO)	Health & Planning (NGO)	Disaster Preparedness	Fish cult (NGO)
Cycles	8th	8th	8th	7th	7th	7th	7th	5th	2nd

The comparative results between the 1st cycle to 8th cycles of KAP surveys show that all of the surveyed HHs are practicing their knowledge and skills gained from training on **field crop and homestead gardening**. Both knowledge and practice levels of the farmers of NGO Group have a gradual increase for the intervention areas of homestead gardening. For example increase in knowledge level by 68% and practice level by 42% when compared with the year 2013. Similar reflection has been found in practice level i.e. increase by 37% in the case of crops and homestead gardening by FF members compared to year 2013.

KAP data reveal that there has been huge increase (64%) both in knowledge level and in practice level in the areas of poultry rearing by NGO group members. This has been due to introduction of poultry and livestock as sub-component of social and livelihood support (SLL) component. The participants have responded with grateful acknowledgement that they are getting services of poultry workers, trained by hired specialists, organized by CDSP IV. They are getting services of poultry workers in the form of vaccination in lieu of minimum service charges.

In the area of legal and human rights, both knowledge level and practice levels of NGO group members have increased, 56% in knowledge level and 22% in practice level compared to 2013. In the area of disaster management participants' knowledge level has increased by 34% and practice level has increased by 47% when compared with 1st KAP cycle recorded in 2014.

Both knowledge level and practice levels of NGO group members have a gradual increase in the areas of health and family planning services. KAP data show that there are gradual changes in positive directions in most areas.

The 1st cycle of KAP data on NGO group members who have been trained on fish culture have been recorded last reporting period January - June 2016. In the current reporting period 2nd cycle of KAP on fish culture has been recorded. Survey data reveal that knowledge level about aquaculture has creased by 36% and practice level increased by 14% when compared with 1st KAP survey recorded in the previous reporting period.

Results of KAP Surveys

A. Field Crops and Homestead Gardening for Farmers Forum Members

KAP Cycle	Knowledge level (%)			Practices level (%)		
	Poor	Moderate	Good	Practiced	Not practiced	No responses
First Cycle (Jan-Jun 2013)	50	49	1	63	37	-
Second Cycle (Jul-Dec 2013)	21	57	22	78	21	-
Third Cycle (Jan-Jun 2014)	13	48	39	84	12	2
Fourth Cycle (Jul-Dec 2014)	10	54	36	84	15	1
Fifth Cycle (Jan-Jun 2015)	0	17	83	100	0	0
Sixth Cycle (Jul-Dec 2015)	0	15	85	100	0	0
Seventh Cycle (Jan-Jun 2016)	2	9	89	100	0	0
Eighth Cycle (Jun-Dec 2016)	0	18	82	100	0	0

B. Homestead Gardening for NGO Group Members

KAP Cycle	Knowledge level (%)			Practices level (%)		
	Poor	Moderate	Good	Practiced	Not practiced	No responses
First Cycle (Jan-Jun 2013)	40	56	4	54	48	1
Second Cycle (Jul-Dec 2013)	17	68	16	77	21	2
Third Cycle (Jan-Jun 2014)	10	60	30	70	28	2
Fourth Cycle (Jul-Dec 2014)	11	57	32	90	10	0
Fifth Cycle (Jan-Jun 2015)	5	61	34	81	19	0
Sixth Cycle (Jul-Dec 2015)	2	53	45	86	14	0
Seventh Cycle (Jan-Jun 2016)	0	41	59	94	6	0
Eighth Cycle (Jul-Dec 2016)	0	28	72	96	4	0

C. Poultry Rearing for NGO Group Members

KAP Cycle	Knowledge level (%)			Practices level (%)		
	Poor	Moderate	Good	Practiced	Not practiced	No responses
First Cycle (Jan-Jun 2013)	50	47	3	25	67	8
Second Cycle (Jul-Dec 2013)	34	47	19	38	50	12
Third Cycle (Jan-Jun 2014)	18	63	19	51	45	04
Fourth Cycle (Jul-Dec 2014)	12	71	17	47	42	11
Fifth Cycle (Jan-Jun 2015)	6	70	24	82	37	12
Sixth Cycle (Jul-Dec 2015)	8	59	33	62	31	7
Seventh Cycle (Jan-Jun 2016)	2	59	39	81	14	5
Eighth Cycle (Jul-Dec 2016)	0	59	67	89	4	7

D. Goat Rearing for NGO Group Members						
KAP Cycle	Knowledge level (%)			Practice level (%)		
	Poor	Moderate	Good	Practiced	Not practiced	No responses
First Cycle (Jan-Jun 2013)	53	45	2	19	67	14
Second Cycle (Jul-Dec 2013)	33	56	11	24	62	14
Third Cycle (Jan-Jun 2014)	20	57	23	30	65	5
Fourth Cycle (Jan-Jun 2015)	10	64	25	56	22	22
Fifth Cycle (Jul-Dec 2015)	22	52	26	27	67	6
Sixth Cycle (Jan-Jun 2016)	20	61	19	26	71	3
Seventh Cycle (Jul-Dec 2016)	0	73	27	28	67	8

E. Cow Rearing for NGO Group Members						
KAP Cycle	Knowledge level (%)			Practice level (%)		
	Poor	Moderate	Good	Practiced	Not practiced	No responses
First Cycle (Jan-Jun 2013)	46	50	4	18	74	8
Second Cycle (Jul-Dec 2013)	30	60	10	34	51	15
Third Cycle (Jan-Jun 2014)	25	59	19	41	48	11
Fourth Cycle (Jan-Jun 2015)	0	17	83	100	0	0
Fifth Cycle (Jul-Dec 2015)	12	57	31	43	47	10
Sixth Cycle (Jan-Jun 2016)	5	61	34	50	45	5
Seventh Cycle (Jul-Dec 2016)	0	41	59	50	22	5

F. Legal and Human Rights for NGO Group Members						
KAP Cycle	Knowledge level (%)			Practice level (%)		
	Poor	Moderate	Good	Practiced	Not practiced	No responses
First Cycle (Jan-Jun 2013)	65	33	2	4	66	30
Second Cycle (Jul-Dec 2013)	55	38	7	6	51	43
Third Cycle (Jan-Jun 2014)	36	36	27	7	23	71
Fourth Cycle (Jan-Jun 2015)	6	53	41	23	15	62
Fifth Cycle (Jul-Dec 2015)	6	57	37	24	17	59
Sixth Cycle (Jan-Jun 2016)	7	62	31	21	20	59
Seventh Cycle (Jul-Dec 2016)	0	42	58	26	15	59

G. Health and Family Planning for NGO Group Members						
KAP Cycle	Knowledge level (%)			Practice level (%)		
	Poor	Moderate	Good	Practiced	Not practiced	No responses
First Cycle (Jan-Jun 2013)	44	54	2	57	19	24
Second Cycle (Jul-Dec 2013)	19	62	19	63	13	24
Third Cycle (Jan-Jun 2014)	12	53	35	66	13	21
Fourth Cycle (Jan-Jun 2015)	8	57	35	69	11	20
Fifth Cycle (Jul-Dec 2015)	8	54	38	65	11	24
Sixth Cycle (Jan-Jun 2016)	5	55	40	74	8	18
Seventh Cycle (Jul-Dec 2016)	0	40	60	72	4	24

H. Disaster Preparedness for NGO Group Members						
KAP Cycle	Knowledge level (%)			Practice level (%)		
	Poor	Moderate	Good	Practiced	Not practiced	No responses
First Cycle (Jan-Jun 2014)	12	66	22	32	24	45
Second Cycle (Jan-Jun 2015)	5	34	21	28	32	0
Third Cycle (Jul-Dec 2015)	10	65	26	71	27	2
Fourth Cycle (Jan-Jun 2016)	4	58	38	75	24	1
Fifth Cycle (Jul-Dec 2016)	0	58	56	79	21	

I. Fish Culture for NGO Group Members						
KAP Cycle	Knowledge level (%)			Practice level (%)		
	Poor	Moderate	Good	Practiced	Not practiced	No responses
First Cycle (Jan-Jun 2016)	8	63	29	84	15	1
Second Cycle (Jul-Dec 2016)	0	35	65	98	2	0

Appendix-13: Case studies

These case studies are from the draft PCR for PNGO activities (sub-component 4b). There are other case studies in TR 13 and TR 18 as well as in the draft report on sorjon cultivation.

Case study 1: Family planning

Kohinoor Begum and her husband, Kamal Uddin, migrated to Noler char 8 years ago after losing all their wealth and land in Hatiya upazila. After arriving in Noler char, Kohinoor gave birth of one daughter and three sons as there were no family planning or any other services in the char. The family had to lead a very measurable life, in a very poor living environment on the char. They were tortured and dominated by the so-called bahini.

After the start of CDSP-IV; she was enrolled in an SSUS credit group, and was soon was introduced to the local Health and Family Planning Facilitator (HFPF), who told of temporary and permanent methods of family planning. She was living serious hardship due to having a big family, and the HFPF convinced her to use the permanent method as has already four children.

After discussing the matter with her husband, both of them agreed on the permanent method and Kohinoor asked the HFPF to take her to a convenient clinic. Accordingly the HFPF took her to the Family Welfare Centre at Khasher Hat where Kohinoor underwent the procedure. Now she is living happily with her husband and children. She is grateful to SSUS and CDSP-IV.

Case study 2: Traditional birth attendant

Zohura Khatun (age 38) and her husband, Abu Bakar, live at Hazi Idris Miah Bazaar samaj There are five members in their family. Zohura has been working as a traditional birth attendant (TBA) for a long time, but without any training. Before CDSP-IV intervention, she has visited many pregnant women but did not provide them with good advice to follow during their pregnancy. Consequently they encountered many pregnancy complications. She has not counted, but many pregnant women died for the lack of proper advice. Zohura has little education, and could not provide appropriate advice or diagnose the symptoms of risk.

But some women did successfully give birth. But Zohura did not know about the importance of the first course of breastfeeding (colostrum) that is vital for babies to prevent sickness. Instead, she advised the new mothers to feed their babies ‘honey’ or some other liquid stuff. As a result, most of the babies developed stomach sicknesses.

After CDSP IV started its work in her area, Zohura visited the local PNGO branch office, and the branch manager appointed me as one of the TBAs to be supported by the project. The health and family planning staff of CDSP-IV organized a 15-day TBA orientation and training that covered all the critical situations relating to delivery, and to pre- and anti-natal care. Zohura feels that this has made a dramatic change in her work, as she deals with the pregnant women. Now she knows the signs of critical, vulnerable and risky situations during pregnancy. Understanding the risky situations, Zohura can advise women to go to a local hospital where the baby can be delivered safely for both mother and baby. After a safe birth, she advises new mothers to feed the first course of breast-milk (colostrum). Now the babies and mothers are staying healthy all the time, which was not the case before CDSP-IV.

Case study 3: Health services-1

Saleha Begum, now 30 years old, used to live in Tomiruddin union of Hatiya upazila. She married Md Abdul Aziz when she was 16 years old. When they were living in Hatiya, Saleha had three daughters. At the end of 2010 the family lost her house and farm land due to river erosion, so they moved to the then new accreted Caring char, settling on some khash (public) land and building a small house. Her husband was working as a rickshaw puller. After coming to Caring char she gave birth to a son, but lost a lot of blood during the delivery because there was no trained person available to help her. Due to loss of blood she then suffered from malnutrition and various diseases. At that time there were no medical facilities or doctors in the area.

Saleha could not get proper treatment and medicine due to her poverty. She purchased medicine from a local medicine shop but this did not make her better.

One day she got to know that there is a clinic in SSUS Hasina Bazaar Branch, supported by CDSP-IV. After gating this news, Saleha and her husband visited the clinic. The Medical Assistant at the clinic gave her treatment and advice. She got recommended medicine and followed the advice, and is now fully cured. Now all her family are very happy and grateful to CDSP-IV and SSUS.

Case study 3: Health services-2

Shahena Begum and her husband Md. Helal Uddin live on Noler char, having moved here from Hatiya upazila after they lost their house and all their land to river erosion about 10 years ago. On the newly accreted Noler char area they settled on some khash (public) land and built a small house on one side, using the rest of land use for agriculture.

At that time there were no medical facilities or doctor, and no safe water from deep tube wells. In this situation, all her family members suffered from various ailments such as dysentery, diarrhoea and fever. They could not travel far to get a prescription and medicine due to their poverty. They bought medicines from local medicine shops but this did not cure their diseases.

When CDSP IV start its work, they heard that there was now a clinic at the SSUS Al Amin Bazar Branch, supported by CDSP-IV. After getting this news the whole family visited this clinic and get treatment and advice from the paramedic. Now they all free of any kind of disease. They are very happy and thankful to CDSP-IV and SSUS.

Case study 4: Use of microfinance

Mrs Hosneara Begum, aged 50, lived on Hatiya island until the year 2000 when she lost her land to river erosion and became a refugee. Later she and her family (husband, four sons and two daughters) took shelter in the newly accreted char Nangulia. She has now been living here for 12 to 15 years, but when she arrived there were no roads, no DTW for safe drinking water, no schools, no cyclone shelters and no sanitary latrines. The law and order situation was very bad, with *bahini* (pirates) was ruling the char. Natural disaster and poverty was her daily companion. However, she was very hard working, and started rearing poultry at her hut/house. Her husband was manual labourer and one son was driving a rental car in Chittagong district.

SDI, one of the partner NGOs of CDSP-IV, started work at char Nangulia in January 2012. Hosneara joined one of their microfinance groups, and started making regular savings of Tk10-20 per week. She soon got three 3 days IGA training on cow rearing from the project through SDI. With her first loan of Tk5,000, plus some savings, she bought a cow for Tk9,000. Then she took a second loan of Tk15,000 and bought another cow for Tk28,000. Now she was getting 3 to 4 litres of milk per day, selling in in the market for Tk30 to Tk40 per litre, and earning net profit of Tk100 per day. Later Hosneara she took another loan of Tk20,000 and bought another cow for rearing. She was now getting 5 to 6 litres of milk daily. After meeting family demand she was selling milk for Tk40 to Tk50 per litre and making a daily net profit of Tk200 to Tk250.

Hosneara found out at a meeting with the SDI Agriculture Coordinator that there was another opportunity – this time to earn money from vegetable cultivation. She discussed the idea with her husband and in 2015, she was selected for demonstration of vertical gardening, and received one day of training. She was given 11gm of Alavi variety cucumber seed from the project. She cultivated this on a trellis around her homestead and on fallow land. As part of the demonstration she used modern technologies such as: (i) pheromone trap, (ii) Bordeaux mixture, (iii) balanced fertilizer, and (iv) vermicompost. She produced 1500 kg of cucumber and sold it in the market for Tk15/kg, making a net profit of Tk16,880. Hosneara is now interested in cultivating vegetable and fish using the sorjan method of integrated farming.

Hosneara knows that vermicompost is very useful for the land and has received concrete rings and worms to make this from the project. She has taken up fish cultivation, getting two days training on fish culture and three days training on fish nursery. She has used a loan of Tk20,000 loan mostly, for fish culture, earning a net income of Tk80,000. Her most recent loan from SDI was for Tk50,000 due to her success in cow rearing, vegetable cultivating and fish farming. Currently her

vegetables and milk have a reputation of being of good quality and she can sell them at a higher price (Tk3-4) than other farmers.

Hosneara is now economically solvent and self-dependent, and her life is very much better than before. She is grateful to SDI and CDSP-IV for her success. Three years ago, she was lived in a hut, now she has a tin house and her mouth is filled with laughter. She is expecting bright future in her life.

Case study 5: Vertical garden

Moniza Begum now lives at Shohag Chowdhury Gram, on char Nangulia, her family having lost its land on Hatiya island to erosion in 2002. She and her husband, Nur Islam, have two daughters and four sons. Before CDSP IV, Moniza grow some vegetables in her homestead area, but using traditional methods. The family was poor, with a monthly income of only Tk2500 to Tk3000.

When CDSP IV started, Moniza joined a micro-finance group organised by the SSUS, one of the project partner NGOs. At one of the weekly meetings for the group, she met the SSUS Agriculture Coordinator who suggested she a vertical garden. As she was interested in doing this, she was selected to set up and demonstration of 2 decimals. In October 2015 she was given some seed of bitter gourd and 1 kg mustard oil cake (to make quick compost). Moniza used the following technology in her plot:

- Vertical system for climbing vegetables
- High yielding variety seed
- Quick compost
- proper dose of chemical fertilizer
- Pit system (1ftx1ftx1ft) with two seeds in each pit
- Bordeaux mixture to control fungal diseases
- Sex pheromone trap to control fruit fly
- Mulching system to retain moisture

The crop grew well and Moniza harvested 240 kg bitter gourd, of which 30 kg was consumed by her family and 210 kg sold at an average price of Tk30/ kg, earning Tk7,200. Moniza has used this money to help repay her microcredit loan, and to start converting some of their agricultural land for sojorn cultivation – where she can grow these climbing vegetables along with raising fish. She hopes that she will earn more money with this technology.

Case study 6: Fish fingerling nursery-1

Mrs Rezia Begum is 35 years old, abandoned by her husband, and has lived on char Nangulia since 2003. BRAC, one of the partner NGOs of CDSP-IV, started work on char Nangulia in January 2012. Rezia joined a BRAC microfinance group in February 2012,and has been making regular deposits of Tk10 to Tk20 each week with the grup and now has Tk13,500 in her savings account.

Soon after joining the group Rezia received three days training on fish farming and later was trained for another three days in how to manage a fish fingerling nursery. After getting this

training she was given 500 gm of spawn by the project and established fish nursery her pond of 15 decimals. This spawn produced a total of 37,500 fingerlings. After keeping some to grow for home consumption, she sold the rest at a price of around Tk2 each, earning a total of Tk60,500 . As her costs (mainly feed) were only Tk5,700, she made a good profit. Demand for her fingerlings was more than she could supply, so Rezia now plans to expand her nursery pond area.

Case study 7: Fish fingerling nursery-2

Alo Begum is 30 years old, and has lived in Noler char since 2006. Her husband was disabled by an accident three years ago, so she has to support her family. In April 2013 she joined a microfinance groups organised by the Al Amin bazaar branch of SSUS, one of the partner NGOs of CDSP-IV. She has been attending the weekly group meetings and making regular savings deposits – she now has T10,500 in her account. With assistance from SSUS Alo established a plant nursery which has earned her a good profit.

Once the plant nursery was operational, Alo attended three days of training on how to run a fish nursery. After getting the training, she established a fish nursery in a pond of 16 decimals. She received 500 gm of spawn from the project, along with technical support.

Her production cost was Tk6,500 and she produced 26,500 fingerlings. After keeping some for household fish production, she sold the others at around Tk1.50 each, earning a total of Tk22,700. Alo has become a role model of other fish famers in that area.

Case study 8: Fish farmer

Mrs Kuhinur Begum aged 35. migrated to Ziauddin char with her husband, Md. Babul, in 2002 after to losing their land to river erosion. They paid a land grabber Tk40,000 for 140 decimals of land. At that time, Ziauddin was a new char, and there was no safe water, sanitary latrines, or education for their children (one daughter and two sons). Her husband is a daily labourer, and did not earn much, so life was a struggle and they were often short of food and other necessities.

However, after 10 years living on the char, they heard that BRAC was starting its activities on char Ziauddin as a partner of CDSP IV. Kuhinur joined a BRAC microfinance group in 2012 and has been making weekly savings of Tk10 – these have now accumulated to reach Tk7,259.

Since joining the CDSP IV group, Kuhinur has had much support from BRAC and CDSP-IV, including a sanitary latrine, vegetable cultivation, a vermicompost preparation system, health services and fish production. In 2013 Kuhinur was trained for two days as a model fish farmer, and used her 1st loan from BRAC of Tk8,000 for fish culture. Kuhinur and her husband used the money, plus their own capital, to dig a pond and to cultivate fish in that pond. But they did not earn profit as, despite the training, Kuhinur did not really know how to cultivate fish.

Kuhinur has now had five loans from BRAC. Apart from fish cultivation, these have been used for cattle and poultry rearing – these two enterprises have earned a good profit. In 2016 she received

two days training on “Improved Fish Culture Management”. After getting this training, she decided to try fish farming once again. Using money from a loan of Tk25,000, she purchased fingerlings and other inputs (dyke repair, fingerlings, lime, fertilizer and feed etc.). She released 1000 different fingerlings (rui, catla, mrigle, silver carp etc.) in her 18 decimal pond, got technical advice from the BRAC fishery coordinator, and carefully followed what she had learned in the training.

The total production cost was Tk15,000, and 375 kg fish were produced. Kuhinur earned total Tk33,750 from sales of around 320 kg of fish at a price of Tk105/kg, with the rest being consumed by her family. This left her with a good profit of Tk18,750, so she has decided that she will extend her fish farm in future. Now her family’s economic condition is very good.

Case study 9: Goat and poultry rearing

Bibi Joygun aged 40, and her husband Shah Alam used to live in Shahbazpur upazila on Bhola island. They had three sons and two daughters. But then her husband deserted her, and their land, house and other assets were all lost river erosion.

With nowhere to go, Bibi and her five children moved to char Ziauddin, occupying one acre of land, and building a thatched house. Life was a struggle, with various types of disasters and set-backs facing Bibi and her children. They had to pass many days in acute poverty and starvation.

Their life began to improve when CDSP-IV started its development work on char Ziauddin. Bibi Joygun was admitted into a microfinance group set up by BRAC. She received training on improved rearing practices for goats from BRAC under the CDSP-IV IGA training programme. At group meetings she also learned about improved methods of poultry, goat and cow rearing including better housing, feeding, health management etc from the Poultry and Livestock Coordinator of BRAC.

After receiving training, she bought two goats. She applied the knowledge in rearing of goat that she gained in the training. She built slatted-floor house for her goats and started to provide feed as per the requirement of the goat. She also vaccinated and de-wormed all goats, following a schedule of vaccination and de-worming. In this she received necessary veterinary support from local paravets who had been trained by the poultry and livestock program of CDSP-IV. Now the number of Bib’s goats has been increased from two to 10.

Bibi also has 35 chickens and 25 ducks. She has received the necessary poultry vaccination services and treatment from a local woman who had been trained as a Poultry Worker by CDSP-IV. *“Due to proper management, no goat was affected by any type of disease during last 1.5 years and no goat was died at the same time”* she said, going on to say that the health condition of all goats and poultry was quite good. Goats have been regularly breeding and giving birth to two of three 3 kids each time.

Now Bibi is economically much better off than ever before and is able to feed her family well. Many of her neighbours have started goat rearing after observing her success. Bibi Joygun maintains close communication with the Poultry and Livestock coordinator of BRAC. She hopes that the extension services provided under CDSP-IV will be continued in future so that she can run her goat farm properly.

Case study 10: Success story of a paravet

Md. Akhter Hossain is the 22 year-old son of Md. Manik and Mrs Hosneara and lives on Urir char. His mother is a member of a microfinance group organised by SDI (a CDSP-IV PNGO) on Urir char. After he passed his HSC from the Madrasha board, Akhter was unemployed for a long time, and was facing an acute financial crisis with his family.

At end of November 2015 Akhter got the chance to receive training as a Paravet under the poultry and livestock sub-component of CDSP-IV. He received 15 days residential training on primary treatment and vaccination of livestock and poultry at the NRDS training centre, Binodpur, Noakhali. He acquired basic knowledge about different animal diseases, primary treatments, vaccinations and common animal husbandry practice for livestock and poultry as well as practical exposure. After successful completion of training programme he was awarded a certificate on primary treatment and vaccination of livestock authorized by District Livestock officer, Noakhali. He also received a surgical bag from the project. In May 2016, with the help of CDSP-IV and DLS, he also have get the chance of a one month internship placement at the Upazila Veterinary Hospital, Companiganj ,Noakhali for more practical training.

Nowadays Akhter Hossain is providing veterinary services, including treatment and vaccination of livestock, to char dwellers as a trained paravet. He is earning, on average, Tk10,000 to Tk12,000 per month from his paravet profession. He has also started veterinary medicine business by investing tk Tk15,000 to ensure quality veterinary products are available in this isolatedl char area. Now he is better economically established of than ever before, and also provides financial help to his family. Due to his livestock vaccination programmes in the field, there have been no severe disease outbreaks observed in the area. He always keeps in close communication with the NGO sector specialist of CDSP-IV the TA team, DLS, and the SDI branch, for any kind of technical support or advice.

Case study 11: Poultry worker

About 15 years ago Johura Begum (now aged 35) was an inhabitant of Burir Char on Hatiya island but, due to river erosion, her family lost their house and all assets, and migrated to Mohmmadpur samaj on char Nangulia. After a long struggle they got one acre of land. But suddenly her husband left her and they got divorced. After that she led a very measurable life with her two daughters.

When CDSP-IV started, Johura became member of a microcredit group set up by DUS, a CDSP-IV PNGO. To date she has taken seven loans, the last one being for Tk30,000, and has invested these in goat rearing, beef fattening and poultry rearing.

In January 2015 Johura was selected to be trained as a Poultry Worker under the poultry and livestock programme of CDSP-IV. She received three days of residential training on poultry vaccination and treatment at Maijdee, Noakhali and was given a vaccination kit from the project. Then she started working as a Poultry Worker, providing poultry vaccination services in her local area. She gets supplies of vaccines from local the PNGO office with the help of CDSP-IV and DLS. She is now earning an average of Tk2000 to Tk2500 per month from this poultry vaccination service and a small-scale poultry medicine business. From her income she brought 20 Sonali crossbred poultry with some project support. She also has four goats with a slatted floor house, 30 other desi (local breed) chickens and 20 ducks. Apart from her vaccination business, she is earning money from selling goats, poultry and eggs, and has become economically better off than ever before and now lives happily with her two daughters.

Case study 12: Year-round vegetable cultivation

Zohura Begum and her family used to live in Hatiya upazila before losing their land to river erosion in 2006. As a result, they migrated to char Nangulia to find somewhere else to live. She now lives on this char at Rasel gram with her two daughters and two sons along with her husband. At this time, they had little income - their monthly family income was only Tk3000 to Tk3500.

After CDSP-IV started, Zohura joined the Onamika Mohila Group set up by SSUS in Rasel Gram. She attended the regular weekly meetings and deposited regular savings. At one of these meetings she met the SSUS Agricultural Coordinator, who suggested that she establish a year-round vegetable cultivation plot. As Zohura was enthusiastic about this idea, she was selected to have a

demonstration plot and in October 2015 she received 200 gram seed packets of okra, red amaranth, radish, Indian spinach, brinjal, and tomato, along with 5 kg of mustard oil cake (for quick compost) and one pheromone trap. Using these inputs she cultivated a one decimal plot, using the following technology:

- High yielding seed
- Quick compost
- Proper dose of chemical fertilizer
- Bed system (3x1 meter)
- Bordeaux mixture
- Pheromone trap
- Mulching system
- Vermicompost

The vegetables grew well and Zohura harvested 55 kg red amaranth, 5 kg okra, 30 kg tomato, 60 kg radish, 20 kg brinjal, and 40kg Indian spinach. Of this total of 210 kg, her family consumed 55 kg and rest was sold at an average price of about Tk20 per kg, earning Tk3100. Zohura Begum said that before it was due to lack of proper knowledge that we couldn't earn money from vegetable cultivation.

She has used the money to buy some clothes for her children and backyard chickens for her family. She told us that next season she will follow the same technology.

Case study 13: Vermicompost

Fatema Begum arrived in Noler char from mainland Hatiya due to Meghna River erosion 14 years ago. She lives with 3 children along with her husband and mother-in-law. At that time there were no roads, bridges, culverts, cyclone shelters, embankments, educational institutions, safe drinking water, sanitary latrines, transport facilities and vehicles. The law and order situation was very poor, with pirates (locally named *bahini*) ruling the char. The family's socio-economic condition was very bad, with a monthly family income of only Tk2000 to Tk2500, and they had to lead a hand-to-mouth existence.

DUS, one of the partner NGOs of CDSP-IV, started work at Bhumihin Bazar on Noler in 2011. Fatema Begum joined one of their microfinance groups, Gayer Badhu Mohila Samity. At one of the weekly samity meetings, Fatema met the DUS Agriculture Coordinator, and said that she was interested in establishing a vermicompost plant. The Agriculture Coordinator visited her home and selected her for the demonstration which cost only Tk1000. She started with two rings and 500 worms. She took care the plant according to the advice of the Agriculture Coordinator. Since she started she has made near about 750 kg of vermicompost fertilizer, uses 550 kg in homestead vegetable plot and selling 200 kg to her neighbour. She has also sold 700 worms 700 for Tk1 each. In total her plant has produced vermicompost and worms worth about Tk9000.

Fatema is happy with vermicompost as it has made her un-productive saline land productive, and has reduced the need for chemical fertilizer. She has invested the money earned in extension of the vermicompost plant, renovation of their house and education of their children. She feels empowered by DUS and CDSP-IV.