



USAID
FROM THE AMERICAN PEOPLE



Study Report on Selection and Analysis of Value Chains (Final) For Southwest Region



January 06, 2014

USAID's Climate-Resilient Ecosystems and Livelihoods (CREL)

Component 4: Improve and diversified livelihoods that are environmentally
sustainable and resilient to Climate Change

Winrock International

Acknowledgment

This report is produced by **Innovision Consulting Private Limited** for review by the Climate Resilient Ecosystems and Livelihoods (CREL) project, the lead implementer of which is Winrock International. The report is done under purchase order number CREL-INNO-005. The views expressed in the report are of Innovision and its consultants and not necessarily of CREL, Winrock International or USAID.

Innovision Consulting Private Limited would like to thank USAID and Winrock-CREL project for providing us the opportunity to undertake the study. We would like to acknowledge the support provided by Mr. Darrell Deppert, Chief of Party, CREL, especially for his valuable advice and suggestions at the inception phase of the study.

We are also very thankful to Mr. Mahmud Hossain, Livelihood Manager, CREL and his team; Mr. Abul Hossain and P.K Pasha for their valuable guidelines on the design and implementation of the study and also for their restless supports throughout the study.

We are very grateful to the regional coordinator, Mr. Sheikh Md. Ziaul Huque of Khulna, and to the livelihood officer Mr. Touhidur Rahman for their constant and wholehearted cooperation throughout the study period. Otherwise it would have been difficult to conduct the study smoothly. We would also like to acknowledge the contributions and efforts of all the market development officers and livelihood facilitators of the four regions.

We graciously thank the overall cooperation of the Management of CREL, Center for Natural Resource Studies (CNRS), Community Development Center (CODEC) and Nature Conservation Management (NACOM). We thank all the government officials (Forest department, Agriculture department, Fishery department, Livestock department, Department for Youth Development) for their precious time.

Lastly, we would also like to thank all the respondents who gave their valuable time to the research team to get area specific information that helped shape the report.

Abbreviations

Acronym	Abbreviation
AED	Agriculture Extension Department
BADC	Bangladesh Agricultural Development Corporation
BARI	Bangladesh Agricultural Research Institute
BBS	Bangladesh Bureau of Statistics
BDT	Bangladeshi Taka
BFRI	Bangladesh Forest Research Institute
BHMOA	Bangladesh Hotel and Motel Owner's Association
BRAC	Bangladesh Rural Advancement Committee
BRDB	Bangladesh Rural Development Board
BSCIC	Bangladesh Small and Cottage Industries Corporation
CCC	Co-Management Committee and Council
CMC	Co-Management Committee
CPG	Community Patrol Group
CREL	Climate-Resilient Ecosystems and Livelihoods
DAE	Department of Agricultural Extension
DFO	District Fisheries Officer
DLO	District Livestock Officer
DOC	Day Old Chick
DOF	Department of Fisheries
ECA	Ecologically Critical Area
ECOTA	Economic Corporation Organization Trade Agreement
EPB	Export Promotion Bureau
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Statistical Database (United Nations)
GDP	Gross Domestic Product
GI	Geographical Indicator
GOB	Government of Bangladesh
ICS	Improved Cooking Stoves
IDF	Integrated Development Foundation
IGA	Income Generating Activities
IPAC	Integrated Protected Area Co-Management
JDPC	Jute Diversification Promotion Center
MoA	Ministry of Agriculture
MOEF	Ministry of Environment & Forests
MOFL	Ministry of Fisheries & Livestock
MT	Metric Ton
NGO	Non-Government Organization
NP	National Park
NSP	Nishorgo Support Project
PA	Protected Areas
PF	Peoples' Forum

PPI	Pro-Poor Income
R.Ex.	Resource Extractor
RF	Reserve Forest
SHED	Social Health and Education Development
SME	Small and Medium Enterprise
SRDI	Soil Resource Development Institute
SWOT	Strengths, Weaknesses, Opportunities and Threats
TOR	Terms of Reference
ToT	Training of Trainers
TRIPS	Trade Related Intellectual Property Rights (TRIPS) Agreement
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VC	Value Chain
VCA	Value Chain Analysis
VCF	Village Conservation Forum
WS	Wildlife Sanctuary
WTO	World Trade Organization
Bigha	33 decimal
Kani	40 decimal in Chittagong and Cox's Bazaar, 30 decimal in Sylhet region
Lakh/Lac	100,000
Sadar	Administrative center of a district
Upazila	Sub-District

Executive Summary

USAID Bangladesh's Climate Resilient Ecosystems and Livelihoods (CREL) is a five-year project with the aim to scale up and adapt successful co-management models to conserve and protect ecosystems, improve governance of natural resources and increase resilience to climate change. The objective and mandate of the project is to strengthen the ability of the poor and disadvantaged who rely on forest and wetland resources to adapt to climate change, and to improve and diversify their livelihoods, through environmentally sustainable means. In order to identify the alternative livelihoods on which the project can work on, a value chain selection and assessment was carried out. The main objective of the study was to find out the potential value chains and analyzing the value chains to come up with strategies and interventions to ensure sustainable livelihoods for the project beneficiaries of southwest region that lead to reduce pressure on natural resources. The study was conducted in two phases where in phase 1, three potential value chains were identified that meet the project objectives and in phase 2, in-depth value chain analysis of the selected value chains were done.

The study was conducted in line with the USAID guideline for value chain analysis as available on microlinks wiki (<http://microlinks.kdid.org/>) in almost every step. CREL proposed a series of criteria for value chain selection which was adopted by Innovision for the selection exercise. However, due to the special considerations for choosing climate resilient value chains for the project beneficiary who were already selected (listed), slight modifications were made to serve the project's purpose. In the first phase, we used funnel approach to identify and select three potential value chains for the region. The approach used five steps; first, we have reviewed relevant secondary literatures, interviewed CREL staffs and reviewed potential site-wise value chains identified by CREL regional staffs and develop a long list of value chains. Then using cut-off criteria the team has selected 5-10 value chains. The cut off criteria that used was '*Value chains that deplete forest and/or wet land directly will be ineligible for selection*'. Besides cut off criteria 12 more selection criteria were set and weightage assigned against each criterion. Then the team conducted a rapid assessment of the short listed value chains in the field. Overall, 20 in-depth interviews with influential stakeholders along with 7 FGDs with 210 beneficiaries were conducted. In addition, 104 beneficiaries were individually profiled to get a sense of their economic situation and available resources. The findings then were validated with key stakeholders and project staff in a validation workshop. The set of mandates and economic criteria were used to rank the attractiveness of the short listed value chains. Each value chain was given a score against every criterion. Then the highest scored value chains were selected for the region.

The main challenge of the study was to reach all the selected beneficiaries through the selected three value chains which was quite impossible as a significant number of beneficiary do not have minimum resource to engage in any value chain. In this context, consultation with CREL management, the consultants looked at other trades opportunity to the beneficiary for skill development along with the in-depth value chain analysis of the three selected value chains and nature based tourism.

For southwest region, the selected value chains were Tilapia and Carp culture, Sunflower and Vegetable and the identified trades were apiculture, handicrafts, engine repairing, pickles and snacks production, etc. Our estimation is that these value chains and trades will cover majority of the target beneficiaries, if not all of the target beneficiaries of this region.

With the list of selected value chains, a team consisting of lead consultant, value chain analyst and research assistant went to the study region again; southwest. To analysis the selected value chains, the consultants followed the USAID microlink guidelines for value chain analysis. The value chain analysis covered end market analysis, value chain mapping, constraints and opportunities analysis and strategies to address the constraints and utilizing the opportunities. In total 236 respondents of

different type of actors of these three value chains were interviewed in this phase to have in-depth information about the value chains.

Vegetables

In the region, vegetable production currently is 0.32 million tons of summer vegetable and 0.52 million tons of winter vegetables, but it is expected that this can be doubled by adopting special techniques like hybrid seeds, raised bed, pits, etc¹. The vegetables that are grown in these regions include potato, brinjal, bitter gourd, snake gourd, spinach, pumpkin, okra, summer tomato, chili, etc. Based on the data collected, the total market size of vegetables in the project areas is around 35,000 tons, out of which there is at least scope for 28% production to be increased in order to meet the current market demand. Some of the major constraints identified include the lack of knowledge of farmers about using proper inputs and cultivation techniques. This can be addressed by ensuring that input suppliers in the region have better linkages with input companies so they can be trained to provide information about the right use of inputs and also give advice about cultivation techniques to the producers. Along with this, trainings, field days and demonstration plots will help to promote vegetable cultivation and build the capacity of the producers. Facilitation of linkage between farmers and farmer groups with traders, and also traders with forward market actors can be done to ensure consistent demand for vegetables. Thus, the vegetable value chain can expand to meet the growing demand in the region.

Tilapia and Carp Fish

Khulna provides a significant portion of country's total fish production. This region is well known for Shrimp and prawn culture. Khulna also supplies a good amount of Carps (Rui, Catla, Silver carp etc.), Tilapia and capture fish (from rivers and canals). But the project beneficiaries are not utilizing homestead ponds properly for commercial fish cultivation. The major constraints identified include the lack of knowledge and access of farmers about using proper inputs and cultivation techniques. That can be addressed by facilitating the linkage between input companies (hatcheries, feed companies etc.) and input retailers in these regions to help them supplying quality inputs and information about proper cultivations techniques. Trainings, field days and demonstrations will also encourage more homestead fish polyculture and thus increasing the income generation for marginal farmers.

Sunflower

Bangladesh's need for edible oil is annually around 6 lac tons, whereas the production is only around 2 lac tons². To meet that gap different types of edible oils are imported, Sunflower is one of them. Sunflower oil is a good substitute of soybean oil as it is healthier and cheaper. So, there is scope for it to be a competent product beside imported oils. Sunflower is a saline tolerant species; commercial production will ensure high profitability from very low investment. In recent years, Sunflower cultivation has been introduced in the Southern regions of Bangladesh. Current production of sunflower seeds from the project areas is approximately 550 tons. The market for sunflower has not yet been well established but upcoming opportunities are showing with local companies planning to start their own sunflower oil brands and exporters looking to export sunflower seeds. Some of the constraints include unavailability of quality seeds, lack of knowledge of proper cultivation techniques, unwillingness to produce sunflower commercially, rigidity to grow traditional crops only (profitable or not), weak linkage between value chain actors etc. which can be solved by improving the service provision (seed retailers, information provider), facilitating linkage between traders, private companies and farmers in order for the smooth operation of the value chain.

¹ Master Plan for Agricultural Development in the Southern Region of Bangladesh

² <http://www.khulnanews24.com/index.php/local-news/255-initiatives-for-sunflower-production-in-saline-environment-of-southern-bangladesh.html>

Table of Contents

ACKNOWLEDGMENT	I
ABBREVIATIONS	II
EXECUTIVE SUMMARY	IV
1. BACKGROUND AND CONTEXT OF THE ASSIGNMENT.....	2
2. OBJECTIVES	2
3. SCOPE OF WORK	3
3.1 Geographic Scope.....	3
3.2 Demographic Scope.....	3
3.3 Methodological Scope	4
3.3.1 The changing face of poverty.....	4
3.3.2 Need for market-based approach	4
3.3.3 Market-based approach: Challenges and opportunities	4
3.3.4 Need for Value Chain Analysis	5
3.3.5 Climate Resilient Value Chain Analysis	5
3.3.6 Advantages of Livelihoods Development with Value Chain Approach	7
4. METHODOLOGY	8
4.1 Approach of the Value Chain Selection	8
4.1.1 Secondary Literature Review and KII to generate first list of potential value chains and value chain Selection criteria	8
4.1.2 Screening using cut-off criteria	10
4.1.3 Primary Field Investigation.....	11
.....	11
4.1.4 Validation Workshop and Ranking Exercise	12
4.2 Approach to Value Chain Analysis	12
4.2.1 Literature Review	12
4.2.2 In-depth Interviews.....	13
4.2.3 Questionnaire Surveys.....	13
4.2.4 Data Analysis	14
4.2.5 Strategy Workshop	15
5. VALUE CHAIN SELECTION FOR SOUTHWEST REGION	17
5.1 Climactic Assessment of the Target Area	17
5.1.1 Overview of the Natural Resources and Biodiversity in Area	17
5.1.2 Environmental and Climate Change Issues Present in the Area.....	18

5.2	Community Profile of the Target Area	19
5.2.1	Beneficiary Profile	19
5.2.2	Infrastructure and Operating Environment	20
5.2.2	Status of Natural Resource Dependency	23
5.2.3	Engagement in Commercial Activities	24
5.3	Value Chain Selection.....	25
5.3.1	Preliminary List of Value Chains	25
5.3.2	Eligible Value Chains	26
5.3.3	Value Chains Left Out from the List	26
5.3.4	Attractiveness Measure for the Eligible Value Chains	27
5.3.5	Summary of Scores and Ranking of Value Chains.....	29
5.3.6	Tentative Outreach with the Shortlisted Value Chains and Trades	32
	Other Trades.....	35
6.	VALUE CHAIN ANALYSIS FOR VEGETABLE	38
6.1	Brief Overview	38
6.2	End Market Analysis	40
6.2.1	Main Market, Buyers & Competition	40
6.2.2	Demand/ Supply Situation	41
6.2.3	Market Opportunity	41
6.3	Value chain map and analysis of value creation activities	42
6.3.1	Value Chain Actors, Functions and Map	42
6.3.2	Business Enabling Environment	43
6.3.3	Vertical Linkages.....	43
6.3.4	Horizontal Linkages	43
6.3.5	Performance of the Value Chains and Scope for Upgrading.....	45
6.4	Value Chain Governance.....	47
6.5	Inter-Firm Relationships.....	47
6.6	Assessment of the regulatory environment and support services	47
6.7	Poor/Resource-dependent People, Youth and Gender Analysis	48
6.8	SWOT Analysis.....	48
6.9	Constraints Analysis.....	49
6.10	Recommendations.....	50
6.11	Intervention details.....	51
7.	VALUE CHAIN ANALYSIS FOR TILAPIA AND WHITE FISH.....	53
7.1	Brief Overview	53
7.2	End market analysis.....	54

7.2.1	Main Market, Buyers & Competition	54
7.2.2	Demand/ Supply Situation	54
7.2.3	Market Opportunity	55
7.3	Value chain map and analysis of value creation activities	55
7.3.1	Value Chain Actors, Functions and Map	56
7.3.2	Business Enabling Environment	57
7.3.3	Vertical Linkages.....	58
7.3.4	Horizontal Linkages	58
7.3.5	Performance of the Value Chains and Scope for Upgrading.....	58
7.4	Value Chain Governance	59
7.5	Inter-Firm Relationships.....	60
7.6	Assessment of the regulatory environment and support services	60
7.7	Poor/Resource-dependent People, Youth and Gender Analysis	60
7.8	SWOT Analysis.....	61
7.9	Constraints Analysis.....	61
7.10	Recommendations.....	62
7.11	Intervention Details	63
8.	VALUE CHAIN ANALYSIS FOR SUNFLOWER.....	65
8.1	Brief Overview	65
8.2	End market analysis.....	66
8.2.1	Main Market, Buyers & Competition	66
8.2.2	Demand/ Supply Situation	66
8.2.3	Market Opportunity	66
8.3	Value chain map and analysis of value creation activities	66
8.3.1	Value Chain Actors, Function and Map	67
8.3.2	Business Enabling Environment	68
8.3.3	Vertical Linkages.....	68
8.3.4	Horizontal Linkages	68
8.3.5	Performance of the Value Chains and Scope for Upgrading.....	68
8.4	Value Chain Governance	70
8.5	Inter-Firm Relationships.....	70
8.6	Assessment of the regulatory environment and support services	70
8.7	Poor/Resource-dependent People, Youth and Gender Analysis	70
8.8	SWOT Analysis.....	71

8.9	Constraints Analysis.....	71
8.10	Recommendations.....	72
8.11	Intervention details.....	73
9.	TECHNOLOGY INNOVATIONS IN VALUE CHAINS	74
	ANNEX 1: TERM OF REFERENCE	76
	ANNEX 2: DETAILED FIELD PLAN FOR ALL REGIONS.....	80
	ANNEX 3: DATA COLLECTION TOOLS FOR ALL REGIONS.....	83
	ANNEX 5: RESPONDENT LIST FOR ALL REGIONS (PHASE 1 & PHASE 2)	101
	ANNEX 6: REFERENCES	130

List of Tables

Table 1: Geographic distribution of study area	3
Table 2: Criteria Definition, Relative Weightage and Justification	9
Table 3 Category of respondents in each region	13
Table 4: Composition of primary data collection	14
Table 5: Age distribution	19
Table 6: Economic profile of the target beneficiaries	20
Table 7: Amount of Resource Extracted	24
Table 8: Beneficiaries' engagement in commercial activities other than resource extraction	24
Table 9: Justification for leaving out few value chains	26
Table 10: Site wise prevalence of the value chains	30
Table 11: Attractiveness scores for different value chains	30
Table 12: Site wise potential Outreach for Vegetables	33
Table 13: Site wise potential Outreach for Tilapia and Carp	33
Table 14: Site wise potential Outreach for Sunflower	34
Table 15 Site specific CBA- Dacope/Koyra	38
Table 16 Site specific CBA- Chadpai	39
Table 17 Site specific CBA- Munshigonj	39
Table 18 Site specific CBA- Sharankhola	40
Table 19 Market Analysis for Vegetables	40
Table 20 Yield gap of different vegetables	45
Table 21: SWOT Analysis for Vegetable Value Chain	48
Table 22: Constraints Analysis for vegetables value chain	49
Table 23: Intervention design table for Vegetables	50
Table 24 Site Specific CBA for Fish culture	54
Table 25 Market analysis for Fish value chain	54
Table 26: SWOT for Tilapia and White Fish Value Chain	61
Table 27: Constraints Analysis for Tilapia and White Fish Value Chain	61
Table 28 intervention design table for fish value chain	62
Table 29 CBA of Sunflower	65
Table 30: SWOT Analysis for Sunflower Value Chain	71
Table 31: Constraints Analysis for Sunflower value chain	71
Table 32: Intervention design table for Sunflower value chain	72
Table 33: Technologies to be adopted in the proposed value chains	74

List of Figures

Figure 1: Normal Value Chain Process.....	5
Figure 2: Climate Resilient Value Chain Process	6
Figure 3: VC Selection Funnel- The Step by Step Approach for Value Chain Selection	8
Figure 4: Respondent Type.....	11
Figure 5: Type of respondents in the value chain selection phase.....	11
Figure 6: Steps of the Study Process	12
Figure 7 Value Chain Map for Vegetable.....	44
Figure 8 Value Chain Map - Tilapia	57
Figure 9: Value Chain Map for Sunflower	67

List of Charts

Chart 1: Literacy status of the beneficiary.....	19
Chart 2: Seasonal income status of the beneficiaries.....	20
Chart 3: Income Status of the Extractor	23
Chart 4: Beneficiaries' experience of commercial activities other than resource extraction	25
Chart 5 Beneficiary profiling	32
Chart 6Total Vegetable Market Size	41
Chart 7 Traded Volume (MT)	46
Chart 8: Total Market Volume (5000 MT)	55

Part I: Introduction

1. Background and Context of the Assignment

Traditionally, rural inhabitants in Bangladesh relied on the resources extracted from natural sources like forests, wetlands, rivers, and sea for their livelihood. Till date, livelihood of the poor, especially, those having limited or no access to land is still dependent on these resources. However, the increase in population means more extraction of these resources. Hence, relying only on natural resources for livelihood has become difficult for the resource extractors. At the same time, due to excess resource extraction, the sources are not being replenished naturally, resulting in adverse climatic effects. Under this circumstance, alternative livelihood options are required for these resource extractors, which will reduce their dependence on natural resource extraction, as well as improve their livelihoods through increased income.

From March, 2013 Winrock International and the partners have started implementing the Climate-Resilient Ecosystems and Livelihoods (CREL) project to conserve ecosystems and protected areas in Bangladesh. They aim to improve governance of natural resources and biodiversity, and to increase resilience towards climate change through improved planning and livelihoods diversification. The project works on the four broad geographic areas/regions in Bangladesh targeting beneficiaries that are disadvantaged, poor/ultra-poor, women and youth who are dependent on natural resources.

This study intended to identify and analyze value chains in the target areas that can potentially reduce pressure on natural resources through enhancing the livelihoods of the target beneficiaries through alternative income sources. Innovision Consulting Private Limited has conducted the study according to the guidelines provided by CREL and executed the proposed assignment through submission of this Value Chain Selection and Analysis Report.

2. Objectives

The objectives of the study are:

Phase 1: Analyze all potential Value Chains and select 4 Value Chains (including Nature based tourism which is preselected) for full analysis of the region according to the criteria mentioned below;

- Climate Resilient – Value Chains that are climate resilient and/or has the potential to reduce risk from climate change threats.
- Potential to reduce extraction of natural resources
- Ensured Market Demand and/or Opportunity to link with markets
- Potential to increase income of the marginal and vulnerable populations who have small amount of land or totally landless
- Potential to create employment throughout the value chain
- Potential to incorporate women and youth
- Potential to involve MSMEs
- Potential for growth
- Potential to be benefited from the available support services
- Suitable for the economically disadvantaged area particularly in the landscape/wetland area of CREL regions

Phase 2: A detail analysis of the selected value chains to get a vivid picture of each value chain and to formulate the strategy/interventions to strengthen the value chains and create scope for sustainable livelihoods.

3. Scope of Work

3.1 Geographic Scope

The assignment was carried out in the protected areas, core zones and buffer zones of the forests and wetlands in the following specific geographic locations:

Table 1: Geographic distribution of study area³

Regions	Districts	Upazilas	Sites
Southwest Region	Bagerhat	Sarankhola, Mongla, Morrelganj and Rampaul	Sundarbans (WS and RF)
	Khulna	Dacope and Koyra	Sundarbans ECA
	Satkhira	Shyamnagar	

3.2 Demographic Scope

We understood that the target beneficiaries for the project are disadvantaged poor/ ultra-poor households, including women and unemployed youth, dependent on natural resource extraction for their livelihood. To analyze the prospect for inclusion of these communities in formal value chains, it was essential that all existing actors in the prospective and selected value chains are interviewed as respondents in addition to the target beneficiaries. Therefore, the scope of the study included all value chain actors irrespective of their social and economic conditions, in addition to the core target beneficiaries of the CREL project.

³ Terms of Reference

3.3 Methodological Scope

3.3.1 The changing face of poverty

The general understanding of poverty has changed in the past two decades. It is now widely accepted that poverty is dynamic (people move in and out of poverty) and multidimensional (limited access to services and social networks are as important as insufficient incomes). Vulnerability is an important concept in understanding poverty. It relates to risk and people are vulnerable to poverty when they are more at risk than others, due to factors at household level (e.g. ill health), community/ regional level (e.g. drought) and national level (e.g. policies which affect the costs of goods and services).

3.3.2 Need for market-based approach

Establishing a new value chain or entering an existing value chain are both challenging endeavors for smallholder marginalized groups. Even if a market opportunity is recognized, smallholders still require entrepreneurship, business skills, education, and a range of other assets to start an enterprise to commercially compete with the market actors. Business and entrepreneurship skills and orientations are usually challenging to acquire in the rural areas particularly for the smallholder marginalized groups. There is often a high degree of illiteracy, poor understanding of market dynamics and market interface, inadequate access to capital and finance, lack of appropriate resources such as land, tools and equipment, as well as poor negotiating skills and poor economy of scale that increases the difficulties faced by smallholders in starting up a value-adding enterprise. Thus, one-time solutions to the current problems facing these individuals lack lasting impact as the market dynamics change, bringing new challenges and new problems. Consequently, there rose a need for market-based approach which, instead of providing direct assistance to these individuals for immediate solutions; provides technical and facilitating assistance to enable the individuals to solve their current problems as well as future ones for a more sustainable impact.

3.3.3 Market-based approach: Challenges and opportunities

Although the focus of CREL has been to increase the participation of smallholder marginalized groups in higher-valued product value chains, a particular emphasis has been on the promotion of market-oriented, often of specialized products, with support from either the private sector or public sector, and facilitated through NGO's and other international development agencies. However, in such high-value product value chains, the targeted smallholders have limited control. Power is often concentrated among one or a few chain participants that coordinate market activity. As the high-value product is based on consumer assurance, high standards for quality and safety, competitive price, and reliability of supply, lead actors in retail or export often coordinate the value chain members. The ability of smallholder farmers to take the lead is limited, as is their ability to maximize economies of scale. The market is also constantly changing, requiring rural farms and firms to respond and innovate by, for example, switching market channels, changing how they are organized, or investing in equipment. Such value chains may thus be less appropriate for many smallholder actors, who may lack the ability to handle dynamic markets and comply with their increasing amount of cultures, customs, regulations and standards.

The focus is on identifying the potentials of local value chain development through in-depth analysis of successful smallholders.

Local value chains that meet growing local demand might be more within the reach of smallholders. Local markets may also be characterized by new consumer demands due to changing lifestyles and increased knowledge of the benefits of a more diversified products. Recently local value chain development has been advocated by environmentally conscious consumers demanding local farm products that they perceive as being of higher quality, leading to a rise in the number of specialty and local markets. Many

producers have taken advantage of this trend by selling their produce at the growing number of local farmers' markets and/or directly to customers, thus creating local product value chains. The present study primarily focuses on identifying the potentials of local value chain development in the CREL working areas through an in-depth analysis of successful smallholder initiatives in local value chains that could give valuable insights on how to develop value chains based on local resources and context.

3.3.4 Need for Value Chain Analysis

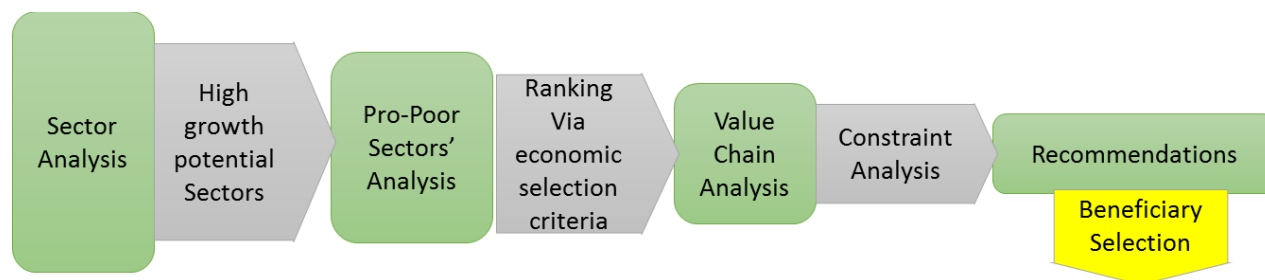
Although Bangladesh presents a story of decline in rural poverty during recent times, coupled with expansion of the non-farm sector, a stagnant agriculture output (and also low productivity) as well as low growth in wages, the expansion of workers in the non-farm sector, though an encouraging trend about the potential of the sector in terms of employment, has however not demonstrated the capacity of the sector to provide growing wages and incomes to the workers. There is thus pressing need for looking more closely at the possibilities of promoting rural livelihoods in specific regions such as the working areas of CREL. The present study may thus be seen within the above larger canvas of poverty, livelihoods and employment.

3.3.5 Climate Resilient Value Chain Analysis

The objective of the project is to strengthen the ability of the poor and disadvantaged who rely on forest and wetland resources to adapt to climate change, and to improve and diversify their livelihoods, through environmentally sustainable means. The study was aim to identify three potential value chains that have significant income increase and employment opportunity for the CREL targeted beneficiaries who are already listed by the project.

In traditional value chain analysis process we start at the end-market to find the most lucrative pro-poor value chains and then work backward through the value chain to reach the beneficiaries of the selected value chains, wherever they may be. The process is summarized below:

Figure 1: Normal Value Chain Process



However, this process is not perfectly suited to VCA for Climate Resilient Value Chains due to the following reasons:

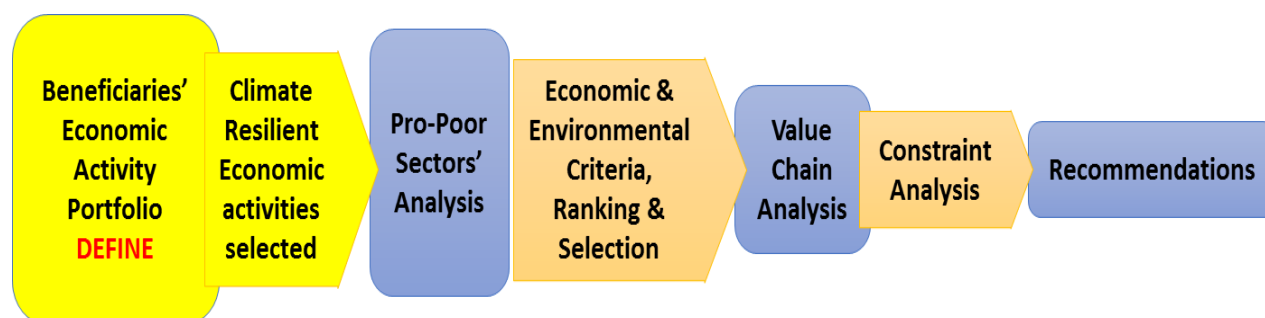
1. The beneficiaries of CREL have already been selected, limited to specific areas.
2. They live within Protected Areas, which due to infrastructural challenges and special institutional constraints mean that the identified end-market is often completely irrelevant to their current economic situation.
3. The project has diversified and wide range of working areas (4 regions with 23 sites, 1000 Village conservation forum, 45 Co-management committee, 8 RMOs) adjacent to protected and wetland area.
4. Location and beneficiary of the project are preselected and their capabilities well known

5. The selected value chains should have climate resilience and supportive to the natural resource management
6. The value chains should have year round income opportunity with a minimum market facilities and support to better NRM
7. Most disaster prone and vulnerable location VS functional market
8. Sustainability VS local practice and behavior
9. Value of Natural resources VS opportunity of exiting localized market
10. Many of the constraints are known like- commercial practice, private sector interest, volume of production, scale of production, assets, access to support market, vulnerability extent, survival condition, existence of market player and infrastructure, stakeholders
11. Region specific target beneficiaries to reach through value chains
12. The project will not provide any direct subsidy to the beneficiaries
13. The project has a provision of skill based capacity building

So we have limited scope to look at the community level rather look at the specific households who are listed as CREL beneficiary. We have kept our lens on the beneficiary of the project not to the region. In this context, we had to have preliminary idea about the CREL beneficiary's economic activities, experience in different income generating activities, existing resources and their demographic status. But in the traditional value chain analysis we need to start from the sectors where we identify the value chains that have maximum participations of the project target people who are not identified initially. Besides, if we follow the normal value chain analysis approach there might be a chance to select a value chain that have higher growth potential but low participation of the CREL targeted beneficiaries. For example, in Southwest region, Shrimp value chain has highest income increase opportunity and also has good growth potentiality but no participation of the CREL beneficiaries. This value chain is not suitable for them as well as its need high investment and improved technical know how for cultivation. The geographic dispersion of the project sites and dissimilarities of the project beneficiary in terms of available resources and skill in potential value chains guide us to do the clubbing of potential value chains where multiple value chains were clubbed together to ensure maximum participation of the beneficiaries. For example, under vegetable value chain we clubbed different vegetables like radish, okra, chili etc. that ensured maximum outreach for the project.

This approach was slightly modified in the value chain selection phase considering the special features of CREL project. The study began by looking into the beneficiaries' economic activities first and then narrowing down the choices based on both economic potential and climate resilience to few VCs for deeper analysis via a rigorous selection process. The process is summarized below:

Figure 2: Climate Resilient Value Chain Process



3.3.6 Advantages of Livelihoods Development with Value Chain Approach

The key advantages of combining livelihoods and value chain analyses are summarized as follows:

- Livelihoods analysis goes beyond costs and prices, income and consumption to provide complementary information to assess (rather than measure) the choices that people make in particular contexts. It helps in explaining what is sometimes termed “weak supply responses” to trade liberalization, for example, when farmers have not responded to higher prices on one crop by producing more of it. It recognizes that other outcomes besides increased incomes are important to people – for example, food security, or more secure rather than higher incomes, or a more sustainable use of natural resources. It allows an assessment of possible trade-offs between outcomes.
- Value chain analysis, provides an essential picture of how the local smallholders interacts with the large markets and the way in which some firms may influence the workings of actors in other parts of the chain. The way in which pressure on prices and costs are often transmitted from retailers to producers has a critical bearing on the potential for enhancing livelihoods through supply chains for particular products.
- As a result both livelihoods and value chain analyses were combined and at the same time the entire assessment was conducted in a participatory way – either in the sense of generating data and understanding with different stakeholders or more powerfully, facilitating learning and action by people who are targeted by particular economic and trade issues based on the market dynamics. It was observed that increasing the involvement of different stakeholders, particularly those who are usually marginalized, contributed more in effectively in the process of designing interventions for income generation.

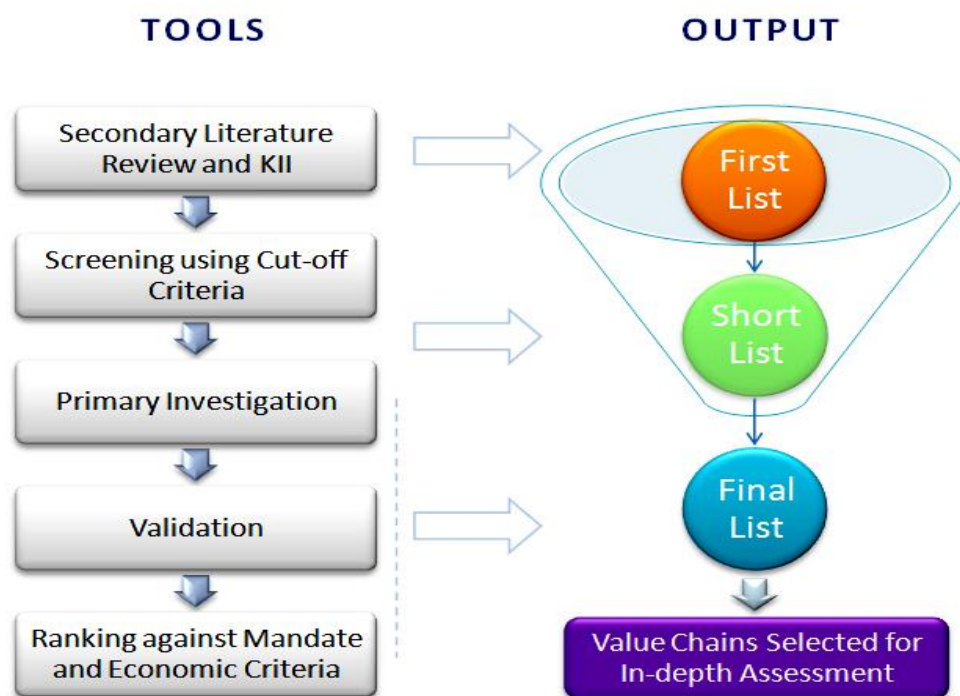
4. Methodology

The study was conducted in two phases where Value Chain Selection in Phase-1 and Value Chain Analysis in Phase-2. In each step of the process, the project personnel of CREL worked with the team in every step, validating the outcomes at each step.

4.1 Approach of the Value Chain Selection

Innovision used a funnel approach to identify, analyze and select potential value chains for a project intending to invest in value chain development. The approach (figure 1) uses five tools to generate three outputs the last of which are final list of value chains selected for in-depth assessment to design interventions of the project

Figure 3: VC Selection Funnel- The Step by Step Approach for Value Chain Selection



4.1.1 Secondary Literature Review and KII to generate first list of potential value chains and value chain Selection criteria

The consultants reviewed all relevant literature on value chain analysis, sector and subsector studies, CREL project papers, policy documents, case studies that are relevant to development interventions in the selected regions. Several key informants interview were also conducted at this stage to develop the first list of potential value chains. The key informants also included CREL staffs having significant experience on value chains in the selected region. A first list of potential value chains for each region was developed.

Based on the literature and interviews with the CREL staffs, one cut-off criteria and twelve criteria for value chain selection were developed.

The cut-off criteria are usually those that are highly related to the project's mandate and therefore its capacity to deliver results. It is noted that the cut-off criteria are used so that value chains in which the project has least scope for contribution are eliminated. This helps increase relevance and efficiency of the screening process. The Cut-off criterion that was used in the screening of the first list of value chains is given below:

Value chains that deplete forest and/or wet land directly will be ineligible for selection

The relative weightages were given to each of the selected criteria based on the importance in consultation with CREL team. The following table depicts the definition, relative weightage and justification for each of the selected criteria:

Table 2: Criteria Definition, Relative Weightage and Justification

Criteria	Definition	Weight	Justification
Climate Tolerance (Low tolerance=1 High tolerance=5)	Climate tolerance is the ability of social or ecological system (<i>inside the value chain</i>) to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change. <small>(IPCC.ch)</small>	3	If there is low climate tolerance, it will likely have high resource requirements and thus not be chosen. Non-resilient crops will already be eliminated by the cut-off criteria.
Climate Resiliency (Low resiliency=1 High resiliency=5)	Climate change resilience is the capacity of an individual, community, or institution (<i>within the value</i>) chain to dynamically and effectively respond to shifting climate impact circumstances while continuing to function and prosper. <small>(IPCC.ch)</small>	3	Climate resiliency is one of the core mandates of CREL project which leads to its high weightage
Resource Extraction Minimization (Not minimized=1 Highly minimized=5)	The chosen value chain must reduce and minimize the pressures on the natural resources in the environment; it should be a more eco-friendly alternative to their current income-generating activity.	5	Since this is one of the core objectives of the project, it has the highest importance
Women and Youth Inclusion (Low inclusion=1 High inclusion=5)	The value chain involves women and youth in its operation and creates employment opportunity for them.	5	This is also one of the core project aims and thus has high weightage
Outreach (Low outreach=1 High outreach=5)	Number of beneficiaries the developing the value chain would directly and indirectly impact.	2	While being one of the main indicators of the Project's success, since the beneficiaries are limited within very specific areas, the outreach number is not the most important aspect of the project.
Growth potential (Low growth=1 High growth=5)	This criterion measures the estimated feasible demand for the value chain product/service in the local, national or international market and growth trend of that market.	5	One of the core market criteria, it is crucial for the chosen value chain product/service to have a lucrative and growing market to attract beneficiaries away from their current source of income. Entering a new source of income requires investment in terms of time, labour and money for tools, inputs etc. The value chain product/service must have clear potential to convince the beneficiaries that it will be worth it.
Income (Low income increase=1 High income increase=5)	Potential monthly income to be generated from choosing the listed value chain: • Area farmed • Yield • Cost of production	5	Regardless of how climate resilient a value chain may be, it must generate significantly higher income than their current source, or it will not be adopted. Thus, the highest weightage is assigned.

	<ul style="list-style-type: none"> Quantity sold Revenue 		
Private sectors participation (Low interest=1 High interest=5)	<p>The presence of private sector firms who are willing to promote the listed product/service and work with the beneficiaries to develop the production base or market channel.</p>	3	<p>Presence of willing private sectors is important for the feasibility of intervention in an M4P approach to value chain development. However, generally if private sector firms are not present, they can be found and involved through linkage building interventions, while project support with financial and human resources makes them willing to cooperate. Thus, it is not as important for this factor to be present for value chain selection.</p>
Development priorities and favorable policy of government (Low priority & favorability=1 High priority & favorability=5)	<p>Government departments and offices located within project area along with others providing support services like NGOs and other project offices.</p>	3	<p>The project areas all lie close to protected areas identified by the government. Thus, there would be additional restrictions and legalities concerning economic activities, project operations etc. In particular, development of new value chain of products/services might be of particular interest to the government's policies concerning these areas. Thus, it is important for the chosen value chain to have the approval of the government policies and their favorability would be an added advantage.</p>
Synergy and potential collaboration (Low synergy=1 High synergy=5)	<p>Complementarity of value chain with other projects in the area</p>	3	<p>Protected areas remain in focus for other projects and initiatives. As such, if the chosen value chains match those of other projects, there lies a scope for CREL to collaborate with them for synergistic impact on beneficiaries.</p>
Risk (High risk=1 Low risk=5)	<ul style="list-style-type: none"> Entry barrier Capital intensive Business risk <p>Every value chain would have its own risk of failure attached with it. Generally, economic activities with greater risks and greater investment also have greater profits. This criterion would judge the potential return in each value chain in terms of sustainable income versus the risk of failure.</p>	4	<p>Considering the beneficiaries, who are very poor, the value chains selected must balance investment with return. The income generated from these potential value chains should be sufficiently higher than their current source while keeping the investment requirements and other risks low in order to make the beneficiaries willing to change. The project aims to facilitate these transitions and assist in minimizing the initial risk with better knowledge, market access and support services. Thus, slightly higher risks should not be a factor for which a value chain should be discarded; resulting in its lower weightage compared to other criteria.</p>
Scope for value addition (Low scope=1 High scope=5)	<p>This criteria judges the scope for developing the beneficiaries' current source of income to move them to a product/service with higher value addition</p>	3	<p>Current beneficiaries are involved in value chains which are not dependent on natural resource extraction. However, due to the limited income from them, they also engage in other activities of resource extraction to supplement their income. If these value chains can be developed for higher value addition and thus higher income, the beneficiaries would be more willing to stop or minimize the resource extraction based activities. However, these value chains may be promoted regardless of value addition since they do not depend on natural resource extraction and it will be more feasible to encourage income generating activities the beneficiaries already do rather than move them to a completely new one. Thus, a relatively lower weightage is assigned compared to other criteria.</p>

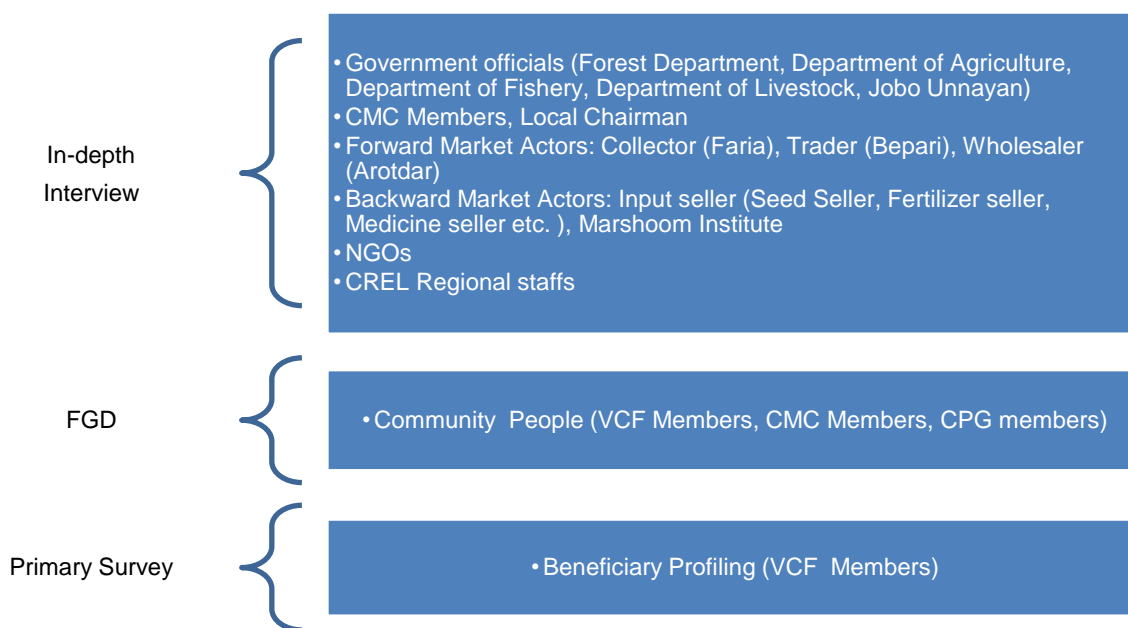
4.1.2 Screening using cut-off criteria

Once the first list of value chains developed, a short list of value chains is derived by using the cut-off criteria. That is, the value chains that have passed through the cut-off criteria were selected for the next step. A list of 8-10 value chains were selected for the region.

4.1.3 Primary Field Investigation

Once the short list was developed, the consultants prepared a checklist in light of the criteria that would be used to compare the attractiveness of the potential value chains. This checklist was used to collect information on all the short listed value chains in each region. During the primary investigation, the consultants conducted in-depth interviews with government officials, forward market actors and backward market actors in the region and in the country, NGO staffs, staffs from other projects engaged in the region and CREL staffs. In this stage, a beneficiary profiling is also conducted through the CREL regional staffs to have better understanding about the community people. Besides, project staffs were also joined in the primary investigation with the consultants and were updated about the findings. They had provided necessary recommendation to the consultants on the field. The tools that were used in the primary investigation and also the type of respondents in field are shown by the following chart:

Figure 4: Respondent Type



The following table summarized the total number interviews conducted in the study area:

Figure 5: Type of respondents in the value chain selection phase



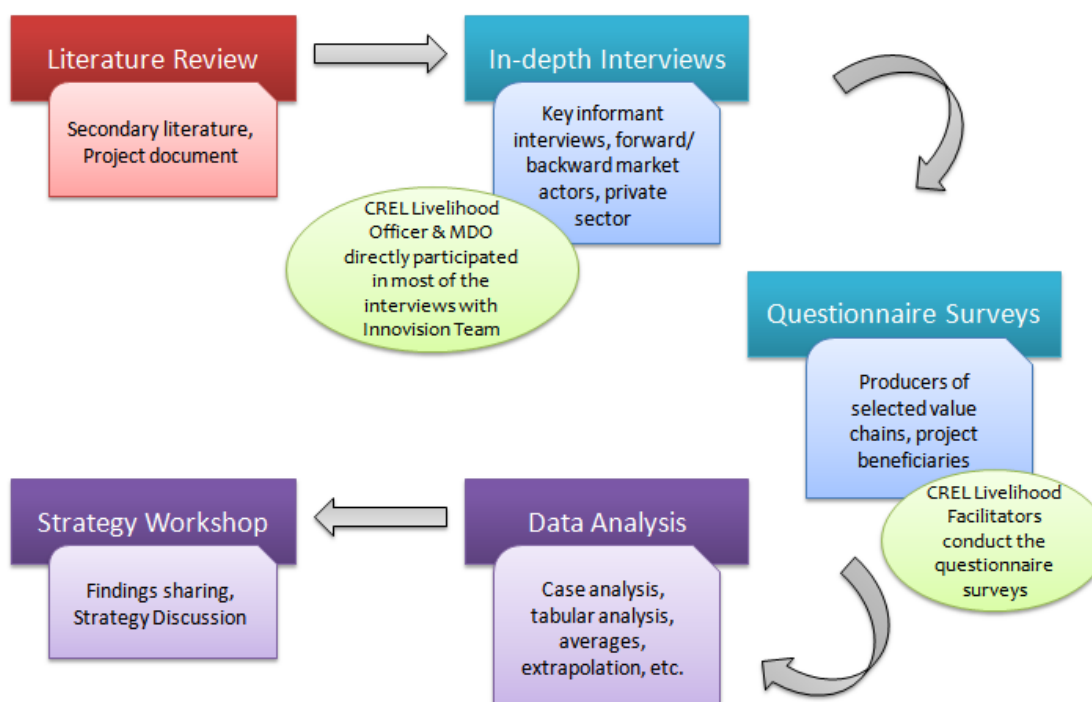
4.1.4 Validation Workshop and Ranking Exercise

After completion of field investigation the information were duly analysed and a daylong validation workshop was organized in Khulna where CREL staffs, different government officials of relevant fields, project beneficiaries, representative of local government, representative of CMC were present. The field findings were shared in the workshop and validated by the participants. Then a ranking exercise was conducted with the direct participation of participants and the top three value chains were derived based on the highest ranking.

4.2 Approach to Value Chain Analysis

Once the value chains were selected, we began with the analysis. The study process started with the literature review, followed by in-depth interviews and questionnaire surveys. The accumulated data was then analyzed and shared in the strategy workshop.

Figure 6: Steps of the Study Process



4.2.1 Literature Review

Literatures from different secondary sources like value chain reports, journals, government publications, newsletters on vegetables & medicinal plants, fruits, sunflower, fisheries, handicrafts, etc. were studied to have a preliminary understanding on the end market, market segments and market potential of the value chains. Besides, the key informants for the value chains, different market actors, regulatory and development stakeholders were also identified through the literature review. The key-informants included stakeholders at different levels of the value chains like government officers, private sector representatives, researchers, NGO personnel, and projects who are working directly with these sub-sectors. A set of checklists for key informants and different value chain actors were developed at this stage of the study. It was also used as the guide to identify the production clusters, major markets and hence in designing the field plan for the in-depth interviews.

4.2.2 In-depth Interviews

In-depth interviews were taken of the different value chain actors of **Vegetables (Brinjal, Bitter gourd, Sweet gourd, Chili etc.), Sunflower** and **Fishery** at both the national and regional levels. The purpose of the in-depth interviews was to gather facts and information on the market systems of the aforementioned value chains to gain a more qualitative overview of the sub-sectors. The workshops and in-depth interviews helped the team to develop a general idea about the existing value chains and also to comprehend the market prospects, the constraints, and the strategies to ensure sector growth and also to identify the potential partners for the project to some extent.

The in-depth interviews were conducted on the program areas in three districts of the region for the comprehensive situation analysis of the selected value chains.

For assessing the value chains, a set of checklists of different value chain actors was used. A total of Eighty (80) respondents of different tiers of these value chains and support functions were interviewed through snowball sampling technique⁴. The respondents included backward linkage actors like feed sellers, spawn sellers (fishery); seed sellers, nurseries, fertilizer and pesticide sellers, other agro input sellers (vegetables, sunflowers); producers (farmers,); forward linkage actors like farias/paikers, arotdars, retailers; and support functions like government bodies.

Table 3 Category of respondents in each region

Actor	South West Region
Backward Linkage Actors	15
Producers	41
Forward Linkage Actors	16
Support Function & other actors	8
All	80

4.2.3 Questionnaire Surveys

Alongside the in-depth interviews, a set of questionnaires for quantitative surveys were designed for producers of the three selected value chains to capture the core issues in greater detail and quantifiable terms for analysis. Most of the respondents in the regions were interviewed during the in-depth qualitative assessment.

A full day orientation session was facilitated by the team leader accompanied by the whole team, for the program staff in each region, to brief them about the objectives of the research and the method of data collection. The session included briefing on the specific objectives of the study, presentation on the selected value chains, introduction of the different value chain actors, detailed field plan, sampling method (snowballing), team composition, and debriefing of the questionnaires and checklists, including rehearsal and mock sessions.

Fifty six producers of the selected value chains were chosen from the three sites of the project area. Data collection was conducted with the structured question guides along with prepared checklist for face to face interviews. For acquiring more information from geographically distant locations, data have been collected by the project staff working in those particular program areas and sites. The core team directly participated in data collection process initially to facilitate the staff and ensure quality of the survey.

⁴Snowball sampling is a non-probability sampling technique where existing study subjects recruit future subjects from among their acquaintances.

Table 4: Composition of primary data collection

Questionnaire Survey	South West Region
Producers	56

Besides, another 100 producers of vegetables and fish value chains were interviewed to know the cost benefit situation of vegetable and fish in each site. The project staffs directly participated to collect the information on the cost benefit analysis.

4.2.4 Data Analysis

The analysis of the collected data included: End Market Analysis, Value Chain Mapping and Opportunities and Constraints Analysis.

End Market Analysis

The end market analysis showed the market opportunities, gap in demand and supply and scope for value chain upgrading to be undertaken by the project. It involved an extensive consumer market research. Since a full scale consumer market research was too broad and resource intensive for the time and scale of this study, the study relied more on secondary information and information collected from value chain actors like retailers, wholesalers and collectors to get the information required for the end market analysis.

The analysis revealed the different market segments, size and share of the market segments (for the local, regional, national level markets), growth trends and gap in the end market.

Value Chain Mapping

The value chains selected in the 1st phase (selection of value chains) were scrutinized in the second phase and value chain maps were developed to illustrate channels through which the product flows from the conception stage to the production stage and finally to the end consumers through the traders. It identified the actors and support service providers, their roles and interactions within the value chain, and their performance. The maps revealed the scopes to upgrade and the bottlenecks in the value chains that restrict up-gradation.

The mapping was done based on the findings unearthed from the in-depth interviews and questionnaire surveys conducted through snow-ball technique.

Constraints and Opportunities Analysis

After mapping the selected value chains of different regions, the opportunities to include the target beneficiaries into the value chains while conserving the ecosystem and climatic condition in the target geographic areas were identified. A comprehensive cost benefit analysis has been done on each and every specific product in the selected value chains on specific sites under each of the regions. This cost benefit analysis revealed the strengths and weaknesses of every sub-sector to be worked on. As the geographical, topological, and climatic environment vary from site to site, the sub-sectors with high prospect in the program areas differed.

After identifying the opportunities, the study identified the reasons for which the beneficiaries are not utilizing the benefits of the value chain opportunities. The systemic dysfunctions in the market systems

within the value chains that hinder a profitable and sustainable inclusion of the poor people were identified and a problem tree analysis was conducted.

Aside from identifying the value chains, the study identified the income generating activities (IGA) in and around the program areas. Analysis for each IGA has been done to illustrate the feasibility of execution and inclusion in the intervention strategies. These IGAs are for the consideration of CREL management to be used for the beneficiaries that cannot benefit for value chain development activities in the selected value chains immediately.

4.2.5 Strategy Workshop

The findings and analyses were shared over a half-day strategy workshop. The valuable inputs from the core team members of CREL and the supporting allied organizations were taken into account to validate the findings and complete the analysis. In addition, broad intervention strategies were discussed in the open forum. The participation of all stakeholder organizations relevant with the project inspired the study to be aligned with the core objectives of the project. The outcome of the discussion was region-wise intervention strategies formed by the regional staff of CREL and guided by Innovision team

Part II: Value Chain Selection for Southwest Region (Khulna, Bagerhat and Satkhira)

5. Value Chain Selection for Southwest Region

5.1 Climactic Assessment of the Target Area

5.1.1 Overview of the Natural Resources and Biodiversity in Area

The South-west region of the target geographic area in the project is included with Mongla, part of Morrelganj and Sharankholaupazila under Bagerhat district, parts of Dacop and Koyraupazila under Khulna district and parts of Shyamnagarupazila under Satkhira district. The area has a unique scenario of soil, land, water and other natural resources including one of the single largest mangrove forests of the world, endowed with an enormous biodiversity in respect of both flora and fauna.

The coastal zone under the stated areas has a diversity of natural resources, including coastal fisheries and shrimp, forest, salt and minerals. Different studies found here a total 453 faunal species of birds, 42 species of mammals, 35 reptiles and 8 amphibian species⁵. Among these, about 46 species of coastal wildlife are endangered with certainty and the actual number would be much more⁶. Among the endangered species are five mammals, 25 birds, 14 reptiles (one crocodile, eight turtles, four lizards and one snake) and two amphibians (frogs). There are at least 36 species of marine shrimps. Among them Penaeide shrimps are commercially important. About 336 species of mollusks; covering 151 genera have been identified. In addition, 3 lobsters and 31 species of turtles and tortoises of which 24 live in freshwater are found in this part of Bangladesh.

Centuries old intensive cultivation left little evidence of natural vegetation except the Sundarbans lying in the littoral area of Khulna Division. The mangrove resources of the Sundarbans are timber, fuel wood, fisheries, wildlife, honey, wax etc. The forest has important tree species of Sundri (*Heritiera fomes*), Gewa (*Excoecaria agallocha*), Goran (*Ceriops decandra*), Keora (*Sonneratia palata*), Kankra (*Bruguiera gymnorhiza*), Passur (*Xylocarpus mekongensis*), Baen (*Avecennia officinalis*), Dhundul (*Xylocarpus granatum*), Amoor (*Amooracuculata*), Other forest species are Golpatta (*Nypa fruticans*), Hental (*Phoenix paludosa*), Khulsi (*Aegiceras corniculata*), etc. This mangrove forest is also the abode of many graceful and rare animals and birds. The Sundarbans also play an important role in protecting the densely populated agricultural hinterlands from the onslaught of frequently occurring cyclonic storm surges.

The Non Timber Forest Produce (NTFPs) that are mostly collected by the inhabitants from the mangrove forest of Sundarban includes tannin bark (most Sundarban species like *Ceriops decandra*, *Ceriops myrobala*, *Phoenix paludosa* yield round 30-42% tannin); *Nypa fruticans* (Golpata), natural honey from *Apis dorsata*, cultured (apiary) honey (*Apis indica*) and bee wax; fuel wood and small poles and boles; fishes, prawn, crab, shrimps; and lime (manufactured from jorgran, kastura and jhinuk)⁷.

⁵O. Quader, Sept. 2010, Coastal and marine biodiversity of Bangladesh (Bay of Bengal), Space Research and Remote Sensing Organization (SPARRSO), Proc. of International Conference on Environmental Aspects of Bangladesh (ICEAB10), Japan

⁶Saheed S.M., 2006, The state of Land, Water and Plant Nutrition Resources of Khulna Division of Bangladesh, Country Report

⁷Anshu Singh, Prodyut Bhattacharya, Pradeep Vyas, Sarvashish Roy, 2010, Contribution of NTFPs in the Livelihood of Mangrove Forest Dwellers of Sundarban, International Centre for Community Forestry, Indian Institute of Forest Management

5.1.2 Environmental and Climate Change Issues Present in the Area

The impacts of global warming and climate change are worldwide. For Bangladesh they are most critical as large part of the population is chronically exposed and vulnerable to a range of natural hazards. Bangladesh scientists believe that because of sea level rise coastal Bangladesh has already experienced the worst impacts especially in terms of coastal inundation and erosion, saline intrusion, deforestation, loss of bio-diversity and agriculture, and large scale migration, especially in the southwestern region. Summers are becoming hotter, monsoon irregular, untimely rainfall, heavy rainfall over short period causing water logging and landslides, very little rainfall in dry period, increased river flow and inundation during monsoon, increased frequency, intensity and recurrence of floods, crop damage due to flash floods and monsoon floods, crop failure due to drought, prolonged cold spell, salinity intrusion along the coast leading to scarcity of potable water and redundancy of prevailing crop practices, coastal erosion, riverbank erosion, damaged communication and transportation facilities, damaged WATSAN facilities, decreased household/ business income, reduced access to education, health, finance, information and other services, deaths due to extreme heat and extreme cold, increasing mortality, morbidity, prevalence and outbreak of dengue, malaria, cholera and diarrhea, increased migration, etc. Salt water from the Bay of Bengal is reported to have penetrated 100 km or more inland along tributary channels during the dry season in Khulna division. The precipitation decline and droughts has resulted in the drying up of wetlands and severe degradation of ecosystems⁸. These are merely the early signs of global warming effects. More adverse impacts are projected for the coming decades, particularly for low lying coastline and floodplain ecosystems in the south west zone which characterize Bangladesh. Sea level rise in the coming decades will create over 25 million climate refugees. Increasing global temperature will also have its effect on different ecosystems, especially on the ecosystems of our mangrove forest; some species will be forced out of their habitats (possibly to extinction) because of changing conditions, while others might flourish. A warming of 2°C would result in mass mortality of coral reefs globally and many freshwater species would become extinct⁹.

Majority of people in Sundarbans are engaged as agricultural labor (66-79%). And although agriculture has been the main occupation of the people in Sundarban, it is nothing yielding (only 10 quintals per hectare for the main crop) due to salinity of the soil, which prevents optimum growth of agricultural crops. Around 50% of agricultural laborers are landless. It provides a livelihood of about 0.3 million *bawalies* and a large number of Fishermen of south-western part of Bangladesh directly or indirectly dependent on this forest resources. Therefore, the Reserve Forest area serves as the buffer for their survival and though the percentages of NTFP collectors are less (varying from 6-9%), the contribution of NTFPs is enormous in the total annual household income (79%). The livelihood of nearly 2 million people is linked with the non-agricultural sources, which mainly include fishing and allied activities from the rivers and creeks as one of the major sources of income. However, Sundarban being a biosphere reserve and is a protected area under the IUCN Category 1 Aim poses several restrictions for the collection of the NTFPs from forest areas.

Nevertheless, certain relaxations have been made for the collection of few specific NTFPs, which are mostly animal based like honey, fishes and crabs. Nearly 19-25% of the households are engaged in fishing activities while 15-20% is engaged in honey collection. But it has been observed that many forest produces (including sundry, white Gewa (*Excoecaria agallocha*, etc.) have been depleting gradually. It was observed that the extent of extraction by villagers having higher dependence on NTFP is low whereas those having lower dependence on NTFP their extent of extraction are higher. A good number of conflicting uses of lands

⁸BCCSAP, 2009, Bangladesh Climate Change Strategy and Action Plan, Ministry of Environment and Forestry, 2009

⁹IPCC Fourth Assessment Report: Climate Change 2007 (AR4), Chapter 4

including shrimp culture are also prevailing in the south-west region and put the sustainability of existing eco-system under threat¹⁰.

5.2 Community Profile of the Target Area

5.2.1 Beneficiary Profile

Extreme poor households, landless households, forest dependent people, ethnic community, widowed or divorced women, households with either no children or large numbers of children (i.e. especially girls, who will require dowry to get married), and families without regular income represent the biggest yet most vulnerable portion of population living in the target areas. It is a good sign that the project has targeted this population as beneficiaries. We conducted a household survey with 104 of these people, as well as, included 172 of them in Focus Group Discussions. We have tried to develop an initial profile for these target peoples from the findings from the survey and the FGDs.

Table 5: Age distribution¹¹

Age Group	Male	Female	Total
Below 18	44%	44%	44%
18 to 33	26%	29%	27%
34 to 60	27%	24%	26%
Above 60	3%	2%	3%

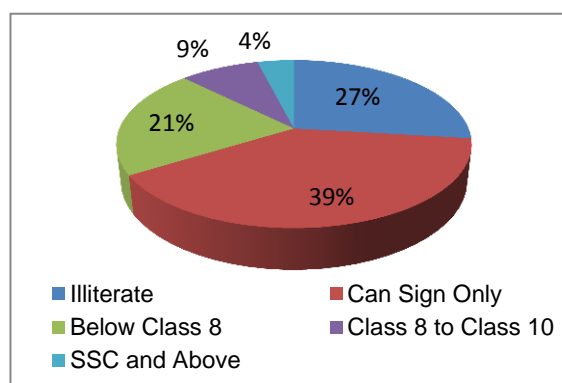
In terms of demographic information, there is very little difference in gender distribution of the beneficiaries, with 52% of the household members being male and 48% being female. Almost half of these household members are below 18 years old, with 27% being in age

group of 18 to 33 and 26% being in age group of 34 to 60 years.

Literacy status of the Sundarbans resource extractors was found to be very poor. The larger portion of these beneficiaries is illiterate or can only sign their names. Only 4% of the beneficiaries was found to be SSC or above educational attainment. Due to this lower level of education status, their entry into conventional service sectors is very limited, as per the beneficiaries in the FGDs.

Examining the economic status of the beneficiary households, it was found that, average family income per year was 44,730 BDT. Around 85% of it comes from some sort of natural resource extraction. In these households, on an average, 2.16 persons are dependent on income of one person. Average annual family expense was found to be more than sixty thousand taka. This means the families are economic deficiency throughout the year. To mitigate the deficiency, almost all the households were seen taking loans, with an average amount of 18,057 taka, out of which, 10,773 taka is outstanding loan. Some of these loans are from different micro credit organizations. However, majority of these loans are from the *Mohajons*, taken as *Dadonor* advance against a particular type of resource extraction.

Chart 1: Literacy status of the beneficiary



Source: Primary data: Beneficiary profiling

¹⁰ Ulrich Kleih, KhursidAlam, RanajitDastidar, UtpalDutta, NicolienneOudwater, Ansen Ward, 2003, Livelihoods in Coastal Fishing Communities, and the Marine Fish Marketing System of Bangladesh, DFID

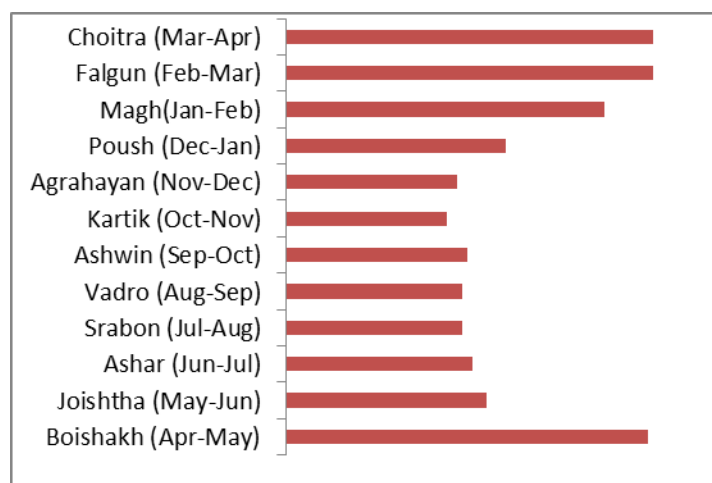
¹¹ Primary data: Beneficiary profiling

Table 6: Economic profile of the target beneficiaries¹²

Average Number of Family Members	4.49
Average Number of Earning Members	1.42
Dependency Ratio	2.16
Average Annual Family Income (BDT)	44,730
Per Capita Per Day Income (BDT)	27.29
Average Annual Family Expense (BDT)	61,356
Average Household Loan (BDT)	18057
Average Household Outstanding Loan (BDT)	10773

Since the income of the beneficiaries is highly dependent on resource extraction (explained in the subsequent sections), seasonal effect was seen in their income status. A general observation was that the average income of the beneficiaries is relatively low during June to October. After October, the income begins to increase gradually and stays at the pick during February till May. The loans observed were taken mainly to cop up with the lean period between June to October. This scenario has minor differences of one or two months in different locations, however, the overall situation of lean period is almost similar for all the locations.

Chart 2: Seasonal income status of the beneficiaries



Source: Primary data: Beneficiary profiling



“Please don’t tell us to rear livestock (cow-goat). We don’t have the feed required in our surroundings nor the money to purchase it. Thus, we have to go to the forests to collect feed anyway”

5.2.2 Infrastructure and Operating Environment

Chandpai

Major portion of Chandpai site is in Monglaupazila and the rest is in Morrelganjupazila. The infrastructure and operating environment of the site falling in Monglaupazila is quite suitable for commercial activities. The road connectivity of the villages within this part is very good with Moglasadar, with narrow but all the year accessible asphalt covered road. Even the union level roads connecting the villages with

¹² Primary data: Beneficiary profiling

upazilasadar are good quality asphalt covered roads. The connectivity via canals and rivers is also very good. Almost all the area is covered under electrification. The business environment in Chandpai site under Mongla is also very much suitable for commercial activities. The Monglaupazila is the hub for major commercial activities in this region with Khulna and Dhaka. There are some big depots of white fish, prawn and crab here in the Mongla municipality. There are some large livestock business enterprises who sell inputs like Day Old Chic, livestock feed, medicine, vaccines, etc. and also buy back poultry items like live birds and eggs. The government eco resort in Karamjal attracts a huge traffic of tourists almost all the year into this region. Also, this is the hub to get transportation and other facilities for the tourists to get into Sundarban. Hence, many small businesses like handicrafts, snacks items, tea stalls, etc. have been established here within this area based on the tourism. There are also local union level markets having trading houses of fish, crab and shrimp depots, PL collection houses, local livestock business enterprises, etc. which have regular business dealings with the larger business people in Mongla.

The Morrelganj part of Chandpai, however, lacks with majority of the infrastructure and operating environmental related benefits. Major barrier for business here is the road connectivity. Although the road connecting the villages with Morrelganj and Sharankhola is a wide asphalt covered road, it is not accessible all the year round. There are small potholes even ditches on this road all the way from Morrelganj to Sharankhola. This road is very unsuitable for larger passenger and cargo carriers. Motorbike is the popular and the only all the year round accessible vehicle in the region. The union level roads are mostly semi-pacca roads, covered with bricks or pebbles or kacha roads. The river connectivity is, however, good from Morrelganj to Khulna, even to Dhaka. There are large, all the year accessible, river transportation available in this part. Hence, majority of the passenger and cargo transportation is done via water ways. Morrelganj is an important market place in this location. There are some large trading houses for livestock business, vegetables, agricultural products and consumer goods in Morrelganjsadar. There are over 900 fisheries here in the upazila producing white fish and prawn (Galda). Even, we have found some fisheries in which fish is cultivated simultaneously with crops like paddy. Hence, there is a good network of fish value chain actors, including fish depots, union level collectors, spawn sellers, etc. in the area. The fish collected from the locality are sent to Khulna and even Dhaka.

Sharankhola

The Sharankhola site consists of several villages of Sharankholasadar, Southkhali union and Rayenda union. Similar the Morrelganj, the road communication in Sharankhola is very troublesome. The main road from Sharankhola to Morrelganj ferry ghat was once asphalt covered road, now it's a combination of numerous ditches and potholes, resulting passenger and cargo carriers travel difficult. Motorcycle is the only all the year accessible vehicle. The road is especially difficult to travel during the rainy season. The union level roads in some areas are also asphalt covered, but during the field observation, the covers were found disappeared in majority of the areas. Other roads are semi-pacca and kacha roads.



“Poor road condition in Sharankhola”

There are five or six renowned markets within the site area, among which Rayenda bazar and Talfalbari bazar are most remarkable. These are regular market places with almost all types of business

enterprises. All types of agricultural inputs are available in these bazars, like seeds, fertilizers and pesticides. The bazars also contain network of agricultural products' value chain actors like paikers, aratdars, retailers, etc. The area is renowned for the safe vegetables grown on the dikes of ponds and gher, hence, there were plenty of vegetable market actors found in these bazars. Some of the NGOs working in this area are working with some conventional, along with unconventional crops like Sunflower and Maize. However, we did not find any retailers or wholesalers for these two crops. Later, it was found that, the NGOs generally buy back these two crops. Especially, BRAC, after establishing their Sunflower extraction plant to introduce their Sunflower oil brand "Sufola" are purchasing Sunflower directly from farmers. Some of these farmers are their members, but they also purchase from non-member farmers. A significant portion of the local households have ponds in the house and are culturing carps and tilapia for household consumption. However, number of hatcheries and nurseries to support these ponds was seen insignificant. Fish farmers avail spawns and fry from Khulna, and sometimes from Jessore. But there were seen depots and collection points of white fish and prawn in the bazars. The area is also very suitable for fruits like Sapota and *Kul*, hence we have seen some collectors and wholesalers for fruits. Some medicinal plants like Bashak were also seen in the locality. We have heard about some agents collecting these medicinal plants and supply those to large companies like ACME and Square.

Khulna

Khulna site consists with parts of Dacop and Koyra Upazilas of Khulna district. The Koyra part of the site has direct road connection with Khulna. The road is narrow asphalt covered the entire year accessible road, passing through a number of large gher. The union level roads are also in good and accessible conditions. But the Dacop part has no direct road communication and is detached with the huge river Shibsha. Culture of Galda and Bagda is the main commercial activities in the area. Hence, there are plenty of market actors for these two products present in the area, including spawn and other input suppliers, fish depots, fish collectors and commission agents. Before the remarkable cyclones like Aila and Sidr, there were plenty of agricultural activities going in both Dacop and Koyra. However, after those cyclone attacks, the soil became saline and agricultural activities became very minor. But, the inhabitants in Dacop said that the salinity is decreasing and agricultural productions like paddy and vegetables have started to flourish. Especially, vegetable cultivation on dikes of Galdaghers was seen. We have seen some paddy and vegetable business people, including some local level collectors, wholesalers and retailers. In some of the areas, duck rearing was seen and producer of ducklings and buyers of duck and eggs were found in Koyra. In Dacop, some commercial poultry activities, especially with broiler birds were seen. But those were found to be consumed locally, not going outside of the upazila. However, presence of poultry input sellers and buyers of birds were seen. Honey is a very common product for the site, like the other sites. Honey collectors and sellers were seen in almost all the bazars in the visited areas. Raw Keura and Keura pickle was found to have emerging demand and hence people were found collecting raw Keura, making pickles and selling in the bazars.

Satkhira

The Satkhira site mainly comprise of Shyamnagar upazila of Satkhira district. Shyamnagar has good road connectivity with Satkhirasadar. The road condition is excellent with asphalt coverage and all the year round accessibility. The union level roads at Munshiganj and Buri Goalni are also asphalt covered round the year accessible roads. But communication with Gabura is very difficult since this union is surrounded by huge rivers. Soil in this area is very saline for which agricultural activities are very rare. Culture of Prawn (Galda) and Shrimp (Bagda) is very common in the region. We have seen huge gher of Galda and Bagda here. Naturally, a significant number of market actors depending on these two products were seen, ranging from depot owners, collectors, agents, input suppliers, retailers, etc. Crab is another important product here and there are some large crab depots here. White fish like carps and tilapia are also very common here and we have seen market actors for these fishes too. Household level poultry

rearing, including chicken and swan was seen very common. But commercial poultry rearing was not seen common. Some people we have seen rear ducks, but as this is a gher area and duck tends to eat spawns, rearing of duck was seen not as high as rearing of swans and chicken. Munshiganj was found to be famous for Sundarban honey. We also found some individuals performing apiculture. For both types of honey, there is a significant number of market actors present in the locality. Local exotic food items like Keura pickle and some local snacks were also found being produced at household level, and sold in local bazars. Some NGOs have trained a few people, especially women on handicrafts product like embroidery. We found a few collectors of these products in Shyamnagar, who collects the product and send to Khulna.

5.2.2 Status of Natural Resource Dependency

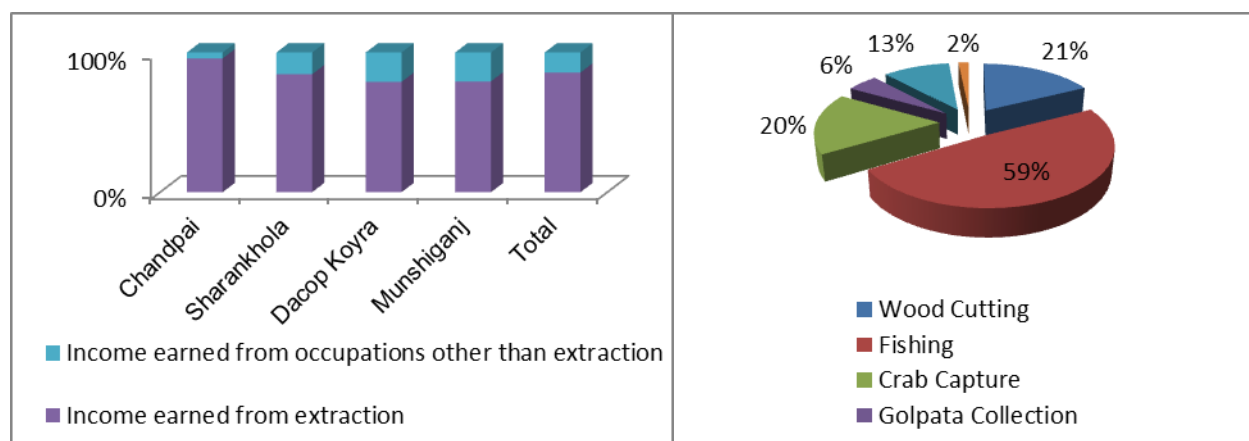
The salient feature of the project beneficiary is that they are all resource extractors and dependent on Sundarbans for resource extraction. Going through the nature of natural resource extraction, it was found that majority relies on fishing. A significant number of extractors also rely on wood cutting, capturing crabs and fish spawns.

A tentative figure of natural resource extracted is shown in the table below. This is, however, an average figure and does not apply for all months of the year. There is different seasonality in the extraction of these resources.



“I live on the forest because the alternative is starvation. As long as I am unable to feed myself, nothing in this world can stop me from going to the forest”

Chart 3: Income Status of the Extractor



Source: Primary data: Beneficiary profiling

Another issue is regarding the wood extraction. Most of the beneficiaries indicated that they do not extract wood legally. But a few of them told us that they extract wood illegally. The amount of wood extracted indicated in the table is mostly firewood which is extracted legally. The actual amount of wood extracted illegally will be a lot higher than this amount, as per the information provided by the VCF members.

Table 7: Amount of Resource Extracted¹³

Resource	Unit/Month	Extracted Amount
Shrimp and White Fish	Kg	203
Fish Spawns /Shrimp PL	Pieces	1954
Crab	Pieces	837
Golpata	Pawn	200
Hilsha	Kg	20
Wood	Maund	33

5.2.3 Engagement in Commercial Activities

We have already seen that the beneficiaries are mostly engaged in extraction related activities. We asked about their present engagement in conventional, non-extraction related occupations. Majority was found to be engaged as minimum paid day labors.

Table 8: Beneficiaries' engagement in commercial activities other than resource extraction¹⁴

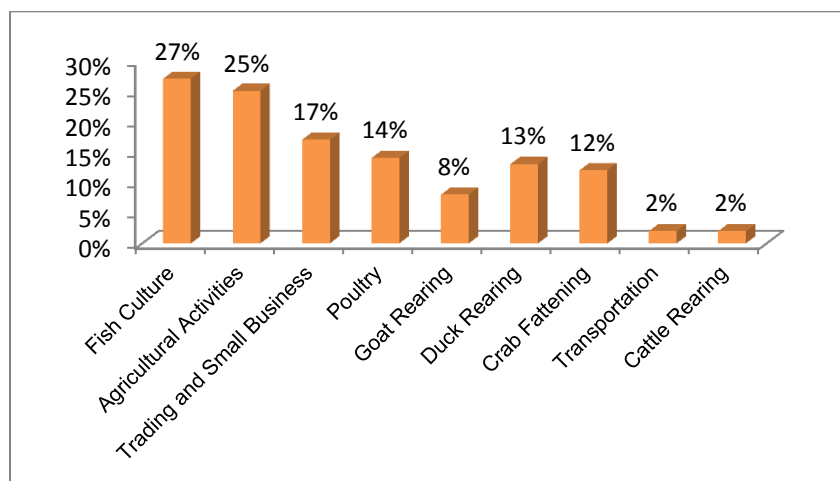
Non-Resource Extraction Activities Presently Engaged	% of Total Beneficiaries Engaged
Agricultural Activities	4%
Day labor	10%
Fish Business	1%
Poultry, Goat Rearing	2%
Handicraft	2%
Fish Culture	2%

We asked the beneficiaries regarding their experience in different non-extraction based commercial activities, highest number of beneficiaries replied about fish culture with carps and tilapia. Other significant commercial activities experience include agricultural activities, trading, duck rearing, crab fattening, poultry, etc.

¹³ Primary data: Beneficiary Profiling.

¹⁴ Primary data: Beneficiary Profiling.

Chart 4: Beneficiaries' experience of commercial activities other than resource extraction



Source: Primary data: Beneficiary profiling

5.3 Value Chain Selection

5.3.1 Preliminary List of Value Chains

In traditional value chain strengthening programs, the value chains having good potentials and meeting with project mandates are selected and then beneficiaries are selected to match with the value chain requirements. The CREL project is unique in a sense that the beneficiaries are preselected before selection of the value chains. Hence, the challenge was to identify value chain having conformity with the beneficiary profiles. Hence, while developing the preliminary list of value chains, we considered the commercial activities in which the community people (in which the target beneficiary lives) are currently engaged with, along with beneficiaries' resource, previous experience and expertise. Time to get return from the value chain activity was also considered during listing down the value chains. We also considered whether the value chain has itself the quality to provide all year income for the beneficiaries, or at least has the potential to club with another related commercial activity to do the same. On the basis of such consideration, we derived with the following preliminary list of value chains:

- | | |
|-----------------------------|-----------------------------------|
| 1. Sunflower Cultivation | 2. Goat Rearing |
| 3. Duck rearing | 4. Crab fattening |
| 5. Cattle Rearing | 6. Apiculture |
| 7. Galda Culture | 8. Bagda Culture |
| 9. Tilapia and Carp Culture | 10. Vegetable and Medicinal Plant |
| 11. Fruits cultivation | 12. Handicrafts |
| 13. Poultry | |

5.3.2 Eligible Value Chains

The cut-off criteria are those factors which would immediately eliminate a value chain from consideration. The cut-off criteria chosen was that value chains which destruct forest and/or wet land directly will be ineligible for selection. Considering this fact, we had to eliminate the livestock related value chains like goat rearing and cattle rearing. Because, we found out that the target geographic area suffers from natural fodder during the winter and summer. During this time, the community people either let their cattle and/or goat graze freely around or into the forest or they collect leaves from trees inside the forest. Both this options are directly involve in deterioration of forest resources. Hence, these two value chains could not pass the cut-off criteria we selected previously. So, after this stage, the eligible value chains were:

1. Poultry
2. Apiculture
3. Galda Culture
4. Bagda Culture
5. Tilapia and Carp
6. Vegetable and Medicinal Plant
7. Sunflower



“Saline Tolerance and cultivability in both Kharif and Rabi season drove the selection of sunflower as a potential value chain”

Among these value chains, strategic decision was taken about implementing interventions in Nature tourism sector. This means that this sector is, to some extent, preselected due to the eco-friendly nature and income increase potentials. Hence, we did not include this in our evaluation process. We shall be analyzing this value chain along with other few shortlisted value chains in the second phase of the assignment, which is the in-depth value chain analysis.

5.3.3 Value Chains Left Out from the List

There were some profitable value chain activities that the community people follow in the target area, which we did not consider for inclusion into the preliminary list. Those value chains and the justification for those to be left out is provided in the table below:

Table 9: Justification for leaving out few value chains

Value Chain	Justification for leaving out
Duck Rearing	The species of ducks available in the target area collect majority of their feed from natural sources. Since fish and prawn/shrimp culture is a big business in the target area, there is a tendency that the ducks will eat the spawns or fries of those cultured aquatic creatures. Beneficiaries informed us that the local influential people involved in the Gher business prohibited them not to rear duck in free range method. The enclosed rearing of ducks will increase the feed cost to a manifold and will consume the bulk of the potential profit. Hence duck rearing, although being a profitable venture, was left out.
Fruits Cultivation	The commercial cultivation of fruits like Jujuba, Sapota and Kul was suggested by the community people and beneficiaries during the validation workshop. These fruits are suitable to be produced in the saline condition. Already people in the target area are cultivating those in their homestead. However, commercial cultivation of these fruits will

	require much time to start generating profits, at least two or more years. Also, apart from Kul, jujube and Sapota do not have very high demand in local market. Their export potential is also not that great. Hence, while we feel that these fruits should be cultivated at household level, but establishing value chains for these through commercial cultivation and marketing will be difficult for the target beneficiaries.
Handicrafts	Engaging target beneficiaries into handicrafts production embroidery, bamboo, cane and Golpata items was suggested to us to be profitable for the beneficiaries. But we considered two facts in this regard – first the beneficiaries have no prior experience in making these products for the beneficiaries would not be possible to be linked with high value market initially in the project. Another reason is that there is not enough local demand for these products and hence beneficiaries would not be able to sell those in those markets. Hence, our analysis was that establishment of handicrafts as an individual value chain will be difficult in our target geographic area. However, handicrafts demand will increase with the increase of tourist traffic, i.e. with the popularization of Nature tourism sector. <u>So, although we will not be analyzing handicrafts as individual value chain, but we will evaluate the potentials of handicrafts as a supporting trade in Nature tourism and we will analyze the number of people that can be included in this trade.</u>
Crab Fattening	Crab fattening is a popular venture for community people living in the target geographic area. There is high market demand and easy marketing opportunities. The return on investment is really high and the return can be obtained relatively quickly. However, the piece crab, which is the main input for this value chain, comes from natural extraction. There is no hatchery established in Bangladesh yet producing piece crabs. Hence, promotion for this value chain would increase the amount of extraction from Sundarbans. At the same time, the investment required for this venture is relatively high. Hence, we are not including this value chain in the eligible list. <u>However, we shall scan into the possibility of hatchery establishment in this value chain, and if that is a feasible option, then we might develop interventions on crab fattening, which CREL could implement in future.</u>
Goat rearing	We found out that the target geographic area suffers from natural fodder during the winter and summer. During this time, the community people either let their goat graze freely around or into the forest or they collect leaves from trees inside the forest. Both this options are directly involve in deterioration of forest resources. Hence, the value chain could not pass the cut-off criteria we selected previously.
Cattle rearing	We had to eliminate the value chain cattle rearing we found out that the target geographic area suffers from natural fodder during the winter and summer. During this time, the community people either let their cattle and/or goat graze freely around or into the forest or they collect leaves from trees inside the forest. Both this options are directly involve in deterioration of forest resources. Hence, these two value chains could not pass the cut-off criteria we selected previously.

5.3.4 Attractiveness Measure for the Eligible Value Chains

Climate Tolerance of the Eligible Value Chains

For Climate tolerance we used the definition of IPCC, “is the ability of social or ecological system (*inside the value chain*) to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self- organization, and the capacity to adapt to stress and change”. Consider this definition, our key informants and our consultants’ view was that Sunflower cultivation and Tilapia culture has higher climate tolerance, since these products can withstand saline condition (the common climactic risk in the target area) at a level higher than the other products. Shrimp, poultry and vegetable scored lower in this criterion. Shrimp is very vulnerable to changing salinity level of water, which is also very common in the target area, as the salinity in ponds and ghers change quite often. Most of the vegetables cannot withstand soil salinity. Poultry is very much vulnerable to temperature change during excessive rain and drought and also to flood. Detailed scoring against this criterion is shown in ranking matrix.

Climate Resiliency

According to IPCC Climate change resilience is the capacity of an individual, community, or institution (*within the value*) chain to dynamically and effectively respond to shifting climate impact circumstances while continuing to function and prosper. Considering this criteria, all the products selected got lower scores, as our analysis suggested that these products or the actors will have minimum dynamic response towards the shifting climate impact circumstances. This means, the products, although can tolerate the climate change risks, but will be able to act very little in changing the situation.

Resource Extraction Minimization

The indicator requires the chosen value chain must reduce and minimize the pressures on the natural resources in the environment; it should be a more eco-friendly alternative to their current income-generating activity. As per our analysis, Tilapia, Sunflower, Apiculture, Poultry and Vegetable score high in this indicator, since these value chains do not require inputs extracted from nature. Shrimp and Prawn score low in this indicator, as the PL to culture these aquatic creates require to be extracted from nature. As a matter of fact, PL capture is one of the highest natural resources being extracted from Sundarbans.

Women and Youth Inclusion

This criterion indicates the value chain's ability to involve women and youth in its operation and creates employment opportunity for them. Our analysis indicates that Poultry should have higher scores against this indicator, while vegetable, prawn, sunflower and apiculture should have moderate scores and the rest with lower scores.

Outreach

With outreach the value chain's ability to benefit number of beneficiaries can be explained. We found that, since a larger number of beneficiaries have their own ponds, though in smaller size, they can culture tilapia and carps in those ponds. Also, Apiculture does not require lot of spaces. Hence, we thought these two value chains should get higher scores against this criterion.

Growth Potentials

This criterion measures the estimated feasible demand for the value chain product/service in the local, national or international market and growth trend of that market. Our findings suggest that vegetables, tilapia and carp have higher growth potential than other value chains.

Income Increase for Beneficiaries

This was one of the most important criteria chosen in the selection exercise. Our analysis suggests that vegetable has the highest potential for income increase, given the economic and resource situation of the beneficiaries. Aquaculture like Shrimp, Prawn and Tilapia will also increase significant income for the beneficiaries. While Sunflower can increase a moderate amount of income, poultry and apiculture will only provide a subsistent income increase.

Private Sector Participation

This criterion indicates whether there is presence of private sector firms who are willing to promote the listed product/service and work with the beneficiaries to develop the production base or market channel. From this perspective, we thought Sunflower has got more potential to involve private participation.

Development Priorities and Favorable Policies of Government

This criterion reveals whether the value chain has the potentials to become one of the priority sectors of the government or whether it can get any special policy related benefits. Since Prawn is one of the most important export sector products of Government, in our view, Prawn got higher score in this criterion.

Synergy and Potential Collaboration

With this indicator, we wanted to judge whether any value chain has the potential to get involved with works done by other NGOs or development partners. We found that there are some development projects going on in the target area focusing on Tilapia, so we put more score on Tilapia culture against this indicator. Poultry also got higher scores. Other value chains, although didn't scored as high as tilapia and poultry, but also scored relatively high in this scores, since there are some possibilities for synergy in all of these value chains.

Risk

We wanted to identify value chains with limited risks. Hence, this criterion was included into the indicator list. We considered three types of risks – entry barriers into the value chain, capital intensiveness and business operation risks. We identified that vegetable culture and apiculture involve lower risk in comparison with other value chains; hence we scored higher marks for these two value chains. On the other hand Shrimp, Prawn and Poultry are very much prone to diseases and the entire investment can be lost, for which we have scored lower marks for these value chains in this indicator.

Scopes for Value Addition by Target Beneficiaries

This criterion judges the scope for developing the beneficiaries' current source of income to move them to a product/service with higher value addition. We thought that, with the experience, the target beneficiaries can add higher value in poultry. Hence we scored higher marks against this indicator for poultry.

5.3.5 Summary of Scores and Ranking of Value Chains

In order to measure the attractiveness of the eligible value chains we first look at their prevalence across each site. This was done to ensure the maximum beneficiary outreach. The site wise prevalence of these value chains are shown below:

Table 10: Site wise prevalence of the value chains¹⁵

	Chandpai	Sharankhola	Munshiganj	Dacop Koyra
Tilapia	√	√	√	√
Prawn	√	√	√	√
Shrimp		√	√	√
Crab Fattening	√		√	√
Poultry	√	√	√	√
Vegetable	√	√	√	√
Apiculture		√		
Sunflower		√	√	√

Summary of the scores for each of the value chains against the criteria and the weighted scores is shown in the table below.

Table 11: Attractiveness scores for different value chains¹⁶

Criteria	Weight	Tilapia		Prawn		Shrimp		Apiculture		Poultry		Vegetable		Sunflower	
		Score	WS	Score	WS	Score	WS	Score	WS	Score	WS	Score	WS	Score	WS
Climate Tolerance	3	4	12	3	9	2	6	3	9	1	3	2	6	5	15
Climate Resiliency	3	2	6	2	6	1	3	1	3	2	6	2	6	2	6
Resource Extraction Minimization	5	5	25	1	5	2	10	5	25	5	25	5	25	5	25
Women and Youth Inclusion	5	2	10	3	15	2	10	3	15	5	25	3	15	3	15
Outreach	2	4	8	1	2	1	2	4	8	3	6	2	4	2	4
Growth Potential	5	4	20	3	15	3	15	3	15	3	15	4	20	3	15
Potential for Income Increase	5	4	20	4	20	4	20	2	10	2	10	5	25	3	15
Private Sector Participation	3	3	9	2	6	2	6	3	9	2	6	2	6	4	12
Development Priority and Favorable Policy	3	3	9	4	12	2	6	3	9	3	9	2	6	2	6
Synergy and Potential Collaboration	3	5	15	4	12	4	12	4	12	5	15	4	12	4	12
Low Risk	4	3	12	2	8	1	4	4	16	2	8	4	16	3	12
Scope for Value Addition	3	3	9	2	6	2	6	3	9	4	12	3	9	2	6
Total Weighted Score		155		116		100		140		140		150		143	

¹⁵ In-depth interviews, FGDs and validation workshop.

¹⁶ Validation Workshop, In-depth Interviews, FGDs.

Ranking the value chains on the basis of the weighted scores, we can get the following list of value chains:

1. Tilapia and Carp
2. Vegetable and Medicinal Plants
3. Sunflower
4. Poultry
5. Apiculture
6. Shrimp
7. Prawn

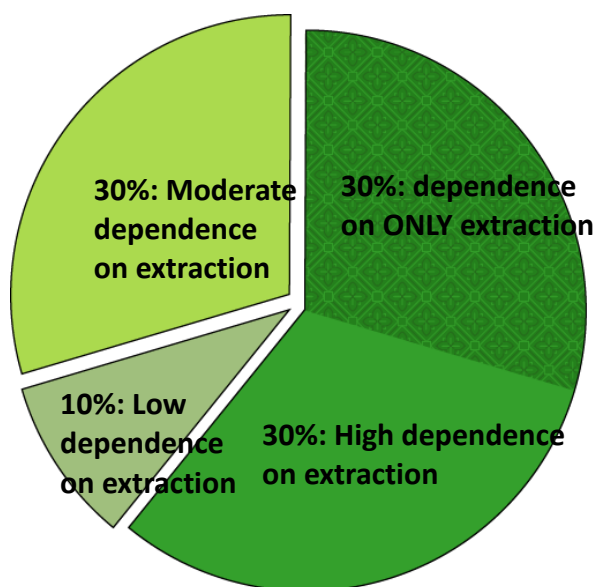
Finally, the top three ranked value chains were selected for in depth analysis in the second phase of the assessment. The value chains are:

1. Tilapia and Carp
2. Vegetable and Medicinal Plants
3. Sunflower

5.3.6 Tentative Outreach with the Shortlisted Value Chains and Trades

Based on the beneficiary profiles we have from the project database, along with the information collected during the study, an overview of the beneficiaries have been mapped out. As the following diagram shows:

Chart 5 Beneficiary profiling¹⁷



Based on this, it can be inferred that those with very little or moderate dependence on extraction, are beneficiaries which have some access to land. This 40% of the total 32,000 beneficiaries are the initial focus of the agricultural value chains. The agriculture value chains can be targeted towards the different kinds of households.

- 28% beneficiaries with land of 20 decimals, who can be targeted for sunflower cultivation or vegetable cultivation in commercial scale;
- 60% of beneficiaries with at least homestead land and/or dykes can cultivate vegetables;
- 50% of the beneficiaries have at least 5 decimals of pond area where semi-intensive polyculture of tilapia and white fish can be carried out.

¹⁷ Project documents.

Table 12: Site wise potential Outreach for Vegetables¹⁸

Chadpai	Sharankhola	Munshigonj	Dakope/Koyra
No. of target beneficiaries: 4091	No. of target beneficiaries: 3354	No. of target beneficiaries: 13007	No. of target beneficiaries: 11625
Potential Outreach: 45%	Potential Outreach: 70%	Potential Outreach: 50%	Potential Outreach: 70%
Overall Potential Outreach: 60%			
Considerations for Outreach Estimation			
<ul style="list-style-type: none"> Homestead spaces are available High unmet regional demand Scopes for potential upgrade of culture practices, post-harvest techniques and trading efficiency 	<ul style="list-style-type: none"> Currently 30% beneficiaries are involved in the VC. Beneficiaries have cultivable land. Soil is very fertile Homestead spaces are available High unmet regional demand Scopes for potential upgrade of culture practices, post-harvest techniques and trading efficiency 	<ul style="list-style-type: none"> Homestead spaces are available High unmet regional and national demand Scopes for potential upgrade of culture practices, post-harvest techniques and trading efficiency 	<ul style="list-style-type: none"> Currently 25% beneficiaries are involved in the VC. Beneficiaries have cultivable land. Homestead spaces are available High unmet regional demand. Scopes for potential upgrade of culture practices, post-harvest techniques and trading efficiency

Table 13: Site wise potential Outreach for Tilapia and Carp¹⁹

Chadpai	Sharankhola	Munshigonj	Dakope/Koyra
No. of target beneficiaries: 4091	No. of target beneficiaries: 3354	No. of target beneficiaries: 13007	No. of target beneficiaries: 11625
Potential Outreach: 30%	Potential Outreach: 15%	Potential Outreach: 35%	Potential Outreach: 25%
Overall Potential Outreach: 50%			
Considerations for Outreach Estimation			
<ul style="list-style-type: none"> More than 80% beneficiaries have pond of at least 4.26 decimal. High unmet regional and demand Scopes for potential upgrade of culture practices, post-harvest techniques and trading efficiency 	<ul style="list-style-type: none"> Currently 60% beneficiaries have pond High unmet regional and national demand Scopes for potential upgrade of culture practices, post-harvest techniques and trading efficiency 	<ul style="list-style-type: none"> Currently 90% beneficiaries have pond. High unmet regional and national demand Scopes for potential upgrade of culture practices, post-harvest techniques and trading efficiency 	<ul style="list-style-type: none"> Currently 76% beneficiaries have pond High unmet regional and national demand Scopes for potential upgrade of culture practices, post-harvest techniques and trading efficiency

¹⁸ Primary data: Beneficiary profiling, In-depth interviews and FGDs., Secondary data: Project documents

¹⁹ Primary data: Beneficiary profiling, In-depth interviews and FGDs., Secondary data: Project documents

Table 14: Site wise potential Outreach for Sunflower²⁰

Chadpai	Sharankhola	Munshigonj	Dakope/Koyra
No. of target beneficiaries: 4091	No. of target beneficiaries: 3354	No. of target beneficiaries: 13007	No. of target beneficiaries: 11625
Potential Outreach: 5%	Potential Outreach: 20%	Potential Outreach: 5%	Potential Outreach: 10%
Overall Potential Outreach: 50%			
Considerations for Outreach Estimation			
<ul style="list-style-type: none"> Sunflower can be grown in both robi and kharif seasons, and can be cultivated alongside Aman rice cultivation. Sunflowers require very low cost and has high profitability, almost double. There is available khas land for lease in these regions, which can be used by farmer groups to ensure bulk production. 	<ul style="list-style-type: none"> Sunflower can be grown in both robi and kharif seasons, and can be cultivated alongside Aman rice cultivation. Sunflowers require very low cost and has high profitability, almost double. There is available khas land for lease in these regions, which can be used by farmer groups to ensure bulk production. 	<ul style="list-style-type: none"> Sunflower is saline tolerant. Sunflower can be grown in both robi and kharif seasons, and can be cultivated alongside Aman rice cultivation. Sunflowers require very low cost and has high profitability, almost double. There is available khas land for lease in these regions, which can be used by farmer groups to ensure bulk production. 	<ul style="list-style-type: none"> Sunflower is saline tolerant. Sunflower can be grown in both robi and kharif seasons, and can be cultivated alongside Aman rice cultivation. Sunflowers require very low cost and has high profitability, almost double. There is available khas land for lease in these regions, which can be used by farmer groups to ensure bulk production.

There will be a large number (**about 30%**) of overlap among these 70% beneficiaries (22,400 households) who are capable of being engaged into more than one value chain. The most integrated value chains will be of fish and dyke vegetables, which possibly at least 50% of the beneficiaries can be part of.

30% of the beneficiaries who are dependent only on extraction can be accounted to be the landless/ pondless target group. This group cannot be directly targeted with the agriculture value chains, since they will not have easy access to land, including homestead land.

Taking this into consideration, the assessment also included identifying possible areas of trade where these landless extractors can get involved in, in order to generate additional income.

²⁰ Primary data: Beneficiary profiling, In-depth interviews and FGDs., Secondary data: Project documents

Other Trades

- (i) **Labour for large private sector industries:** There are many active and growing private sector companies, in the fisheries sector who are usually looking for semi-skilled labour to work on their lands/ponds. Hatcheries, fish feed companies are interested in providing training to unskilled labour who are willing to work for them for a certain period of time. There is a huge demand for labour, which can be met by the landless fishermen as an alternative source of income for them. Interventions are needed to link these companies to these regions where they can promote themselves as a viable employment option to the youth from these regions.
- (ii) **Handicrafts:** Given the potential to promote Nature tourism in these regions, there is a possibility to develop a market here for handicrafts and souvenirs. Small groups of souvenir producers can be developed to produce different kinds of handicrafts from local resources like golpata leaves, or pottery using the river mud. These products can be marketed as rustic, local handicrafts targeting the tourists through the tour guides, vessels or resorts. This provides a strong potential for women to get involved in this trade, and the government youth department can also get engaged to provide such trainings.
The interventions regarding this trade would include developing training modules, providing suitable trainings to the different groups, and facilitating the linkages with the tourist market and proper marketing of the handicraft products to ensure demand for souvenirs from the tourists.
- (iii) **Honey Processing:** Honey collection is carried out regularly in the Sundarbans, and is legally allowed since it is a renewable resource. After collection, very little processing is done to the honey at the producer level, and is usually sold to larger collectors and processors who tend to sell the honey at the district levels. Thus, well packaged, quality honey is not usually sold at the local level. Honey can easily be marketed as a souvenir local product to the tourist market, if properly processed and packaged as organic wild honey.
Small groups of honey collectors can be trained to be able to properly process and clean the honey and then ensure proper packaging of it as souvenir products. This will not only create a market for local honey to be sold at the local level, but also allow a higher price to be set on it if it is marketed well.
- (iv) **Small Scale Poultry:** For households with little homestead land, small scale poultry can be a possibility. The chickens can be reared in the homestead areas using semi-intensive techniques to ensure high profitability. The chickens need to be fed and can be sold at any point as they grow. They can also be reared for eggs which can be consumed at home and also sold to others in and around the localities.
Interventions for this will have to look into establishing both the backward and the forward markets for this value chain. Also, this value chain will have to be specific to households who have the space to rear poultry, and who can invest into this business.
- (v) **Net Making:** Being a region based on the fish industry, there are different kinds of fishing nets required for different forms of fishing. But most of the nets being used in these regions come from India. Given the high demand for fishing nets, small enterprises for net making can be developed here. The Government Youth department has trainings for net making,

which can be expanded into these regions and targeting the landless groups in the project regions. This can be an alternative source of income for these beneficiaries in this region. Interventions for this would include setting up the backward linkages for net makers, promoting the viability of this work so as to garner interest in joining this workforce. The project would also need to promote the training for this activity and ensure relevant trainings take place so the products made will be competitive to the Indian nets. It might also be necessary to promote the nets being made locally, so as to shift the demand from Indian fishing nets to locally made fishing nets.

- (vi) **Boat Making/ Repairing:** Being a fishing dependent region, and surrounded by rivers, boats are a major requirement in daily transport and livelihoods. But there are very few boat making and repairing entities in these regions. Few individuals in each area can be trained in this area, so they can establish themselves as small entrepreneurs who can make and/or repair boats. Since the demand for such services already exists, a few entities as such will ensure supplying to this need.
- (vii) **Shallow-engine Van/ Motorcycle/ Cycle Repairing:** Most of the transportation of the land in all these regions is usually done via shallow-engine vans, motorcycles and bicycles. Based on the need, there are small repair shops in these areas catering to the needs of these vehicles. But, there is a lack of proper mechanics, and for more intricate issues, vehicles need to be taken to Khulna or Bagerhat towns. Thus, there is a strong demand to train and develop a few mechanics in these more remote places. This can also be done with the youth department since they already have trainings catering to this.
- (viii) **Solar Panel Servicing/ Repairing:** Solar panels are widely used in these regions, since electricity is scarce. Almost 80% of households and businesses in these regions have solar panels for their daily usage. Currently, most of these panels are still within their warranty and pay back periods, thus they have regular servicing and checkups being done to them. In the span of two years, most of these panels will require servicing or repairing work. Thus, there is a potential demand for such services coming up. Interventions will include providing training to some individuals from each area, targeting the landless youth, who can establish themselves in this service business.

Part III: Value Chains Analysis for Southwest Region (Bagerhat, Khulna, Satkhira)

6. Value Chain Analysis for Vegetable

6.1 Brief Overview

Vegetable cultivation has been a sector that has been widely promoted in the Southern regions of Bangladesh in recent years. Khulna region's agriculture is largely dominated rice cultivation and cash crops like sugar cane, jute, sesame seeds, etc. Cultivation of vegetable has successfully taken off in recent years, but is yet to be one of the major produces coming from these regions.

The vegetables that are grown in these regions include potato, brinjal, bitter gourd, snake gourd, spinach, pumpkin, okra, summer tomato, and chili.

Most farmers are not aware of how best to treat saline soil and thus productivity of vegetables is being hampered; also, households rarely use their homestead space to cultivate vegetables other than potato and chili. Thus, vegetable production is relatively low in the project areas. Cyclone Aila had caused massive damage to the coastal regions and left the soil in these areas highly saline, destroying crops and agricultural lands. But, in recent years, the soil has mostly recovered from this destruction and vegetable cultivation has started out again in many parts of Greater Khulna.

Rationale for choosing Vegetable as a Value Chain:

- Vegetables can be cultivated in most areas around the year. Even in highly saline regions like Chandpai and Munshigonj, it is possible to grow vegetables between June to November.
- Vegetables can also be grown on homestead land and on the dykes of ponds or gher. Saline soil can be easily treated to make it suitable for farming vegetables on.
- Around 60% of CREL's beneficiaries have small homestead land/dyke that can be used for cultivating vegetables. Around 28% of these beneficiaries have on average 20 decimals of land, thus makes it suitable for commercial cultivation.
- The profitability of growing vegetables is much higher than traditional crops. However, the profit differs from site to site depending on soil conditions, climatic impacts, environmental concerns etc. Thus, different vegetables were chosen to capitalize on the individual suitability of the vegetables to the respective sites. This way, even though each vegetable may not be suitable for every site, the portfolio of vegetables would cover all the project sites and consequently the beneficiaries. The differences in site-wise cost-benefit analysis is shown below:

Table 15 Site specific CBA- Dacope/Koyra²¹

Crop/Species	Field Preparation Cost/Dec	Seed Cost/Dec	Fertilizer Cost/Dec	Pesticide cost/Dec	Labor cost/Dec	Transport and other costs/Dec	Average Cost/Dec	Average Revenue/Dec	Average Yield (kg)/Dec	Net Profit/Dec
Brinjal	119	19	105	86	81	3	413	1005	60	592
Chilli	128	44	71	94	88	8	433	816	20	383
Potato	119	182	111.5	59.9	106.6	0	579	940	94	361
Sweet Gourd	67	17	25	11.7	0	0	120	300	12	180
Tomato	135	36	60.0	19.3	32.8	3.1	286	427.4	50.3	141

²¹ Primary data: Cost benefit analysis survey

Table 16 Site specific CBA- Chadpai²²

Crop/Species	Field Preparation Cost/Dec	Seed Cost/Dec	Fertilizer Cost/Dec	Pesticide cost/Dec	Labor cost / Dec	Transport and other costs / Dec	Average Cost / Dec	Average Revenue/Dec	Average Yield (kg)/Dec	Net Profit/Dec
Brinjal	59	26	26	17.0	20.7	43.4	192	1375	50	1184
Snake gourd	87	25	45	10.1	39.2	81.3	288	907	41	620
Potato	75	49.7	53.5	18.7	12	28.25	237	762	44.3	525
Sweet Gourd	124.9	36	94	34	9	66	363	771	42	408
Spinach	45.0	30	53	9	4.6	66	208	1679	98	1470
Tomato	141.5	53	78	38	20	110	440	1731.5	85.9	1292
Okra	48.2	30	39	33	84	74	306	951	40	645
Bitter Gourd	84.4	42	46	16	22	53	264	1686	116	1422
Gourd	80.3	57	62	53	40	164	455	1741	125	1286

Table 17 Site specific CBA- Munshigonj²³

Crop/Species	Field Preparation Cost/Dec	Seed Cost/Dec	Fertilizer Cost/Dec	Pesticide cost/Dec	Labor cost / Dec	Transport and other costs / Dec	Average Cost / Dec	Average Revenue/Dec	Average Yield (kg)/Dec	Net Profit/Dec
Brinjal	131	43	69	46	194	98	581	1171	66	590
Chili	103	51	51	51	52	51	358	612.5	15.2125	254
Potato	111	99	64	27	63	40	404	687.5	47.5	283
Sweet Gourd	106	29	56	56	0	106	354	690	72.5	336
Spinach	144	24	84	33	81	33	399	821.25	66.875	422
Tomato	111	67	67	61	128	72	506	733.3	65.6	228
Okra	133	33	61	53	111	106	497	967	85	469
Gourd	125	25	50	25	105	150	480	2175	232.5	1695

²² Primary data: Cost benefit analysis survey

²³ Primary data: Cost benefit analysis survey

Table 18 Site specific CBA- Sharankhola²⁴

Crop/Specie	Field Preparation Cost/Dec	Seed Cost/Dec	Fertilizer Cost/Dec	Pesticide cost/Dec	Labor cost/Dec	Transport and other costs/Dec	Average Cost/Dec	Average Revenue/Dec	Average Yield (kg)/Dec	Net Profit/Dec
Brinjal	17	44	72	37	0	17	219.2	897	72	677.5
Snake Gourd	20	67	53	20	0	0	160	573	45	413
Chili	43	120	46	30	0	80	336	845	16	509
Potato	27	154	148	33	0	213	325	771	101	356
Sweet Gourd	0	5	56	16	0	29	139	640	85	501
Spinach	8	25	4	4	0	8	50	342	33	234
Tomato	27	65	63	20	0	20	195	893	45	698
Okra	38	73	53	28	0	28	220.2	709	37	367
Bitter gourd	54	217	133	79	0	104	587.5	700	37	112.5
Gourd	0	13	45	28	0	13	100	493	79	393

6.2 End Market Analysis

6.2.1 Main Market, Buyers & Competition

Since the project areas are located in remote regions, the end market of vegetables in most places is small and not linked to the national market for vegetables. Based on the information collected from the project areas, the overview of end markets for vegetables can be provided in the table below:

Almost all of the vegetable produced in the region is consumed locally, and there is even a gap in supply which is filled in by vegetables being imported from Khulna. Marginal farmers tend to consume around 60% of their produce and large farmers consume up to 5% of their produce. They both tend to sell the vegetables to local retailers or arotdars which are bought by local consumers.

No major competitor for these vegetables was seen in the study region. Vegetables imported into these regions tend to be the ones which have very high market demand, and most of these vegetables are not imported into the more remote areas due to infrastructure issues.

Table 19: Market Analysis for Vegetables

	Sharonkhola	Dacope/Koyra	Chandpai	Munshiganj
Main Market	Rayenda Bazar	Local haats, Tala Bazar	Local haats, Mongla Bazar	Munshiganj Bazar
Buyers	Households, passing cargo vessels, local haats	Households	Households	Households

²⁴ Primary data: Cost benefit analysis survey

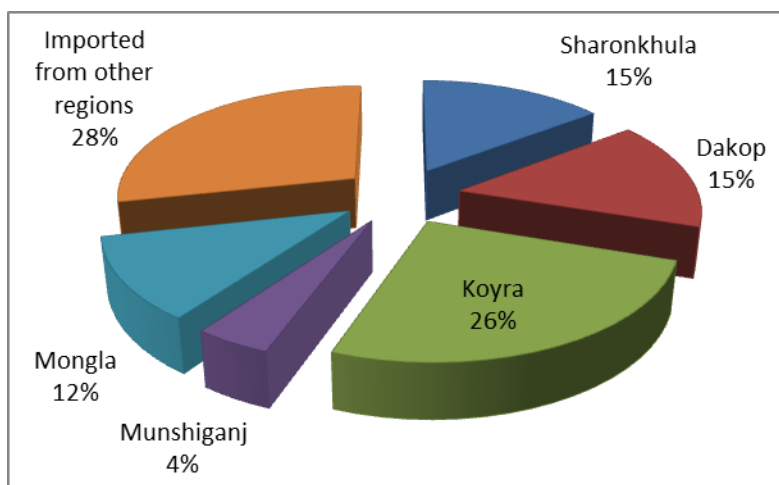
Market Opportunity	High unmet local demand	Unmet local demand; Linkage to Tala, Paikgacha, Bagerhat Bazars	Linkage to Mongla (hub for vessels)	Unmet local demand
---------------------------	-------------------------	---	-------------------------------------	--------------------

6.2.2 Demand/ Supply Situation

Based on the data from BBS and the primary survey carried out during the assessment, the total vegetable market volume in the project areas can be calculated to be around 35,000 tons.

Vegetables sold in these regions are almost completely used up for local consumption by households. In Sharonkhola, 10% of vegetable sales in Rayenda Bazar caters to passing cargo vessels, which buy a lot of their food from there, but this adds up to about 1% of the total vegetable sales for all the project regions together. To meet this demand though, almost 70% of the vegetables sold at Rayenda Bazar is imported from other regions like Jessore, Khulna.

Chart 6: Total Vegetable Market Size



Source: BBS and the primary survey

Vegetable prices in these locations are higher (approximately 30% more) than the price in the national market. This is mainly because of the low local supply of vegetables in these regions. In places like Chandpai, where vegetable cultivation is very low, and the roads are of poor quality, small households tend to consume very little vegetable. The imported products that come to these areas consist mainly of onions, chili, etc.

The consumption pattern reveals that the average daily consumption composition is shaped by the locally available vegetables. Rarely vegetables from distant villages reach these markets. Thus, it can be expected that increase in productivity of vegetables will result in an increase in the local consumption.

6.2.3 Market Opportunity

There is a huge demand-supply gap for vegetables in these regions. The import of vegetables from other regions of Bangladesh to most of these regions is almost none. The local consumption of vegetables largely depends on the supply and the price of vegetables, which is higher than the national level markets. Due to the perception that vegetables cannot be grown on saline soil, some areas do not have the practice of cultivating vegetables. This allows for a large potential for households to take up vegetable cultivation, firstly to enrich their own consumption, and then selling the excess production in the local bazaars for additional income. Based on the graph above showcasing the total market size of vegetables in the project areas, there is at least scope for 28% growth to meet the current market demand.

6.3 Value chain map and analysis of value creation activities

The vegetable for Khulna was mapped using information from the different project areas. The following Value Chain map provides an overview of how the different actors engage through for the production, harvesting, processing and selling of vegetables in these areas.

6.3.1 Value Chain Actors, Functions and Map

Input Suppliers

Seeds, fertilizers and insecticide/pesticide are the major inputs for vegetables production. The retailers range from small retailers in local markets to large stores – cum – wholesalers who sell to large commercial farmers and have strong relations with sales representatives of large companies. Apart from supplying inputs, the input retailers also provide information on use of feed and aqua-chemicals as embedded service. There are no specific input suppliers for vegetable inputs alone, rather for agricultural inputs overall. Most retailers can be found locally.

Production

Producers are the targeted beneficiaries, responsible for cultivating the vegetables. Farmers are categorized into two groups; medium and small/marginal. The farmers hardly produce vegetables commercially. The primary beneficiary group is made up of homestead gardeners, who follow subsistence- level farming without commercial concerns or investment ability. They mostly consume their produce; they are in some cases also connected with small retailers in local markets. Lack of commercial experience and scale-up practices lead their final product to be incompetent in the larger markets. Lastly, there are larger commercial farmers who use more than 30 decimals and aim for wholesale markets rather than small local market retailers. They have a preferred relationship with input suppliers.

Trading

There are several actors performing the role of trading; they are 'faria', 'bepari', 'arotdar' local market sellers etc. Farias are small traders who collect vegetables in small scale from the small and remote farmers and sell them to bepari arot or depots. Beparis usually buy vegetables in larger volume and sell them to arots or depots or large markets. Farias bring in vegetables from major district bazaars to local bazaars. The local retailer has the strongest connection with the beneficiaries; they serve both as the market for selling by small farmers and also for buying vegetables as consumers when local production is insufficient. For slightly larger volumes provided by small commercial farmers, the preferred interaction is with local commission wholesalers. These traders do not technically own the product. Rather, they hold the product overnight and sell it to retailers and wholesalers in other areas and keep 5%-7% of sales price as commission. Vegetables produced in the targeted area are usually traded locally.

End-market or End Consumer

Firstly, there are the local consumers who lie in the same village and/or locality. They are the main markets for the beneficiaries, taken directly or via forias. The next level is district level markets which are major commercial hubs which service the other areas within and outside the districts. For the beneficiaries, the vegetable production is still at a very amateur level and the end-market is mostly limited to local markets with minimal exposure to district level markets and none to national markets.

6.3.2 Business Enabling Environment

There is a domestic unmet market for demand for vegetable as the supply is low in the region. In general, we found the business environment favorable for commercialization of vegetables farming. Supports from different programs are also facilitating the vegetables sector for its growth. There is good availability of both input suppliers and market actors. The challenge remains within the production tier as many producers and especially the targeted beneficiaries are satisfied with their subsistence farming technique, unwilling to risk the investment behind commercial upscaling.

Vegetable cultivation can be a highly profitable venture with the use of better inputs and cultivation techniques.

6.3.3 Vertical Linkages

Weak flow of information:

Flow of information within the value chain actors is feeble. Due to low volume of production, producers have weak relationship with the forward market. So they are less aware of the market dynamics. Information about demand and price change hardly reaches them.

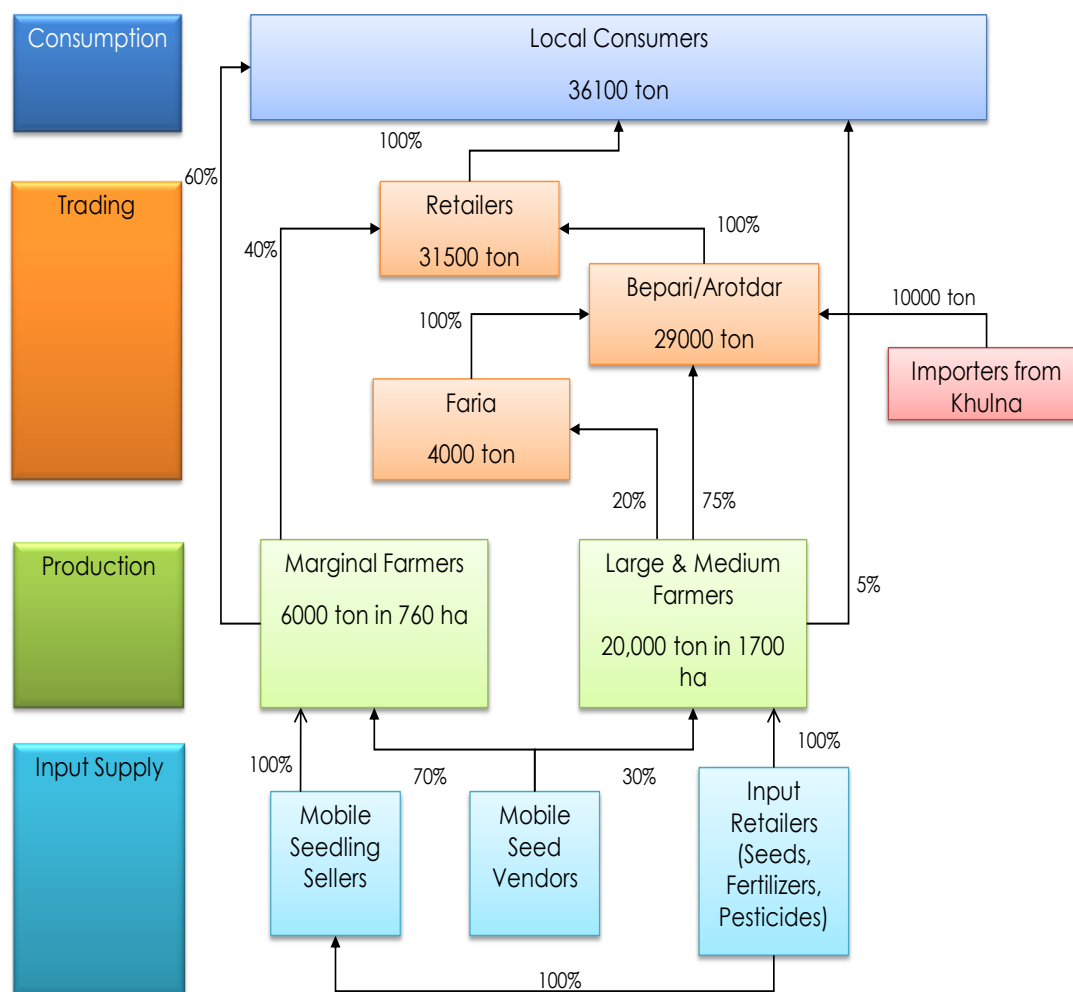
Informal vertical integration in production threatens quality assurance:

Beneficiaries are mostly dependent on retained seeds that lead to quality degradation. That also creates weak relationships with seed suppliers. Though access and quality to other inputs are also present; but distance and limited demand means individual beneficiaries are unable to influence the input sellers.

6.3.4 Horizontal Linkages

Horizontal linkages among beneficiaries were present in some weak forms. Generally, the beneficiaries have been part of a group under former project and there is a level of interaction, albeit informal in nature. Sharing of inputs and knowledge is commonly seen between the farmers. However, these trading actors prefer to work with large farmers as they are consistent and professional. Targeted beneficiaries cannot access these actors and stick to local markets.

Figure 7 Value Chain Map for Vegetable²⁵



²⁵ Primary data, In-depth Interviews, Questionnaire survey.

6.3.5 Performance of the Value Chains and Scope for Upgrading

Input Suppliers

In these regions, there are different types of input suppliers who are active and catering to the different kinds of vegetable farmers – commercial ones and marginal farmers.

The marginal farmers mostly buy their inputs, mainly seeds or seedlings from the mobile vendors/sellers who sit on the floor of main bazaars. These input sellers mostly sell non-branded or unknown brands' seeds and seedlings also grown from unknown branded seeds. They tend to sell inputs mainly for vegetables and other such non-cash crops.

The input retailers, with their own establishments in the bazaars, tend to sell different kinds of inputs – seeds, fertilizers and pesticides. They mainly cater to the demand for cultivation of cash crops, but also have branded and non-branded inputs for vegetables and other non-cash crops. These suppliers purchase their products from the district-based input dealers, but most of them have no direct linkage with input companies.

These input suppliers have very little information about the technicalities of using different inputs. They tend to provide basic information about how to use their inputs – treatment of seeds, how to apply pesticides – but they lack the knowledge to be able to provide proper cultivation advice to farmers regarding vegetables. Although, they are interested in providing cultivation advice as a means to market their products better.

Most farmers also tend to use their own seeds for certain vegetables, like potato, brinjal, lady's finger, etc.

Scope for Upgrading: The input suppliers have direct linkage with farmers and can potentially influence their behavior by marketing better quality inputs to them. They are also capable of promoting better cultivation

techniques, by providing proper information about treatment of soil and using inputs properly. This has also been proven to be good incentive for input sellers to enhance the services of their business, resulting in more business. Farmers tend to build a closer relationship with input sellers who provide this embedded service and tend to purchase more inputs from them.

Farmers

Commercial vegetable farmers are more active in areas like Sharonkhola and Koyra, where the salinity is low in most areas. They tend to grow vegetables like – potato, brinjal, gourds (bitter, snake, sweet, etc.) spinach, pumpkin, okra, summer tomato, chili and sell them to the nearest haats. These larger farmers usually consume 5% of their produce and sell approximately 80% of their produce to farias and local arottdars.

Table 20 Yield gap of different vegetables

Crop	Yield gap (kg/dec)
Bitter gourd	41
Cucumber	38.7
Pumpkin	22.8
Brinjal	138
Okra	22.3
Tomato	166.2
Chili	10.6

Source Master Plan for Agricultural Development in the Southern Region of Bangladesh

Marginal vegetable farmers tend to grow some vegetables in their homestead plots, for mostly own consumption. They usually consume approximately 60% of their produce and sell the excess mostly to their neighbours or to neighbourhood shops.

The general perception in Chandpai, Munshiganj and many areas in Dacope is that vegetable cannot be grown in these saline regions. But there has been cultivation practices tried out in other places, mostly in Koyra where farmers have successfully been growing vegetables by treating the soil and fertilizing it.

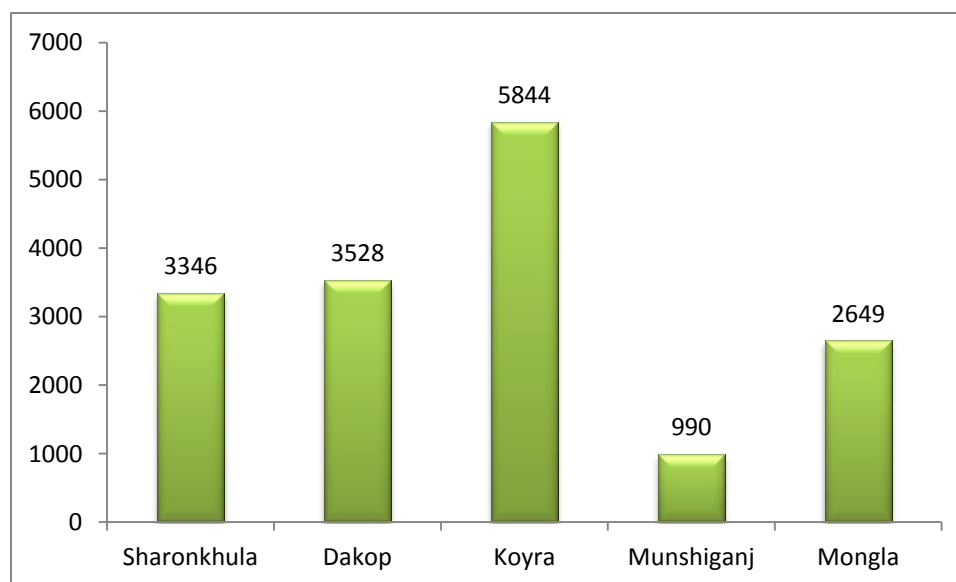
Scope for Upgrading: Households are not capitalizing on their homestead plots by using them for vegetable cultivation, and even large farmers are not using proper cultivation techniques, thus not reaching the adequate level of productivity for vegetables in these areas.

Based on data from the “Master Plan for Agricultural Development in the Southern Region of Bangladesh” by MoA and FAO, there is a yield gap in the productivity of vegetable farmers in the Greater Khulna region, as shown in the table. This elaborates that by using proper techniques for soil treatment and using better inputs, it is possible to increase the production of vegetables in these regions.

Traders

Vegetable arots are present in the major haats in all the regions, although they differ in size and number. These arotdars tend to be directly linked to the few commercial vegetable producers in the area, and purchase the produce directly from them. Their daily trade volume of vegetables is approximately valued at BDT 50,000-80,000.

Chart 7: Traded Volume (MT)²⁶



In areas like Koyra, where it is less saline and commercial vegetable farmers are present, farias are active in purchasing vegetables from the farms and selling them at the nearest major bazaars like in Koyra, Tala, Paikgacha, etc, where arotdars are present.

²⁶ BBS.

In areas like Chadpai and Munshiganj, where commercial vegetable production is non-existent, farias are not active for collecting vegetables. Although, many farias tend to work in these areas for collecting fish from the ghers and even homestead ponds.

Scope for Upgrading: Bulk production of quality vegetables in these project regions would encourage more traders to become active in these regions. It will also provide the vegetable producers a basis for better bargaining.

6.4 Value Chain Governance

Influence & control along the chain

The value chain is largely influenced by traders, especially the wholesalers. As the region has a large amount of vegetables coming from outside, the quality and supply of those products influence the markets greatly and the channel via which they come in is the wholesalers.

Power dynamics

Thus, for both product movements into and within the region, the wholesaler is in charge. Unfortunately, due to the small production volume, targeted beneficiaries are unable to even engage with the wholesalers, let alone have any influence on them.

6.5 Inter-Firm Relationships

As such cooperation and collaborations exist between trader groups especially to get the product into the consumers' hand in shortest time possible. District wholesalers keep in touch with various markets and their retailers to quickly negotiate prices and terms of trade. The strength of inter-firm relationships can be seen in the concept of commission-based wholesalers who do not own the product but sell it on the farmers' behalf for a commission. As the business is spread out over the year across different vegetables, the market actors generally manage a steady business relationship for long-term profitability.

6.6 Assessment of the regulatory environment and support services

Infrastructure: Khulna is connected to other parts of the country with a good network of roads and water transport facilities. Within the Khulna division though, road facilities too many of the project areas is of poor quality or non-existent. This causes a major issue with ensuring proper transportation of both inputs and produces to and from the project regions.

Public Services: There is a strong mandate and interest from the District level Agriculture offices to focus on increasing the production of vegetables in Khulna region. Upazila and Union level Agriculture officers are very interested to promote measures for treating salinity and thus improve vegetable production in these areas. They are very interested in being involved with promoting these techniques in a larger scale.

Financial Services: Microcredit organizations are actively working in these regions. There has been many different projects also operational in these areas since Cyclone Aila, and have been providing different financial alternatives to the residents in the project areas.

6.7 Poor/Resource-dependent People, Youth and Gender Analysis

Increased vegetable cultivation in these areas will increase consumption of vegetables of the producers' households, and also make it more accessible for other households to purchase them. The increased supply of vegetables in the area will also help to decrease the price to some extent, making it more plausible for poor households to afford vegetables more regularly.

Vegetable cultivation can be a highly profitable venture with the use of better inputs and cultivation techniques. Thus, it can be an encouraging area for the youth to get involved in.

Homestead cultivation of vegetables will also encourage more involvement of women in the production of the vegetables.

6.8 SWOT Analysis

Table 21: SWOT Analysis for Vegetable Value Chain

Strengths	Opportunities
<ul style="list-style-type: none"> Agro inputs like fertilizers, pesticides, seeds (including hybrid) are available Vegetable cultivation is potentially highly profitable 	<ul style="list-style-type: none"> Supply gaps in the local markets for vegetables indicates at least 70% higher production will be consumed without making a negative impact on price At least 60% of the beneficiaries have homestead and/or dyke land, and 28% has more than 20 decimals land which can be treated and used for vegetable production Bulk production in groups will encourage bulk trading and increase the bargaining power of the producers Input retailers are interested in promoting new products and providing cultivation information to producers
Weaknesses	Threats
<ul style="list-style-type: none"> Current productivity is low due to traditional approaches of vegetable cultivation Farmers believe that saline soil is not appropriate for cultivating vegetables Lack of awareness about treating salinity in the soil Limited capital Access to market is low in terms of physical communication and transportation 	<ul style="list-style-type: none"> Lack of traders in the remote areas The zone is prone to natural disasters like flood, cyclone and hurricanes

6.9 Constraints Analysis

Table 22: Constraints Analysis for vegetables value chain

Actors	Functions	Constraints
Input Suppliers	Selling seeds, pesticides, fertilizers to the producers	They do not source high quality packaged inputs since the demand for them is low. Also, they are not able to provide the proper information about how these inputs should be used to ensure best productivity.
Public agriculture services	Providing information to farmers about cultivation techniques	The public extension service is not actively operating in most of the project areas. Thus, farmers are not getting the required information about treating saline soil for vegetable cultivation and using proper cultivation techniques to ensure high productivity. This results in farmers not being able to produce vegetables or producing poor quality of vegetables and not making much profit from it.
Private agriculture services	Providing information to farmers about cultivation techniques and proper usage of inputs	The demand for inputs is very low in this area, so private companies are not active in these regions. They are also not aware of the potential to cultivate vegetables by treating saline soil, which can be a scope for them to market their products in these areas. Farmers are currently not aware of how best to use high quality inputs to get the best production from their lands. For marginal farmers, the additional cost of using better inputs is perceived as unnecessary since they are not aware of the value addition from higher productivity.
Farmers	Produce vegetables	Farmers are not aware about the potential to grown to vegetables in their saline soil, especially about utilizing their homestead and dyke lands. They are also not aware of the profitability of vegetables, and about the viability of it being an income generating activity for them. Currently, they are not well-informed about the cultivation techniques of treating saline soil, and also about the best practices to ensure high productivity from vegetable cultivation by using quality inputs.
Financial Services	Providing finances to producers to be used for cultivation of vegetables	Using better inputs for vegetable cultivation will result in some increase in the cost of production. Marginal farmers would be inclined to get microcredit products for investment into vegetable cultivation. But, microcredit institutions do not provide crop-based/seasonal products that can be repaid at the end of a crop cycle.
Infrastructure	Roads and communication for transportation	Most of the project regions have poor road connections to Khulna district. Most common types of transportation include low-engine vans, motorcycles, bicycles and trawlers or row boats for travelling by the river.
Rural farias	Collecting from producers and selling to Arotdars	Farias are only active for sourcing vegetables where there is a high production of vegetables. Even then, most of these regions have very few producers of good quality and/or quantity of vegetables.
Arots (or arotdars)	Wholesale facilitation of vegetables at the main markets (bazaars)	Mainly buying from producers and farias to be able to sell large quantities. They sell to local retailers and/or consumers. They are usually not able to meet the local demand with the local supply, and then they source the additional amount required from arotdars in Khulna.
Rural Retailers	Retailing vegetables to local consumers	These retailers buy the vegetables from the arotdars of local producers, and sell them mainly to local households. In Sharonkhola, they also sell to the cargo vessels which pass near there.
Local consumers	Consumption of vegetables	Consumption of vegetable is low in these regions, since supply is low and prices are high. Most producers are able to meet their household vegetable requirements from their own homestead gardens.

6.10 Recommendations

The opportunities for working on these constraints can be analyzed to develop intervention plans that can be used as the basis to plan project activities:

Table 23: Intervention design table for Vegetables

Constraint	Intervention	Output	Outcome	Impact	Leverage Point
Vegetable farmers use poor quality inputs	Facilitate the linkage between input companies and input retailers in these regions to help them market quality inputs	Input suppliers will be able to provide quality inputs to the farmers	Farmers are able to avail quality inputs	Farmers are able to have higher yield by at least 20-50%	Input retailers
Vegetable farmers follow traditional cultivation practice as they do not have access to information on improved practice	Create service provider (seed retailers) to ensure information flow to the vegetable farmer	Service providers are providing information on better cultivation practices to the farmers	Farmers are using better cultivation techniques	Vegetable Farmers are able to have higher yield 20-50%	Seed companies, Fertilizer companies; Agro-chemical companies and Commercial nurseries.
	Set up demonstrations to showcase better cultivation practices	Farmers are able to see and learn about better cultivation practices			Seed companies; Fertilizer companies; Agro-chemical companies and Commercial nurseries.
Vegetable traders are not sourcing from these regions	Facilitate linkage between farmers and traders by encouraging Farias for vegetable collection from farmers	Farmers are producing vegetable in bulk	Traders are actively sourcing vegetables from these regions	Farmers are motivated and growing more vegetables	Arotdars, Urban super stores, etc.

6.11 Intervention details

The potential interventions are detailed below, considering the opportunities that can be worked on with specific actors to improve vegetable cultivation in these areas:

Intervention 1: Facilitate the linkage between input companies (seed, fertilizer, chemical) and input retailers in these regions to help them market quality inputs

Potential Partners: Seed companies; Fertilizer companies; Agro-chemical companies and Commercial nurseries.

Support Service Providers: Bangladesh Agricultural Research Institute (BARI), DAE.

Farmers are not motivated to use proper inputs, since they are not aware of their benefits. Thus, there is a potential market for input companies to market and sell their produce. The input companies can create linkages with the input retailers and seedling sellers who can promote these products in these areas. Input retailers have direct contact with the farmers and have the motivation to promote better quality products to them, in order to build better relationships with the farmers.

BARI and public service providers have interest to encourage vegetable cultivation in these regions by promoting saline-tolerant varieties.

Intervention 2: Create service provider (seed retailers) to ensure information flow to the vegetable farmers

Potential Partners: Seed companies; Fertilizer companies; Agro-chemical companies and Commercial nurseries.

Support Service Providers: Bangladesh Agricultural Research Institute (BARI), DAE.

Building on the linkage between input companies and input retailers, these retailers can be enhanced to also act as the service provider for technical advice to the vegetable farmers. Farmers are not motivated to use improved inputs, since they are not aware of the proper techniques and methods for using them. Input retailers providing the technical advice when selling inputs adds value to the service the farmers are able to get from them. This in turn helps the farmers to increase their yield and productivity, encouraging them to produce more vegetables.

Public Agriculture Officers have interest to promote vegetable cultivation in these regions and can provide trainings on treatment of soil and cultivation techniques.

Intervention 3: Provide trainings and set up demonstrations to showcase better cultivation practices

Potential Partners: Seed companies; Fertilizer companies; Agro-chemical companies and Commercial nurseries.

Support Service Providers: Bangladesh Agricultural Research Institute (BARI), DAE.

The general perception in these regions, especially Chandpai, Munshigonj is that vegetable cultivation is not possible due to the high saline soil. To change this mindset, the best method is to showcase through creating demonstration plots. Some lead farmers, who have a potential to influence others in the locality, can be chosen to be trained and carry out vegetable farming in their lands. Seeing the actual production of vegetables and watching how the cultivation was carried out is both a learning tool and a motivation for

interested farmers. Also, trainings and field days should be organized to transfer knowledge about cultivation techniques to farmers.

Intervention 4: Facilitate linkage between farmers and traders by encouraging Farias for vegetable collection from farmers

Potential Partners: Arotdars, Urban super stores, etc.

Since vegetable cultivation is very low in most of these areas, there are almost no existing farias who collect vegetables from these farmers. If households start cultivating vegetables, and produce an excess to be sold, then there will be a requirement for traders in these areas. The farmers can start the facilitation of selling vegetables in bulk through one or two specific traders. These traders can be developed from their local members, especially those who cannot be engaged into the value chain as producers.

Facilitation activities carried out to link traders to forward actors like arotdars or urban super stores who can ensure a consistent demand for vegetables, so traders can sell to them.

7. Value Chain Analysis for Tilapia and White Fish

7.1 Brief Overview

Fish play a crucial role in the Bangladeshi diet, providing more than 60% of animal source protein, representing a crucial source of micro-nutrients, and possessing an extremely strong cultural attachment. Bangladesh has extensive and highly diversified fisheries resources. Official Department of Fisheries (DOF) statistics estimate total fish production of 2.56 million tons, of which aquaculture accounts for 39%. Even though white fish accounts for the majority of the production and consumption of fish in Bangladesh, tilapia has great potential in terms of food security and nutritional benefit. It has been gaining increasing popularity among consumers in recent years, and has become one of the most important food fish in Bangladesh (Ahmed, 2009b). Even different income groups spread across Bangladesh are all consuming different forms of tilapia.

There has been a strong growth in the consumption of fish during the period 2000–2005, however, the gap in fish consumption between rural and urban areas widened during this period. Per capita fish consumption in urban areas increased by 17.5% to 18.1kg from 2000-2005 against a national average of 15.4kg, while consumption in rural areas climbed 4.8% to 14.5kg (World Fish Report 2011). Low value wild fish and cultured carps remain the most common fish consumed in rural areas, whereas cultured species of fish (e.g. pangasius, tilapia and climbing perch) are increasingly dominant in Dhaka and other urban markets, along with higher value wild fish.

Khulna region is known for its fish production, and being a hub for cultured fish – mostly galda and bagda shrimps, along with other white fish and cultured fish. Khulna also provides a large source of river-caught fish from around the Sundarban regions. The project areas mostly fall around areas where there is considerable supply of both river-caught and cultured fish. Specifically for tilapia production, Khulna produces around 35,123 MT of tilapia, but there is still a supply gap of 1168 MT which is needed to be imported from other parts of Bangladesh to meet the demand in the urban markets of this region²⁷.

Rationale for choosing Tilapia & White Fish as a Value Chain:

- There is growing demand for Tilapia & White Fish both in the local and the national market. The supply of fish from these regions is very high, and can mitigate some of the supply gap in the local and national market.
- Tilapia is saline tolerant, and can be produced with low risk measures, resulting in high profitability.
- Around 50% of CREL's beneficiaries have at least small (5 decimals) homestead pond which can be utilized for semi-intensive cultivation of tilapia and white fish.
- At least 17% of the beneficiaries have some form of experience in cultivating tilapia; either in their own ponds or working on other farmers' ponds.
- Growing fish is a common practice in these areas, but using proper cultivation techniques is not carried out by marginal farmers.

²⁷ Master Plan for Agricultural Development in the Southern Region of Bangladesh. Ministry of Agriculture, GOB & FAO, March 2013.

- The profitability of growing Tilapia is much higher than traditional crops. However, the profit in fish culture differs from site to site depending on practice, climatic impacts, environmental concerns etc. The differences in site-wise cost-benefit analysis is shown below:

Table 24: Site Specific CBA for Fish culture²⁸

	Pond preparation/dec	Fingerling/dec	Fish feed/dec	Medicines/Vitamins/dec	Irrigation/dec	Total Production/dec	Total cost/dec	Revenue/dec	Net Profit/dec
Chadapai	51	118	62	0	36	4	295	594	299
Munshigonj	89	292	218	0	0	15	643	1579	936
Dakope/koyra	290.2	441	120.6	0	165.2	21	1181.4	2625	1443.6

7.2 End market analysis

7.2.1 Main Market, Buyers & Competition

The fish markets in all the project areas are well developed and linked to the major district markets, like Khulna, Jessore, Dhaka. Based on the information collected from the project areas, the overview of end markets for tilapis and white fish can be provided in the table below:

Table 25 Market analysis for Fish value chain

	Sharonkhola	Dacope/Koyra	Chandpai	Munshiganj
Main Market	Rayenda, Tatalbari, Sharonkhola Bazars	Local bazars, Tala, Koyra Bazars	Local bazars, Mongla Bazar	Kalbari, Shonarmore, Nowabeki, etc.
Buyers	Arots, households, passing ships, local bazars	Arots, households	Arots, households	Arots
Market Opportunity	High unmet local demand	Potential to export more to Tala, Khulna, etc.	High unmet demand from Khulna, Dhaka; hub for Tour Vessels	High unmet local demand; demand from Khulna, Dhaka

7.2.2 Demand/ Supply Situation

Based on the data from DoF and the primary survey carried out during the assessment, the total market volume of Tilapia production in the project areas can be calculated to be around 5,000 MT.

The majority of production is carried out in Mongla and Munshiganj, most of the cultivated fish tends to be exported to divisional towns around Bangladesh like Khulna and Dhaka. Thus, there is a huge potential for supplying more fish from these regions. Dacope and Koyra still have a large unmet local demand for tilapia and white fish, since fish cultivation is not very high in these regions, and the large sized fish tends, both captured and cultured, tend to be imported out to Khulna and other regions.

²⁸ Primary data: Cost benefit analysis

7.2.3 Market Opportunity

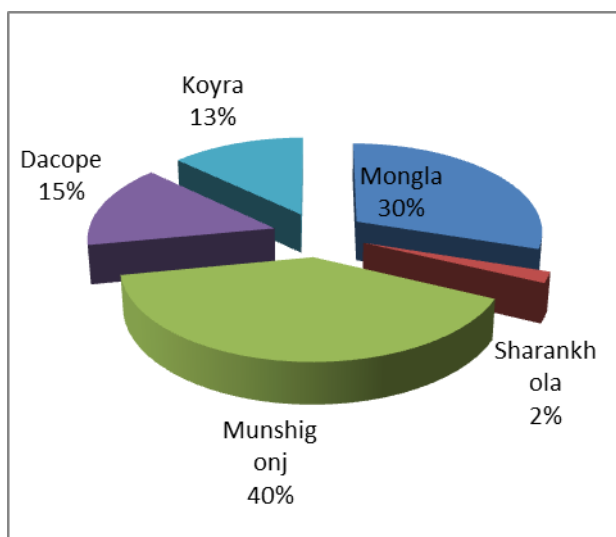
The market for big size of tilapia and white fish is growing not only all over Bangladesh, but in these local regions also. The households have a strong culture of fish consumption, and not just of smaller sized fish, but also of bigger fish like pangasias, tilapia, carp, etc.

There is an overall perception that fish cultivation for commercial purposes cannot be carried out in small ponds. Thus, most of the cultivation of bigger fish is carried out only in the gher, and small farmers do not pursue fish cultivation in their small water bodies.

The study team found a perception gap among the target population, that small ponds are not ideal for cultivating fish commercially. Most households tend to cultivate fish in a very small scale without any proper inputs or feed being used. This is largely for own consumption and they sell the excess at random intervals at very low prices. Thus, addressing this misperception is a key challenge for enhancing cultured fish production in these regions, by showcasing the profitability that can be achieved from semi-intensive cultivation in homestead ponds.

The average pond-size of 5 decimals can be used for poly culture of tilapia along with white fish. Tilapia, mono-sex tilapia, remains a potential species for aqua-farming since they are saline tolerant and can survive in low water levels. Also, Tilapia has a shorter cycle which allows 2 cycles per year in semi-intensive form and 3 cycles in intensive practices.

Chart 8: Total Market Volume (5000 MT)



Source: Primary data, In-depth Interviews, Questionnaire

7.3 Value chain map and analysis of value creation activities

The fish value chain for Khulna region was mapped using information from the different project areas. The following Value Chain map provides an overview of how the different actors engage through for the production, harvesting, processing and selling of tilapia and white fish in these areas.

7.3.1 Value Chain Actors, Functions and Map

Hatching: A total of 30 hatcheries are located in Southern region. Hatchery is the key value chain actor that contributes to expansion of Tilapia and white fish farming in the region. Hatcheries produce fry from the eggs of the broods. Then they apply hormone in the new born fries for making them mono-sex i.e. all male. After the hormone treatment, hatcheries sell the fries to farmers and fry traders.

Fingerling Trading: fry/fingerling traders sell Tilapia fry to the farmers of the targeted region. Fry Traders play a significant role in providing fingerling and information to the farmers on farming of Tilapia and white fish. Fry traders buy from the hatcheries in bulk and sell those to the farmers even in the remote areas.

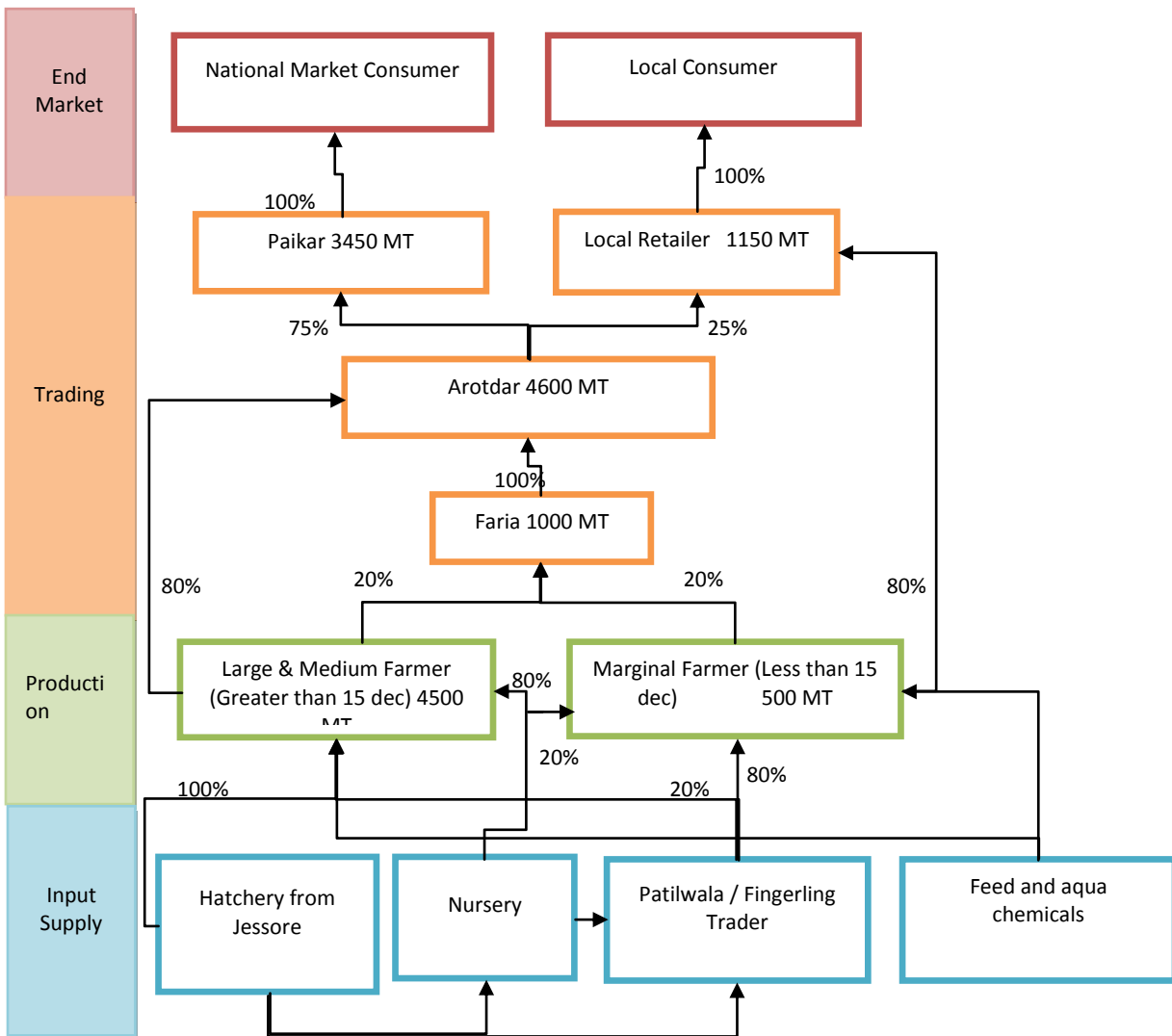
Input Supply: Input suppliers are the retailers of the Feed companies and Aqua-chemical companies. They sell essential inputs of fish farming, which include Factory made feed, Ingredients of homemade feed, different aqua-chemicals and pesticides, to the farmers. These input suppliers are the important channel for the dissemination of information. Private sector companies provide different types of technical information and supports through their retailers and distributors.

Production: Producers are the commercial fish producers, small/marginal farmers which also include targeted beneficiaries. Our targeted beneficiaries are household farmers who make use of small water bodies within their home area (commonly 3-5 dec). The smaller farmers usually depend on patilwala/fry traders or nurseries for fingerling; commercial farmers mostly depend on hatcheries.

Wholesaling: Arots work as the wholesale marketplace where farmers sell their produced Tilapia to the Paikers and Retailers. Arotdars usually keep a Table in the rural markets and farmers place their produces on the table. Then, an auction takes place and highest bidder gets the products. Arotdars take a commission of TK. 3-5% for their facilitation.

Retailing: Retailers buy Tilapia from the Paikers and sell it to the end consumers. Retailers usually sell Tilapia in kg to the consumers.

Figure 8 Value Chain Map - Tilapia²⁹



7.3.2 Business Enabling Environment

Khulna region has traditionally favorable environment for fisheries. This region produces Tilapia than any other regions of the country. That is why the fisheries value chain is stonger than any other value chain in that region. Markets and transportation system are well established so that the value chain can function properly.

²⁹ Primary data, In-depth Interviews, Questionnaire survey.

A significant number of development projects are working in the region. This includes different projects of WorldFish Centre, Katalyst project (through Innovision and Winrock), USAID Price, World Bank (IAPP project) and ACDI VOCA etc. Presence of the development projects is facilitating the development of Tilapia farming in the region. Though there is a concern of sustainability in some cases. Too much dependency on the project can hamper the overall business environment. Projects would need to adopt a market based approach to ensure sustainability.

Banks and other non-bank financial institutes including leasing companies are active in the region to provide credit. However, institutional credits are going to large farmers and hatcheries. Financial facility is still inadequate for the small and marginal farmers. Banks and leasing companies are unwilling to provide credits to the remote small and marginal farmers. Finding no other ways, farmers depend on the micro-credit and other informal sources of credits eventually paying higher interests.

7.3.3 Vertical Linkages

Producers are well connected with forward and backward market actors of the value chain. Many producers (relatively large) act as both grow out farmers and nurseries. Small/marginal farmers are linked with large farmers for input supplies. Formal input suppliers act better for commercial producers only.

The linkage among the traders is stronger as the same wholesaler can function for different aquacultural products. Big markets are functioning in the area and good transportation system gives the value chain the scope for better operation.

Information flows freely since the option to keep fishes in the pond if prices are too low means that any market instability is resolved in short time.

7.3.4 Horizontal Linkages

Horizontal linkages among beneficiaries are present as the beneficiaries belong to groups made by the project. Farmers were found to be sharing ideas and input among them. Though joint production of cultured fish is yet to be started.

At the trading level, both collaboration & healthy competition exist within the markets. This can be seen because every market, at local, district and regional level, all have a form of Association leading to highly competitive market.

7.3.5 Performance of the Value Chains and Scope for Upgrading

Input Suppliers

In these regions, there are different types of input suppliers who are active and catering to the different kinds of fish farmers – commercial ones and marginal farmers, for different kinds of needs.

Hatcheries provide the fish fingerlings which need to be grown to a minimum size in nurseries before they can be let out into the ghers and ponds in Khulna. There are almost no hatcheries in this region, so most commercial farmers get their fingerlings from hatcheries and/or nurseries in Jessore. Established hatcheries like Megafeed ensure sending their fingerlings in oxygenated transport mechanisms all the way over to the farmers in these project locations. Most of the project locations do not have nurseries

catering to the fingerlings, so farmers usually tend to buy bigger fingerlings/ fry to put into their ghers or ponds.

'Patilwalas' are also very common in these regions, where these mobile fingerling sellers move around selling fingerlings at the household gates. These patilwalas usually sell unbranded fingerlings which tend to be of poorer quality. Farmers also tend to catch fingerlings from the river and cultivate them in their own ponds. A patilwala is usually able to have a monthly income of around BDT 30,000, with a 60% profit margin.

The major bazaars in these regions all have properly established input retailers which sell fish feed and aqua chemicals. They have linkage with private company dealers in the divisional towns, and are usually able to provide advice about certain problems that may arise in fish cultivation.

Farmers

In these areas in Khulna, commercial fish farmers are widespread and tend to grow fish targeting the national market – golda, bagda, along with white fish, pagasias and tilapia. Most (75%) of this produce tends to export to larger markets in Jessore, Khulna, Dhaka, etc. These farmers cultivate the fish using proper inputs, pond management techniques and such to ensure high yield and good quality of their fish production.

The marginal fish farmers tend to grow fish without carrying out any form of pond preparation, management or feeding. They also tend to use poor quality of fingerlings, and thus, approximately 60% of farmers tend to be dissatisfied with the quality of Monosex Tilapia fingerlings. The usual size of Tilapia produced from such practice tends to be of about 250 gms, being priced at around BDT 50.

Traders

Fish arots are very prevalent in these regions, since they have a strong fish market catering to national demands for golda, bagda, white fish, tilapia, pangasius including river-caught fish. Most large farmers tend to come directly to arots and sell their produce. Farias are very active in most of these regions, where they go around and collect fish from medium and marginal farmers, and sell to the arots. Farias who work regularly in these areas are able to avail advance funds from the arots to go and purchase fish from the localities. These arots get a commission of BDT 2-3/kg of fish that is traded through them.

Paikers buy from arotdars and sell to markets at the district levels which are mostly exported to the national markets. The paikers usually have a margin of BDT 10-12 /kg whereas rural retailers have a margin of BDT 20/ kg. Consumers of this region usually pay more than the consumers in other region. Average retail price was found to be BDT 140-150/kg.

7.4 Value Chain Governance

Influence & control along the chain

The flow of market / business information along the value chain is open. In most of the cases farmers respond quickly with the prices. Large farmers usually have a good relationship with wholesalers and they do not harvest without knowing market price. However, The ultimate control of the value chain lies with the end-market actors; who dictate demand and pricing of fish.

Role of Beneficiary

Beneficiaries are incapable of going beyond local wholesalers/arotdars and often choose selling directly to consumers in locality for quicker return on harvest. This occurs because of lack of knowledge on proper time of sell to get the maximum return.

7.5 Inter-Firm Relationships

Inter-firm relationships are strong between hatcheries nurseries and producers. The relationship exists within and outside the region. Commercial farmers have good connections with input suppliers from within and outside the region.

Few large farmers also act as input suppliers (fry/fingerling) and also provide knowledge to small farmers. Sourcing inputs (fry/fingerling) is a common practice for small and marginal fish farmers of the targeted area.

7.6 Assessment of the regulatory environment and support services

Infrastructure: Well established market places exist (Arots). They have direct linkage to other markets of the country. Markets also provide other facilities (icing, transportation) to run its operation smoothly.

Public Services: very few of the respondents were found having any formal training on advance cultivation or balanced use of fertilization. These trainings are mostly provided by input companies or by NGOs providing loan.

Financial Services: No particular loan facilities are available for fish farmers. They either have to take loan from mahajan or depend on the loan from micro credit provider NGOs.

7.7 Poor/Resource-dependent People, Youth and Gender Analysis

Increased homestead cultivation of fish in these areas will increase consumption of fish of the producers' households. Increased supply from small-scale producers will also add to more fish being sold at the local haats and also make it more accessible for marginal households to purchase them.

Semi-intensive fish culture can be a profitable venture with the use of better inputs and techniques. Thus, it can be an encouraging area for the youth to get involved in.

Homestead cultivation of fish will also encourage more involvement of women in the production process of managing the pond, feed, etc.

7.8 SWOT Analysis

Table 26: SWOT for Tilapia and White Fish Value Chain

Strengths <ul style="list-style-type: none"> Homestead ponds available in at least 50% beneficiary households Household ponds can be prepared and managed for fish culture Almost all beneficiaries have experience in fish cultivation using old techniques Well established backward and forward linkages in the region 	Opportunities <ul style="list-style-type: none"> High local and national demand Strong linkage with the backward markets of inputs, feeds, aqua chemicals, etc. Traders and forward market linkages are well established due to fish market being strong in these regions
Weaknesses <ul style="list-style-type: none"> Lack of knowledge about pond preparation, management and proper techniques for semi-intensive cultivation of fish in small ponds Misperception about the viability of commercial fish cultivation in small ponds Habit of using caught fingerlings or poor quality inputs Habit of growing fish without investing in it 	Threats <ul style="list-style-type: none"> Salinity and weather can impact water conditions in ponds Climatic disaster prone areas Limited access to finance for small producers Dependence on loans limits business decisions and ownership

7.9 Constraints Analysis

Table 27: Constraints Analysis for Tilapia and White Fish Value Chain

Actors	Functions	Constraints
Input Suppliers	Selling fingerlings and fries to the fish farmers	Both good quality and poor quality fingerlings are available in these regions through different retailers and patilwalas. The demand for high quality fingerlings is low for marginal farmers, since perception is that fish cannot be produced for commercial profitability in small ponds.
	Selling fish feed, aqua chemicals to the fish farmers	The suppliers have linkage with district level dealers and are able to provide all necessary products for commercial fish farming. They are not well versed with technical advice about fish cultivation, especially about poly-culture in small ponds.
Public agriculture services	Providing information to farmers about fish cultivation techniques	The public extension service is not actively operating in most of the project areas. Also, most of their work focused on promoting large-scale fish culture and does not target the marginal farmers.
Private agriculture services	Providing information to farmers about cultivation techniques and proper usage of inputs	There is a huge demand for fish inputs in these regions, but there is almost no provision of getting information or technical advice about using them from input suppliers. Private companies can facilitate the information flow by ensuring that information about the use of their inputs is provided by the input suppliers to the farmers. Also, promoting the proper use of inputs to get higher profitability would be a means of marketing for these companies, and encourage marginal farmers to move into fish cultivation.
Farmers	Produce vegetables	Farmers are not aware about the potential profitability in cultivating fish in a semi-intensive manner in small homestead ponds. They are also not well-informed about the cultivation

		techniques to ensure high productivity from fish cultivation by using quality inputs properly.
Financial Services	Providing finances to producers to be used for fish cultivation	Proper cultivation of fish will require some increase in production cost for pond preparation, feed management, pond management, etc. The need for financial assistance for marginal farmers would occur. But, microcredit institutions do not provide cycle-based/seasonal products that can be repaid at the end of a fish season. This de-motivates farmers from using better quality inputs.
Infrastructure	Roads and communication for transportation	Most of the project regions have poor road connections to Khulna district. Most common types of transportation include low-engine vans, motorcycles, bicycles and trawlers or row boats for travelling by the river.
Rural Farias	Collecting from producers and selling to Arotdars	Farias are highly active in most of these areas for sourcing fish from medium sized farmers. They will easily start sourcing from smaller farmers if the production increases. Most farias are directly linked to arotdars.
Arot (or arotdars)	Wholesale facilitation of fish at the main markets (bazaars)	Mainly buying from producers and farias to sell fish in large quantities. They carry out business with both cultivated and captured fish, including golda, bagda, tilapia, pangasius and carp. They are directly linked to district markets in Jessore, Khulna and Dhaka.
Rural Retailers	Retailing fish to local consumers	These retailers buy the fish from the arotdars, and sell them in small local bazaars. These fish are usually bought by the local households.
Local consumers	Consumption of fish	Consumption of vegetable is low in these regions, since supply is low and prices are high. Most producers are able to meet their household vegetable requirements from their own homestead gardens.

7.10 Recommendations

The opportunities for working on these constraints can be analyzed to develop intervention plans that can be used as the basis to plan project activities:

Table 28: Intervention design table for fish value chain

Constraint	Intervention	Output	Outcome	Impact	Leverage Point
Farmers do not use quality inputs (fingerlings, feed, etc.)	Facilitate the linkage between input companies and input retailers in these regions to help them market quality inputs	Input suppliers will be able to provide quality inputs to the farmers	Farmers are able to avail quality inputs	Farmers are able to have higher yield	Hatcheries, Nurseries, Feed companies, Agro-chemical companies.
Small-scale fish farmers do not use proper cultivation techniques	Create service providers(input retailers) to provide technical advice for cultivating in small ponds	Input providers will be able to provide technical advice to the farmers	Farmers are using proper cultivation techniques		Hatcheries, Nurseries, Feed companies, Agro-chemical companies.

	Provide training and set up demonstrations to showcase better cultivation practices	Farmers are knowledgeable about using proper cultivation techniques			Hatcheries, Nurseries, Feed companies, Agro-chemical companies.
Farmers do not have access to finances for investing in fish farming	Facilitate linkages between arotdars/financial institutions and farmers to encourage financing options	Farmers are getting financial capital to invest in fish cultivation	Farmers are using better inputs and proper cultivation techniques		Arotdars, Urban super stores, etc.

7.11 Intervention Details

The potential interventions are detailed below, considering the opportunities that can be worked on with specific actors to improve vegetable cultivation in these areas:

Intervention 1: Facilitate the linkage between input companies (fish seed, feed, aqua-chemical) and input retailers in these regions to help them market quality inputs

Potential Partners: Hatcheries, Nurseries, Feed companies, Agro-chemical companies.

Support Service Providers: DFO.

Farmers are not motivated to use proper inputs for cultivating fish, since they are not aware of their higher yield. Thus, there is a potential market for input companies to market and sell their produce to small-scale farmers. The input companies can create linkages with the input retailers who can promote these products in these areas, since they have direct contact with the farmers. They also have the motivation to promote better quality inputs to these farmers, in order to build better business relationships with them.

Intervention 2: Create service providers (input retailers) to provide technical advice for cultivating in small ponds

Potential Partners: Hatcheries, Nurseries, Feed companies, Agro-chemical companies.

Support Service Providers: DFO.

Building on the linkage between input companies and input retailers, these retailers can be enhanced to also act as the service provider for technical advice to the vegetable farmers. Farmers are not motivated to use improved inputs, since they are not aware of the potential increase in productivity that can be attained. Input retailers providing the technical advice when selling inputs adds value to the service the farmers are able to get from them. This in turn helps the farmers to increase their productivity, encouraging them to start cultivating fish even in their small ponds.

Intervention 3: Provide training and set up demonstrations to showcase better cultivation practices

Potential Partners: Hatcheries, Nurseries, Feed companies, Agro-chemical companies.

Support Service Providers: DFO.

The general perception in these regions is that semi-intensive fish cultivation cannot be carried out in small ponds. Thus, marginal farmers are not motivated to use proper cultivation techniques and inputs in growing fish in their homestead ponds. To change this mindset, the best method is to showcase through creating demonstration plots. Some lead farmers, who have a potential to influence others in the locality, can be chosen to be trained and carry out fish cultivation in their homestead ponds. Seeing the actual productivity of fish watching how the cultivation is carried out is both a learning tool and a motivation for interested farmers. Also, trainings and field days should be organized to transfer knowledge about cultivation techniques to farmers.

Intervention 4: Facilitate linkages between arotdars/financial institutions and farmers to encourage financing options

Potential Partners: Arotdars, Urban super stores, etc.

Proper cultivation of fish, even in small ponds, include some investment for pond preparation and management, feed, aquachemicals, etc. Marginal farmers do not have access to cycle-based credit products from institutions like Bangladesh Krishi Bank. Thus, there needs to be linkages developed with actors who can provide financial support to marginal farmers. This can be done through encouraging Arotdars to provide small loans to marginal farmers who will cultivate fish and sell back to these arotdars. It is also possible to look into micro-credit organizations and look into developing season-based microcredit products for these farmers.

8. Value Chain Analysis for Sunflower

8.1 Brief Overview

Sunflower is a saline tolerant crop that has, in recent years, been introduced in the Southern regions of Bangladesh. It is known that Bangladesh's need for edible oil is annually around 6 lac tons, whereas the production is only around 2 lac tons³⁰. This gap in supply is met by importing different varieties of edible oils, which can be subsidized by increasing the national production. Given that sunflower tends to contain 42% oil, and is also a healthier alternative to soya bean oil, there is scope for it to be a competent product alongside imported oils.

Cultivating sunflower on larger pieces of land would ensure high productivity from very low costs, given the price of sunflower seeds is relatively high in the market. It is also possible to be grown during both robi and kharif seasons, and alongside growing Aman rice. During the winter, the land is usually fallow due to high salinity and lack of irrigation, and sunflower can be grown during these months. So, a bulk production of sunflower would be profitable venture for medium and large size farmers to undertake.

Rationale for choosing Sunflower as a Value Chain:

- Sunflower can be grown in both robi and kharif seasons, and can be cultivated alongside Aman rice cultivation.
- Sunflowers require very low cost and has high profitability, almost double.
- Around 28% of CREL's beneficiaries have land of over 20 decimals, thus being able to produce sunflower in bulk.
- There is available khas land for lease in these regions, which can be used by farmer groups to ensure bulk production.
- Also Sunflower production ensures a good profit.

Table 29 CBA of Sunflower³¹

Costs/dec									
Seed	Fertilizer	Pesticide	Irrigation	Field preparation	Labor	Average cost/dec	Average revenue/dec	Average yield/dec	Average profit/dec
24	47.5	25	44	30	30	200.5	390	12	190

³⁰ <http://www.khulnanews24.com/index.php/local-news/255-initiatives-for-sunflower-production-in-saline-environment-of-southern-bangladesh.html>

³¹ Primary data, Indepth Interviews, Questionnaire Survey

8.2 End market analysis

8.2.1 Main Market, Buyers & Competition

The market for sunflower has not yet taken off in a running commercial manner. BRAC is planning to start its own sunflower oil brand, and thus expanding its sunflower seeds source in these regions. There are some new companies also who are looking to expand their products and start producing sunflower oil – City Group and Amrit Group (based in Barisal).

Currently, there is only sunflower being produced in bulk in Sharonkhola, and traders are sourcing from there to sell to local and national level oil crushers/mills. In Dacope, Koyra and Munshiganj sunflower is grown in the homestead in very small quantities, and consumed at home as unrefined oil.

8.2.2 Demand/ Supply Situation

Based on the data from the District Agriculture Office, the total sunflower production in the project areas is recorded at around 550 tons.

BRAC is currently sourcing sunflower seeds mostly from Sharonkhola, from the farmers that they are providing inputs and cultivation information to. They are currently looking to expand their cultivation area from around 2 acres to over 8 acres in the coming year. BARI has also started promoting sunflower cultivation in these regions.

Current production of sunflower seeds from the project areas is approximately 550 tons, from which about 300 tons is sent to oil mills located in Barisal, Thakurgaon, Pabna. This is mostly crushed, partially refined and sold to different locally based companies use sunflower oil in their products. Recently, exporters are also looking into buying sunflower seeds from these oil mills in order to export to places like the Middle East and Russia.

8.2.3 Market Opportunity

Sunflower contains 42% oil. It also contains linolic acid and Omega 3 & 6 fatty acid which makes it a healthier alternative to soya bean oil. The sunflower grown in Bangladesh tends to have higher oil content of up to 45%. One kg sunflower seed can produce around 500-600 ml oil which is greater than any other oil seeds. According to FAO, the average yield of sunflower is 1.4 tons per ha, but the potential yield is 2 to 3 tons per ha. Thus, there is a huge potential to grow more sunflower and promote a newly expanding market for edible sunflower oil in Bangladesh.

The production of edible sunflower oil is just taking off in Bangladesh, BRAC being the first one to be establishing an international quality refinery. Other companies have interest in this area and are in the process of setting up similar refineries. Currently, national oil producers do not have the technology to be able to produce properly refined sunflower oil.

8.3 Value chain map and analysis of value creation activities

The sunflower value chain was mapped based on the information from the project areas. The following Value Chain map provides an overview of how the different actors engage through for the production, harvesting, processing and selling of sunflower in this region.

8.3.1 Value Chain Actors, Function and Map

Input Suppliers

Seeds, fertilizers and insecticide/pesticide are the major inputs for sunflower production. There are hardly any formal seed retailers found in the area. Farmers' source sunflower seeds either from BRAC or BARI. Sometimes they also use retained seeds. The other inputs are sourced from agricultural input retailers. There are no specific input suppliers for sunflower inputs alone, rather for agricultural inputs overall. Most retailers can be found locally.

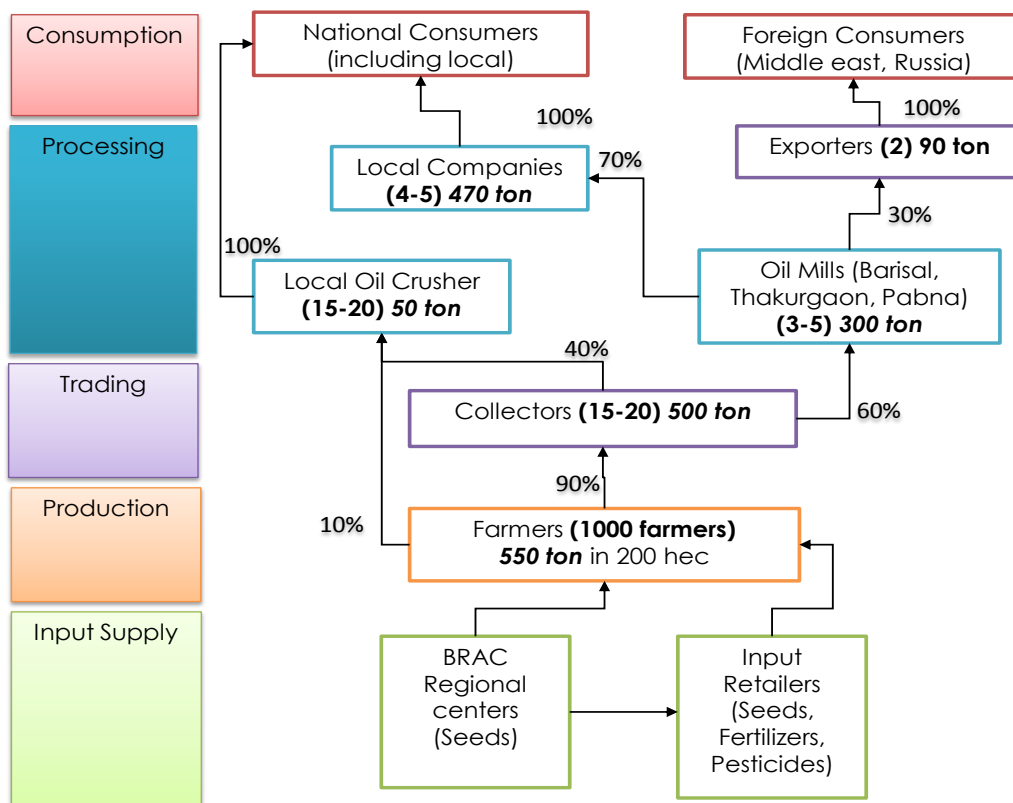
Production

Most sunflower farmers are contract farmer. BRAC gives farmers the contract to produce sunflower, they provide seeds and buy back the produce. Farmers mostly sell their produce to BRAC however in some cases also connected with small retailers in local markets. Lack of commercial experience and scale-up practices lead their final product to be incompetent in the larger markets.

Trading and End-market

Collectors collect sunflower seeds are sent to oil mills located in Barisal, Thakurgaon, Pabna by the local retailers. This is mostly crushed, partially refined and sold to different locally based companies use sunflower oil in their products. Exporters are also looking into buying sunflower seeds from these oil mills in order to export to places like the Middle East and Russia.

Figure 9: Value Chain Map for Sunflower³²



8.3.2 Business Enabling Environment

This region has a competitive advantage for sunflower production. Soil is suitable for large scale sunflower production. However, the overall environment is not yet business friendly. Absence of formal functioning value chain is the main reason for unfriendly business environment. Sunflower is also considered a niche product with seasonal demand at best. Thus, insignificant number of beneficiaries is involved in it on a commercial scale. There is no established network of actors consistently working with sunflower value chain. So, instead of a value chain, it will be more suitable to call it a fragmented value chain.

8.3.3 Vertical Linkages

Vertical linkage among sunflower producing beneficiaries in Khulna Region is low. Beneficiaries in Sharankhola project sites were found to have sunflower production conducive to commercialization. No formal input suppliers have been found within the project sites and producers sourced it directly from BRAC or BARI. Most producers are involved in BRAC's contract farming and the others sell within the neighbourhood. Among the few large commercial producers we found, they had direct relation with wholesalers or oil mills.

Weak flow of market information also exists due to informal structure of the value chain. Very few actors of the value chain are vertically well connected with other actors. Farmers have no idea about where their product goes. Few commercial farmers work with selected few wholesalers to ensure their sales. Wholesalers only know their customers but are not aware about the end market. Actors of the value chain get very little information on pricing and demand. Overall vertical linkage within the value chain is delicate or negligible.

8.3.4 Horizontal Linkages

Horizontal linkage among the value chain is weak. As most of the farmers are contracted by BRAC, no remarkable relationships were found between the farmers. Low level interaction were found in trading arena too.

8.3.5 Performance of the Value Chains and Scope for Upgrading

Input Suppliers

In these regions, there are different types of input suppliers who are active and catering to the different needs of the farmers.

The input retailers, with their own establishments in the bazaars, tend to sell different kinds of inputs – seeds, fertilizers and pesticides. They mainly cater to the demand for cultivation of cash crops, but also have branded and non-branded inputs for vegetables and other non-cash crops. These suppliers purchase their products from the district-based input dealers, but most of them have no direct linkage with input companies. These are also the ones who have access to sunflower seeds from BRAC and BADCO, which are being promoted in these regions. Farmers tend to be more satisfied with the BRAC seeds which have higher productivity.

These input suppliers have very little information about the technicalities of using different inputs. They tend to provide basic information about how to use their inputs – treatment of seeds, how to apply pesticides – but they lack the knowledge to be able to provide proper cultivation advice to farmers regarding sunflower. Although, they are interested in providing cultivation advice as a means to market their products better.

Scope of upgrading: The input suppliers have direct linkage with farmers and can potentially influence their behavior by marketing better quality produce to them. They are also capable of promoting better cultivation techniques, by providing proper information about treatment of soil and using inputs properly. This has also been proven to be good incentive for input sellers to enhance the services of their business, resulting in more business. Farmers tend to build a closer relationship with input sellers who provide this embedded service and tend to purchase more inputs from them.

Farmers

Commercial farmers are more active in areas like Sharonkhola and Koyra, where the salinity is low in most areas. They would also be the ones most suitable for cultivating sunflower and having a bulk production which can encourage traders to source from these regions in bulk. Farmers in Koyra and Munshiganj are currently producing sunflowers in very limited scale and using the unrefined oil for their personal consumption.

Currently, there are approximately 1000 farmers cultivating sunflower in these regions, producing about 550 tons of sunflower seeds. The farmers also carry out the post-harvest sorting and drying of the sunflower seeds. But they are not well knowledgeable about the requirements of the mills, thus cannot sort the seeds well.

Scope of upgrading: Sunflower is feasible for cultivation in the project areas, being saline tolerant. There productivity is very high, more than 100% and would be profitable for medium and large farmers. Promoting the feasibility of sunflower cultivation would be the first step to encourage farmers to start cultivating it. Bulk production is required to ensure traders and companies being interested in sourcing from these regions. So, grouping farmers together to ensure bulk production could be carried out. With more technical knowledge about producing and processing sunflower seeds, the profitability of sunflower farmers can be increased considerably.

Traders

Currently, only Sharonkhola has collectors who are actively sourcing sunflower seeds and selling them to oil mills and crushers. These traders lack proper knowledge about the use of sunflower seeds and also do not have strong linkages with oil seed processors. Better linkage with processors will provide them with higher market price and encourage them to source more seeds as per the demand in the market.

Traders also have difficulty finding quality seeds that have been sorted and separated from the ones with less oil content. It is easier for them to get higher price for seeds which have been sorted.

Scope of upgrading: Developing better linkages between collectors and companies – like BRAC, Amrit, will ensure better market price for sunflower seeds. It will also create the awareness in the local regions about the demand for sunflower seeds and encourage more production.

8.4 Value Chain Governance

Influence & control along the chain

Since no established value chain exists, the largest influence is exerted by institutional buyer like BRAC or remote oil mills who assess the demand and keep stock accordingly.

Power dynamics

For large commercial farmers the negotiation power lies completely in the hands of large wholesalers who shift the product both within the region and outside.

8.5 Inter-Firm Relationships

Since the product is a niche market with fragmented supply chain, the scope for collaboration and cooperation is low at present.

8.6 Assessment of the regulatory environment and support services

Public Services: BARI has just started promoting sunflower production in these regions in Bangladesh. Thus, there is a strong mandate for improving and ensuring more production of sunflowers in these regions.

Financial Services: No particular loan facilities for Sunflower farmers were found in the region.

Apiculture: Since sunflowers can also be used for the production of honey, it is also possible to involve producers or others in the area to get involved into apiculture. Farmers can start bee-keeping initiatives, where the bees will produce honey from the sunflowers in the region, and these can be collected by the producers and marketed as locally produced sunflower honey.

8.7 Poor/Resource-dependent People, Youth and Gender Analysis

Sunflower cultivation requires very little cost and labour, thus can be carried out by marginal farmers with very little cost. But for productivity and profitability of sunflower would be more from larger scale production, thus is more suitable for farmers who have access to larger pieces of land.

The post-harvest sorting and drying can be areas for involving women.

Also, being a substitute to other forms of edible oil, sunflower oil is already being used by the local households since it is cheaper than soya bean oil. This can also help to decrease costs for marginal households.

8.8 SWOT Analysis

Table 30: SWOT Analysis for Sunflower Value Chain

Strengths <ul style="list-style-type: none"> ▪ Sunflower is saline tolerant ▪ Bangladesh produces sunflower seeds with higher oil content (around 45%) 	Opportunities <ul style="list-style-type: none"> ▪ High national demand-supply gap in edible oil ▪ Companies looking into producing substitutes for soya bean oil ▪ BRAC and BADC are promoting sunflower production ▪ BRAC's hybrid high quality sunflower seeds are available in the markets ▪ Khas land available for leasing
Weaknesses <ul style="list-style-type: none"> ▪ Sunflower trade linkages are not strongly established 	Threats <ul style="list-style-type: none"> ▪ Companies are not sourcing from these regions since they are not aware of it as a source of sunflower production ▪ Salinity and weather can impact water conditions in these regions ▪ Areas are highly prone to disaster

8.9 Constraints Analysis

Table 31: Constraints Analysis for Sunflower value chain

Actors	Functions	Constraints
Input Suppliers	Selling seeds, pesticides, fertilizers to the producers	They do not always keep high quality sunflower seeds since the demand for them is very low. Also, they are not able to provide the proper information about how these inputs should be used to ensure best productivity.
Public agriculture services	Providing information to farmers about cultivation techniques	The public extension service is not actively operating in most of the project areas. Thus, farmers are not getting the required information about how and why to cultivate sunflowers.
Private agriculture services	Providing information to farmers about cultivation techniques and proper usage of inputs	There are very few private companies which have introduced sunflower seeds or other inputs. The input sellers can act as a provision for information about cultivation of sunflowers. This can encourage farmers to use better inputs, cultivation practices and profitably cultivate sunflowers.
Farmers	Produce vegetables	Farmers are not aware about the potential of making profit from cultivating sunflowers, since there is almost no demand for sunflower seeds in most of the regions. Informing them about the potential for selling this product will encourage them to invest in it and ensure high productivity.
Financial Services	Providing finances to producers to be used for cultivation of vegetables	Sunflower will be a profitable venture if cultivated in bulk. This will require some costs for the production, and farmers tend to prefer crop-based financing options rather than the traditional method of microcredit. These crop-based options are not

available in these regions for sunflower.		
Infrastructure	Roads and communication for transportation	Most of the project regions have poor road connections to Khulna district. Most common types of transportation includes low-engine vans, motorcycles, bicycles and trawlers or row boats for travelling by the river.
Collectors	Collecting from producers and selling to oil mills and crushers	Collectors are only sourcing from Sharonkhol currently. They are not well aware about the market scenario and the available private sector players at a national level. They are also facing difficulties sourcing bulk, good quality sunflower seeds from the farmers.
Local oil crushers	Crushing the sunflower seeds and producing oil	Local crushers use old mechanisms to crush the sunflower seeds and produce oil which is consumed by the local households. This is highly unrefined oil and does not taste well.
National oil mills	Processing the sunflower seeds to produce semi-refined and refined edible oil	Oil mills are producing different qualities of refined sunflower oil. To ensure that the locally produced oil can compete with the imported sunflower oil, the refinery needs to be of very high quality. The level of refinery from old machines is not adequate for producing sunflower oil.
Local companies	Buying sunflower oil and selling to local consumers	The local companies are buying sunflower oil and using it in different products. They are also looking to produce high quality edible sunflower oil for local consumers. The level of refinery from old machines is not adequate for producing sunflower oil.
Exporters	Buying sunflower seeds for export	There is recent interest from the Middle East and Russia about importing sunflower seeds from Bangladesh. Seeds produced here are of higher oil content (around 45%) which makes them more lucrative for the export market.
Local consumers	Consumption of sunflower oil	Local households are directly consuming the unrefined locally crushed sunflower oil. At the national level, currently edible sunflower oil is not being produced, but some products use sunflower oil as an ingredient.

8.10 Recommendations

The opportunities for working on these constraints can be analyzed to develop intervention plans that can be used as the basis to plan project activities:

Table 32: Intervention design table for Sunflower value chain

Constraint	Intervention	Output	Outcome	Impact	Leverage Point
Farmers are not knowledgeable about sunflower cultivation	Create service provider (seed retailers) to ensure information flow about sunflower cultivation	Service providers are providing information on better cultivation practices to the farmers	Farmers are using proper cultivation techniques to grow sunflowers	Farmers are cultivating sunflowers	Input companies, DAE.
	Provide trainings and set up demonstrations to showcase sunflower cultivation practices	Farmers are able to see and learn about better cultivation practices			Input companies, DAE
Sunflower traders	Facilitate linkage	Traders have a	Traders source	Farmers are	Private

are not sourcing from these regions	between traders and local companies to source from these regions	linkage to sell sunflower seeds	from these regions to meet their demand	motivated and growing more sunflower	companies, DAE, BARI.
	Facilitate linkage between farmers and traders to promote bulk production	Farmers are encouraged to produce sunflower in bulk			Private companies, DAE, BARI.

8.11 Intervention details

The potential interventions are detailed below, considering the opportunities that can be worked on with specific actors to improve vegetable cultivation in these areas:

Intervention 1: Create service provider (seed retailers) to ensure information flow about sunflower cultivation to farmers

Potential Partner: Input companies, DAE.

Building on the linkage between input companies (like BRAC) and input retailers, these retailers can be enhanced to also act as the service provider for technical advice to the vegetable farmers. Farmers are not motivated to use improved inputs, since they are not aware of the proper techniques and methods for using them. Input retailers providing the technical advice when selling inputs adds value to the service the farmers are able to get from them. This in turn helps the farmers to increase their yield and productivity, encouraging them to produce more vegetables.

Intervention 2: Provide trainings and set up demonstrations to showcase better cultivation practices

Potential Partner: Input companies, DAE.

Sunflower is a new crop that can be introduced to these regions. Thus, farmers are not familiar with the cultivation practices and neither are they knowledgeable about the potential of profitability from sunflower production. Seeing the actual production of sunflower seeds and watching how the cultivation was carried out is both a learning tool and a motivation for interested farmers. Trainings and field days need to be organized to promote the cultivation techniques and make farmers aware about the business viability of sunflowers.

Intervention 3: Facilitate linkage between traders and local companies to source from these regions

Potential Partner: Private companies, DAE, BARI.

Local companies are venturing into producing edible sunflower oil for the first time in Bangladesh. They are interested in finding sources for quality sunflower seeds, which can be grown in these regions of

Bangladesh. Linking them to traders who can help them promote sunflower cultivation in these regions would be beneficial for these companies. Having a market to sell sunflower seeds will be an essential requirement for traders, and they can also ensure sales to the farmers according to the demand of these local companies.

Intervention 4: Facilitate linkage between farmers and traders to promote bulk production

Potential Partner: Private companies, DAE, BARI.

Based on the demand of the local companies, the traders will be sourcing for sunflower seeds from these regions. They can also actively promote the need for bulk production to ensure bulk buying of quality sunflower seeds. These traders can be developed from their local members, especially those who cannot be engaged into the value chain as sunflower producers.

9. Technology Innovations in value chains

Table 33: Technologies to be adopted in the proposed value chains

Value Chain	Proposed Intervention	Introduction to New technology
Vegetables	Provide trainings and set up demonstrations to showcase better cultivation practices	<ul style="list-style-type: none"> • Introducing Dyke farming to reduce production cost and use of harmful chemicals (pesticides, insecticides) • Introduction of a process of land preparation that will lessen the adverse impact of salinity. In this process the land is covered by straw to keep the soil temperature low to facilitate reduction of salinity.
Tilapia and Carps	Provide training and set up demonstrations to showcase better cultivation practices	<ul style="list-style-type: none"> • Cultivation of Tilapia in green water aquaculture technique for household ponds. • Development of Tilapia nursery in cage or household ponds. • Introducing of low cost carp poly culture (Silver, Rui, Grass carp common carp) in household pond

Annex

Annex 1: Term of Reference

Background

Climate-Resilient Ecosystem and Livelihoods (CREL) is an USAID funded project implemented by a team led by Winrock International. CREL project will scale up and adapt successful co-management models to conserve ecosystem and protected areas (PA's) in Bangladesh, improve governance of natural resources and bio-diversity, and increase resilience to climate change through improved planning and livelihoods diversification. CREL will build the capacity of resource users for financial and entrepreneurial literacy so they participate profitably in value chain activities that will increase access to inputs, credit, markets, information, and improved technology. The result will be viable livelihoods and enterprises that increase incomes, sustain resources and productivity, and improve resiliency, especially among marginal and vulnerable populations. A brief background of the project is attached with TOR as Annex I.

CREL aims to provide sustainable alternative livelihood opportunity to the CREL target beneficiaries who are disadvantaged, poor/ultra poor, women, youth and highly dependent on natural resources through strengthening suitable and climate resilient value chains.

Objectives of the Study

The main objective of the study is to find out the potential Value Chains and analyzing the Value Chains to come up with strategies and interventions to ensure sustainable livelihoods for the beneficiaries of the project that lead to reduce pressure on natural resources. The study will be conducted in two phases. Specific objectives of each Phase of study can be defined as follows:

Phase 1: Analyze all potential Value Chains and select 4 Value Chains (including eco-tourism which is preselected) for full analysis from each region according to the criteria mentioned below;

- Climate Resilient – Value Chains that are climate resilient and/or has the potential to reduce risk from climate change threats.
- Potential to reduce extraction of natural resources
- Ensured Market Demand and/or Opportunity to link with markets
- Potential to increase income of the marginal and vulnerable populations who have small amount of land or totally landless
- Potential to create employment throughout the value chain
- Potential to incorporate women and youth
- Potential to involve MSMEs
- Potential for growth
- Potential to be benefited from the available support services
- Suitable for the economically disadvantaged area particularly in the landscape/wetland area of CREL regions

Phase 2: A detail analysis of the selected value chains to get a vivid picture of each value chain and to formulate the strategy/interventions to strengthen the value chains and create scope for sustainable livelihoods.

Scope of Work

Working area for this study is Bangladesh. Following sites will be covered in the study:

Northeast	Habiganj	Chunarughat and Madhabpur Chunarughat	Satchari NP RemaKhalenga WS
	Maulavibazar	MaulavibazarSadar and Sreemangal Kamalganj and Sreemongol Kularua, Juri, Baralekha, Fenchuganj&Golapganj	HailHaor Lawachara NP HakalukiHaor ECA
	Sunamganj	Dharmapasha, Tahirpur	TanguarHaor ECA (Only based on secondary literature)
	Sylhet	SylhetSadar, Goainghat	Kadimnagar NP
Southeast Zone 1	Chittagong	Lohagara,Banshkhali	Chunati WS
	Rangamati and Banderban Rangamati	Chandanise, Rangunaia, BanderbanSadar, Kaptai	Dudhpukuria- Dhupchhari WS Kaptai NP
Southeast Zone 2	Cox's bazar	Cox's bazar Sadar,Ramu Chakaria,	Himchhari NP Fashiakhali WS Medhakachapia NP
		Teknaf Ukhiya	Teknaf WS Inani proposed NP
Southwest	Bagerhat	Sarankhola, Mongla, Morrelganj and Rampaul	Sundarbans (West)
	Khulna	Dacope and Koyra	SunderbanECA
	Satkhira	Shyamnagar	Sundarbans (East)

Innovision will assess all available Value Chains of the project areas to shortlist the Value Chains which are close to the criteria mentioned in the objectives. In addition to the mentioned criteria, Innovision will need to assess the available backward & forward linkages, business & financial services, infrastructure and enabling environment in project sites which are directly linked with the Value Chains. After the initial assessment, Innovision will submit a report elaborating the selection process of the shortlisted Value Chains. Once the value chains are shortlisted, Innovision will do an in-depth analysis of each value chain. This analysis should be in line with USAID guideline for analyzing value chains provided in the website <http://microlinks.kdid.org/>. CREL project will need separate report for each of the selected value chain according to the following guideline:

- End Market Analysis (Main market, buyers, competition) and market demand
- Descriptions of the Value Chains (Actors, their roles and functions, map and relationships of the actors and service providers)
- Performance of the Value Chains and Scope for Upgrading (performance in each stage, Cost-benefit, value addition)
- Poor/resource dependent, youth and gender Analysis and scope of integration in value chains
- Assessment of Business , Financial and other services
- Assessment of Policy/Regulations
- SWOT Analysis
- Summary of the constraints
- Recommended Strategies/Interventions

Though market demands will be assessed and incorporated in Value Chain Study report, CREL will need a separate report on market demand assessment of each Value Chain.

Timeframe

Task	Deliverables	Deadlines
Phase 1: Selection of Value Chains	Report on detailing the selection process and selected Value Chains	20 th Calendar day
Phase 2: Full Analysis of the selected Value Chains	Report on full analysis of the selected Value Chains.	70 th Calendar day

Innovision will need to provide a detail work plan mentioning breakdown of the activities with dates. Alteration of dates during the implementation stage should be made in consultation with the Livelihood team of CREL/Winrock International.

Methodology

Innovision will propose methodology for the each phase of the study. However, proposed methodology should include following steps (not exhaustive):

- **Desk Research**
- **Field Study and analysis of the findings**
 - **FGD**
 - **Interview of different actors**
- **Key Informant Interview**
- **Workshop**

Innovision will consult with the livelihood team of CREL to finalize indicative sample size and methodology.

Deliverables

The deliverables to be provided by Innovision under the PO are the following:

Phase 1:

- Summary findings of the desk research
- Matrix of the key findings from the stakeholders workshop(if any)
- Detail report on selected value chains elaborating selection process and methodology
- Presentation at CREL on selection process and selected Value Chains

Phase 2:

- Report on desk research(with draft value chains)
- Workshop report
- Report on full analysis of each of the selected value chains (including ecotourism)
- Market Demand Assessment Report
- Database of the study (including all filled questionnaire, list of the interviewees)
- Presentation on the findings of the study

Resource Facilities by Winrock, CODEC, CNRS and NACOM

To supervise the study, Winrock and their partners will use their own resources. However, Livelihood Officer, Market Development Officer and Livelihood Facilitator will assist Innovision in conducting the study. This assistance include, arranging interview, facilitate interview process and organizing workshops at regional level.

Key Contact Person

Mr. Sadruddin Imran, Chairman & CEO of Innovision will be key person from the vendors side while CREL project's Enterprise and Livelihood Manager Mr. Mahmud Hossain will be the key contract person for the this activity.

All Communication with GOB and USAID must be coordinated with the Chief of Party of Project, CREL.

Annex 2: Detailed field plan for all regions

Field Plan: Phase 1

Innovision Consulting Private Limited					
CREL-Value Chain Assessment in Khulna Region					
Draft Activity Plan during selection phase (16/8/13 to 24/8/13)					
Date	Day	Responsibilities of Consultant Team		Responsibilities of CREL Team	
		9 AM to 1 PM	2 PM to 5 PM		
16/8/13	Friday		Travel from Dhaka to Khulna		
17/8/13	Saturday	Meeting with CREL Staffs in Khulna Office to detail and finalize study plan and explain study tools	Lunch/Diner with senior regional government that CREL is working with (DFO and ACF from Forest Office, Representatives from DAE office, etc.) (this can also be arranged on 22/8/13, depending on the situation of presence of government officials)	Participate the Meeting, arrange the presence of government officials in the formal lunch/diner	
18/8/13	Sunday	Travel to Sarankhola Site Office, visit one or two communities, physical observation of the geographic location and business opportunities	FGD with local VCF members (Resource Extractors, 12 persons from 3 or 4 different VCFs), discussion with community people, discussion with market players	Sarankhola site officials arrange the FGDs and travel to community, other site officials fill up the beneficiary profile in the format supplied from the consultant team	
19/8/13	Monday	Travel to Dacop/Koyra Site Office, visit one or two communities, physical observation of the geographic location and business opportunities	FGD with local VCF members (Resource Extractors, 12 persons from 3 or 4 different VCFs), discussion with community people, discussion with market players	Dacop/Koyra site officials arrange the FGDs and travel to community, other site officials fill up the beneficiary profile in the format supplied from the consultant team	
20/8/13	Tuesday	Travel to Chandpai Site Office, visit one or two communities, physical observation of the geographic location and business opportunities	FGD with local VCF members (Resource Extractors, 12 persons from 3 or 4 different VCFs), discussion with community people,	Chandpai site officials arrange the FGDs and travel to community, other site officials fill up the beneficiary profile in the format	

			discussion with market players	supplied from the consultant team
21/8/13	Wednesday	Travel to Munshiganj Site Office, visit one or two communities, physical observation of the geographic location and business opportunities	FGD with local VCF members (Resource Extractors, 12 persons from 3 or 4 different VCFs), discussion with community people, discussion with market players	Munshiganj site officials arrange the FGDs and travel to community, other site officials fill up the beneficiary profile in the format supplied from the consultant team
22/8/13	Thursday	Key Informant Interview with other project staffs, Private Sector Representatives, Government Officials	Key Informant Interview with other project staffs, Private Sector Representatives, Government Officials	Site officials will handover the beneficiary profiles (30 per site) to the consultant team. Preparation for the validation workshop, including ensuring presence of participants
23/8/13	Friday	Consolidation of findings	Preparation for validation workshop	Ensure the presence of the validation workshop participants
24/8/13	Saturday	Validation workshop with CMC representatives, relevant government officials, VCF members and CREL staffs	Travel back to Dhaka	

Field Plan: Phase 2

CREL Value Chain In Depth Assessment					
Khulna Region					
Date	Day	Activity	Starting Time	Responsible Person (s) from Innovision	Night Stay
8-Sep	Sunday	Travel from Dhaka to Khulna, 4 Persons from Innovision	8:30 PM	Entire Innovision Assessment Team	Khulna

		Discussion with RC and LO at CREL Khulna Office	1:30 PM		
		Discussion on Shortlisted Value Chains and Trades			
		Finalization of Field Plan and Interview Schedule			
9-Sep	Monday	Discussion with Department of Fisheries Officers and justify the feasibility of Tilapia and carp culture in target area	10:00 AM	Innovision Team 1 and the expert	Khulna
		Discussion with Department of Agriculture Officers in Khulna and justify the feasibility of Vegetable, Medicinal Plants and Sunflower	10:00 AM	Innovision Team 2 and the expert	
		Discussion with National Youth Training Center in Khulna and identify potential trades and inclusion opportunities for beneficiaries	2:00 PM	Innovision Team 1 or 2	
		Discussion with BRAC Khulna Office	2:00 PM	Innovision Team 1 or 2	
10-Sep	Tuesday	Travel from Khulna to Sharankhola	7:30 AM	Innovision Team 1	Sharank hola
		Interview the lead producers, marketing intermediaries, input suppliers and other value chain actors for shortlisted value chains			
		Travel to Mongla and Back	8:00 AM	Innovision Team 2	Khulna
		Interview the lead producers, marketing intermediaries, input suppliers and other value chain actors for shortlisted value chains			
11-Sep	Wednesday	Interview Continues		Innovision Team 1	Khulna
		Travel Back to Khulna			
		Travel to Mongla and Back	8:00 AM	Innovision Team 2	Khulna
		Interview Continues			
12-Sep	Thursday	Consolidation of Findings in Chandpai and Sharankhola site	10:00 AM	Both Innovision Team 1 and 2	Khulna
		Identification of Private Sector Engagement Requirement			
		Identification of Financial Institution Engagement Potentials			
13-Sep	Friday	Break		Both Innovision Team 1 and 2	Khulna
14-Sep	Saturday	Travel to Koyra	7:30 AM	Innovision Team 1	Koyra or Dacop

		Interview the lead producers, marketing intermediaries, input suppliers and other value chain actors for shortlisted value chains			
		Travel to Munshiganj	7:30 AM		
		Interview the lead producers, marketing intermediaries, input suppliers and other value chain actors for shortlisted value chains		Innovision Team 2	Munshiganj
15-Sep	Sunday	Travel to Dacop, Interview Continues	7:30 AM	Innovision Team 1	Koyra or Dacop
		Interview Continues, Travel back to Khulna		Innovision Team 2	Khulna
16-Sep	Monday	Travel Back to Khulna		Innovision Team 1	Khulna
		Additional Interviews in Khulna		Innovision Team 2	Khulna
17-Sep	Tuesday	Consolidation of Findings in Dacop-Koyra and Munshiganj Sites	10:00 AM	Both Innovision Team 1 and 2	Khulna
		Strategy Discussion with CREL Khulna Team			
18-Sep	Wednesday	Travel Back to Dhaka		Both Innovision Team 1 and 2	

Annex 3: Data collection tools for all regions

Beneficiary Profile

Name of target beneficiary								Age:..... Years
Occupation:								
Literacy								
1. Illiterate	2. Can sign only	3. below class 8	4. Class 8 to 10 pass	5.SSC passed	6.HSC passed	7.Graduate	8.Above graduate	
Address:								
Mobile number								
Own Land (dcm)								
Pond size (dcm)								
Number of Members in the Household:								
Age of the family members:								
Male	0 -18	18- 33	33 - 60	60+				
female								

Number of earning members:					
Number of dependent members					
Sources of income for the household	Source	Earning Member	Income Generating Months	Monthly Income	Yearly Income
Major expenses of the household					
Type, amount and source of resource extracted					
Experiences in production, trading,					
Skills in VCA					
No of hours per day that can be spared for VCA by the respondent					
No of available households members to assist					
Amount and type of assets to support the VCA					

**Producer record for Tilapia Farmers
Value Chain Analysis for CREL Project**

Respondent's Name		
Father's / Husband's Name		
Phone Number		
Date		
Status	Beneficiary	Non-Beneficiary
Farmer's Pond Size	Own:	Lease:
No. of cycle per year		

Fish species'	
---------------	--

1. Cost Benefit Table, Please specify the Cycle: months

Costs

Amount (BDT)

Pond preparation (Lime, fertilizer, etc)

Fingerling

Fish feed

Medicines / Vitamins

Irrigation & drainage

Transportation

Labor

Others

Total Cost

Total Production (KG)

Total sells volume (KG)

Average sales price (per KG)

Total Revenue (BDT)

Net profit (total cost-total revenue)

1.1 How many cycles do you complete in a year _____

1.2 Are you satisfied with the quality of FRY? YES / NO

1.3 Are you satisfied with the quality of the feed? YES / NO

1.4 When do you stock the FRY? Specify the months _____

1.5 What is your stocking density? _____

1.6 Is nursing facility available in your Pond? YES / NO

1.7 Do you know the Feed Conversion Rate(F.C.R)? _____

2. Support services status

2.1 What type of support services is required? Are they available in the area? Are they adequate? (please tick).

Service Type	Required	Available	Adequate	Service Provider
Preservation				
Transport				
Financial				
Knowledge & Information				
Irrigation				
Other				

2.2 Are you satisfied with the price you get? YES / NO

2.3 Are there any groups / association of farmer in your area? YES / NO

2.4 If YES, are you member of any of them? Write names.

**Questionnaire for Tilapia Hawker / Patilwala / Fry Trader
Value Chain Analysis for CREL Project**

Respondent's Name	
Occupation	
Phone Number	
Date	

1. Sales Status

1.1 From where do you buy your product? Describe the volume, cost and sales price.

Region	Source	Volume (1000 pcs / year)	Avg. Buying Price (BDT / 1000 pcs)	Avg. Selling Price (BDT / 1000 pcs)
Local	Hatchery			
	FRY Traders			
	Local Market			
	Other			
Outside	Hatchery			
	FRY Traders			
	Local Market			
	Other			

1.2 What are the regions of yours sales? Describe volume distribution and customer base.

Region	Location	Trade volume (1000 pcs)	Customer Base
Local			
Outside			

1.3 What quality parameters you look for when you buy FRY?

1.4 Are you satisfied with the quality you get? YES / NO

1.5 If NO, how do you Fryan to get better quality FRY?

1.6 What quality parameters your customers look for when buying from you? Are they satisfied?

2. Market Status

2.1 How many other Hawker / Patilwala / Fry trader are there in the region?

2.2 How is price determined in the market? Who has more influence, you or the buyer?
Why?

2.3 Are you satisfied with the price you get? YES / NO

2.4 If NO, how do you Fryan to increase the price?

2.5 What is the current status of your business? Growing / Static / Shrinking

2.6 Do you plan to expand your business? YES / NO. If YES, how?

2.7 What are the impediments for your business expansion?

2.8 How do you face these impediments?

2.9 Do you provide any type of embedded services to your customers? YES / NO

2.10 If YES, what are they?

Credit service	
Market Information Sharing	
Knowledge Sharing	
Hands on training	
Others	

2.11 Are there any support services (QC, Export promotion, Technical & Financial Services etc.) for your business? What are they? What more are required?

**Questionnaire for Tilapia Farmers
Value Chain Analysis for CREL Project**

Respondent's Name		
Father's / Husband's Name		
Phone Number		
Date		
Status	Beneficiary	Non-Beneficiary

Farmer's Pond Size		
--------------------	--	--

3. Input Supply Status

3.1 Type, Sources, Preferences and price of the FRY (one cycle).

Sources	Numbers	Price/Tk. Thousands	Volume (%)
---------	---------	---------------------	------------

Hatchery

Fry Traders

Patilwala

Local Fry Market

Other

3.2 How many cycles do you complete in a year _____

3.3 Are you satisfied with the quality of FRY? YES / NO

3.4 If NO, what are the reasons?

1.5 If YES, what are the quality parameters you prefer?

- a. Low mortality rate b. High growth rate c. Less disease prone d. Bigger FRY Size
e. Uniform Size f. Other

1.6 Which type of feed you use for your **Pond**?

Type of feed	Source of feed	Price (TK / KG)	Volume purchased (KG / per cycle)
--------------	----------------	-----------------	-----------------------------------

Ready Floating

feed Sinking

(factory

made)

Local feed

(from feed crushers)

Homemade feed

1.7 Are you satisfied with the quality of the feed? YES / NO

1.8 If NO, what are the reasons?

1.9 Do you use aqua chemical for your pond? YES / NO

1.10 What type of obstacles do you face in input supply?

- a. On time availability of quality FRY b. Unavailability of quality FRY
c. On time availability of quality feed d. Unavailability of quality feed
e. Quality of water f. High price of FRY in stocking time h. Small size or uneven size of fry
g. Others

2 Production status / practice

2.1 When do you stock the FRY? Specify the months_____

2.2 What is your stocking density? _____

2.3 Is nursing facility available in your Pond? YES / NO

2.4 If NO, how do you manage?

2.5 How do you prepare Pond / Pond before stocking

2.6 What is your total production last season (KG)?_____

2.7 Details of other costs (Land, labor, surveillance & transport)

Particular		Unit type	Number of Unit	Unit Price BDT	Total
Human Labor	Hired labor	Man-days			
	Own labor	Man-days			
Land	Own	Dcm			
	Leased	Dcm			
Surveillance	Own	Man-days			
	Hired	Man-days			
Transport					
Total Cost					

2.8 What is your total cost of production (fry, feed, aquachem/medicine/fertilizer, land, labor, surveillance & transport)?

2.9 Do you know the Feed Conversion Rate(F.C.R)?_____

3 Sells status

3.1 Where do you sell your Tilapia? What is the volume distribution & price?

Selling Point	Volume (Kg / Year)	Average Selling Price (TK/ Kg)			Selling Region & Volume (%)			
		Large	Medium	Small	Local	%	Outside	%
Faria								
Arotdar								
Local market								
Pond side								
Other								

3.2 What is your customer base?

Selling Point	Number	Regular (%)
Faria		
Arotdar		
Local market		
Other		

3.3 What are the quality parameters you maintain when selling your product?

3.3 Do you perform any chilling before you sell your products? Yes/No

4 Support services status

4.1 What type of support services is required? Are they available in the area? Are they adequate?

Service Type	Required	Available	Adequate	Service Provider
Preservation				
Transport				
Financial				
Knowledge & Information				

Irrigation

Other

4.2 Do you face any obstacles in acquiring these services? If YES, what are they?

4.3 What is the status of Govt. services in the area?

5 Market status

5.1 How is price determined in the market? Who has more influence, you or the buyer?
Why?

5.2 Are you satisfied with the price you get? YES / NO

5.3 If NO, how do you plan to increase the price

5.4 What is the demand of your customers?

a. Better quality, higher price

b. Any quality, lower price

c. Medium quality, moderate price

d. Size of Fish (Large / Medium / Small)

5.5 What are the challenges faced with your business and what kind of assistance do you need to solve it (A2F)?

Challenges	Assistance required

6 Business Enabling Environment

6.1 Are there any groups / association of farmer in your area? YES / NO

6.2 If YES, are you member of any of them? Write names.

6.3 What are their functions? Are they capable of delivering their functions? Are they delivering?

6.4 Do you about any Govt. policies or regulations for Tilapia farmer? If YES, describe.

6.5 Are there any NGOs / Organizations working in the area for the Tilapia farmers? If YES, what are their activities?

7 Others

7.1 How is your business affected by climate change?

1. Low	2. Moderate	3. High	4. Very High	5. Severe
--------	-------------	---------	--------------	-----------

7.2 What are the adverse effects of climate change you are facing?

Questionnaire for Tilapia Feed Suppliers Value Chain Analysis for CREL Project

Company's Name	
Respondent's Name	
Designation	
Phone Number	
Date	

1. Sales Status

1.1 What ready feed products do you sell?

Product						
Company						
Buying Price / Kg						
Selling Price / Kg						
Sells Volume / Year						

1.2 What open feed products do you sell?

Product						
Source						
Buying Price / Kg						
Selling Price / Kg						
Sells Volume / Year						

1.4 What are you sales area coverage and sales volume?

Own Region	Name	Volume of Sales (%)	Price Increase (%)
Other Region	Name	Volume of Sales (%)	Price Increase (%)

2. Customer Status

2.1 What is your customer base?

Regular	Irregular	Local (%)	Outside (%)

2.2 Are your customers happy with the quality of the products you sell? YES / NO

2.3 What is the demand of the customers?

Demand parameters / Customer type	Regular (put tick)	Irregular (put tick)	Local (put tick)	Outside (put tick)
Better quality, more price				
Medium quality, moderate price				
Any quality, lower price				

3. Market Status

3.1 Are you satisfied with the price you get? YES / NO

3.2 If NO, what the factors behind the price fluctuations?

3.3 How do you plan to tackle the price fluctuation?

3.4 How do maintain quality of the products? What are the parameters

3.5 What is the demand-supply situation of the feed market?

- a. More demand – less supply b. Less demand – more supply c. Equal demand-supply

3.6 How many other input retailers like you are there in this area?

3.7 Are the products available throughout the year? YES / NO

4. Business Enabling Environment

4.1 Do you plan to expand your business? YES / NO

4.2 If YES, what are the factors that will help you to expand your business?

4.3 What more facilities you seek to expand your business? From whom?

4.4 Do you get any support services from the companies? YES / NO

4.5 If YES, what are they?

4.6 Are there any support / incentives from Govt. for the Aqua Chemical retailers in the area? If YES, what?

4.7 How will you rate the effect of climate change over the market? (put Tick)

6. Low	7. Moderate	8. High	9. Very High	10. Severe
--------	-------------	---------	--------------	------------

Questionnaire for Nursery Tilapia Value Chain Study for CREL

1. Procurement

1.1 From where do you buy your fry/spawn? Describe your procurement system.

1.2 From where do you procure your inputs? Describe your other procurement systems.

2. Sales

2.1 Where do you sale your fingerling? Describe the volume, cost and sales price.

Client	Region	Number	Volume	Avg. Selling Price (BDT / 1000 pcs)	Avg. Cost of Production of PL (BDT/ 1000)
Large farmer	Local/outside				
Small Farmers	Local/outside				
Trader/Patilwala	Local/outside				

Other	Local/outside				
-------	---------------	--	--	--	--

2.2 What quality parameters your customers look for when buying from you? Are they satisfied? YES / NO

2.3 If NO, how do you plan to get better quality PL?

3. Market Status

3.1 How many Hatcheries are in operation in your region?

3.2 How is price determined in the market? Who has more influence, you or the buyer? Why?

3.3 Are you satisfied with the price you get? YES / NO

3.4 If NO, how do you plan to increase the price?

3.5 What is the current status of your business? Growing / Static / Shrinking

3.6 Do you plan to expand your business? YES / NO. If YES, how?

3.7 Do you provide any type of embedded services to your clients? YES / NO

3.8 If YES, what are they?

Credit service	
Market Information Sharing	
Knowledge Sharing	
Hands on training	
Others	

3.9 What are the climatic difficulties that you face to run your business?

Questionnaire for Tilapia -Arotdar / Faria /Depot Value Chain Study for CREL Project

Respondent's Name	
Designation	

Address	
Phone Number	
Date	
Business Started	

Q1. What is your procurement source? What are their numbers? Which are the regions and distribution volume ratio of your source

Tilapia			Reason for most preferred procurement source
Procurement Details			
Sources	Numbers	Volume (KG)	

Small Farmer

Large Farmer

Faria

Other

Region	Volume (%) of procurement
--------	---------------------------

Q2. Are there any services (financial, technical, embedded etc.) you offer to your procurement sources?

Q3. Describe the yearly volume of procurement and supply.

Species	Procurement Volume (MT /Year)	Supply Volume (MT /Year)	Supply Margin (BDT/MT)
Tilapia			

Q4. Whom do you sell your products?

Q5. Which regions do you supply? Describe the percentage distribution of sales.

Species	Region	Sales percentage
Tilapia	Local	
	Outside	

Q7. Do you plan to expand your business? YES / NO. If YES, how?

Q8. What are the impediments for your business expansion?

Q9. How do you plan to face these impediments?

Q11. Are there any existing Govt. policies that are favorable for your business expansion?

Q12. Are there any support services (QC, Transportation, Technical & Financial Services etc.) for your business? What are they? What more are required?

Q13. How many other Arot / Faria are in operation in the region now?

Annex 5: Respondent list for all regions (Phase 1 & Phase 2)

Sl.	Name	Mobile	Address	Site	District	Region	Occupation	Actor	Tools that used in data collection	Phase of the study	Interviewer
1	P.K.pasha	1199194928	CSS Ava Centre		Khulna	Khulna	EDS		Workshop	1	
2	Md.Touhidur Rahman	1730004533	CSS Ava Centre		Khulna	Khulna	Co-aid-livelihood		Workshop	1	
3	Mijanur Rahman	1711236182	CSS Ava Centre		Khulna	Khulna	CCPAMO		Workshop	1	
4	Moktar Hossain	1719850478	CSS Ava Centre		Khulna	Khulna	Mkt.Development Officer		Workshop	1	
5	Madina Khatun	1.01913E+11	CSS Ava Centre		Khulna	Khulna	Finance & admin		Workshop	1	
6	Abdullah Al Mamun	1712079292	CSS Ava Centre		Khulna	Khulna	Site Officer		Workshop	1	
7	Md.Babul Islam	1717748946	CSS Ava Centre		Khulna	Khulna	Site Officer		Workshop	1	
8	Karuna Mandol		CSS Ava Centre		Khulna	Khulna			Workshop	1	
9	Shahabuddin Gazi	1936266982	CSS Ava Centre		Khulna	Khulna	CMC vc		Workshop	1	
10	Shahajahan Dulal	1715767027	CSS Ava Centre		Khulna	Khulna	Chairman, Dhansagar		Workshop	1	

11	Mihir Vandari	1716078845	CSS Ava Centre		Khulna	Khulna	Treasurar CMC		Workshop	1	
12	Md.Hamif	1716089632	CSS Ava Centre		Khulna	Khulna	SO CERL		Workshop	1	
13	Asim KR Joardar	1712146325	CSS Ava Centre		Khulna	Khulna	CMC president, Shatkhira		Workshop	1	
14	S R Liaul Haq	1711431668	CSS Ava Centre		Khulna	Khulna	Resimal Co-ordinator, CREL Khulna		Workshop	1	
15	G M Shahidul Islam	1713913121	CSS Ava Centre		Khulna	Khulna	CMC Shatkhira, Traesurar		Workshop	1	
16	Asaduzzaman Milon	1948135248	CSS Ava Centre		Khulna	Khulna	VP Sharankhola CMC		Workshop	1	
17	Farid Khan Mintu	1718081616	CSS Ava Centre		Khulna	Khulna	Treasurar, Sharonkhola CMC		Workshop	1	
18	G M Morshed Siddiqi	1711155843	CSS Ava Centre		Khulna	Khulna	So Munshiganj		Workshop	1	
19	Marzia Lipi	1711353147	CSS Ava Centre		Khulna	Khulna	GO CREL South West Region		Workshop	1	
20	Rajena Maji	1961978150	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
21	Marjina Begum	1917469082	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
22	Sahina Begum	1924662117	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant

23	Boby Begum		Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
24	Rahela		Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
25	Rehana Begum	194317098 2	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
26	Aklima Begum	191636822 2	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
27	Sharifa Begum	194660449 1	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
28	Jorina Begum		Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
29	Salim Hawladar	172130380 7	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
30	Md.Sekandar Ali	175241491 1	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
31	Md.Kabir Bepari	193297131 2	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
32	Md.Obaidul Islam	172415776 3	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
33	Al Amin	171950347 9	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
34	Abdul Malek	171756878 8	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
35	Md.Nurul Haq	171724965	Joymoni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant

36	Md.Motaleb	1832706753	Joymuni	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
37	Ashok Das F R	1739331251	Joymunir Ghol	Chadpai	Bagerhat	Khulna	S/O Chaadpai Station		FGD	1	Consultant
38	Abdul Kalam Fakir	1711342216	Joymunir Ghol	Chadpai	Bagerhat	Khulna	CMC President		FGD	1	Consultant
39	Mihir Vandari	1716078845	Joymunir Ghol	Chadpai	Bagerhat	Khulna	CMC Treasurar		FGD	1	Consultant
40	Aliur Rahman	1714717945	Joymunir Ghol	Chadpai	Bagerhat	Khulna	PF President		FGD	1	Consultant
41	Md.Hamtwam	1716089632	Joymunir Ghol	Chadpai	Bagerhat	Khulna	Site Officer		FGD	1	Consultant
42	Md.Mehedi Hasan Khan	1740974456	Joymunir Ghol	Chadpai	Bagerhat	Khulna	wildlife &biodiversity conservati on officer		FGD	1	Consultant
43	Sanjit Hawladar	1964971479	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
44	Shawpan Mridha	1928289188	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
45	Benjamin	1921294169	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
46	Rajkumar Hawladar		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
47	Rony Patwary	1940179904	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant

48	Kamal Boyati	198532029 5	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
49	Shoshodhor Mondol		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
50	Oshit Mondol	193521039 6	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
51	Monika Aditto	194784787 7	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
52	Pushpa Sarkar	193450526 4	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
53	Aroti Biswas	192068719 9	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
54	Nemai Mondol		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
55	Aroti Haldar	196497702 5	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
56	Bonani Patoary		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
57	Julina Mridha	192828918 8	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
58	Omor Hawladar	183518350 7	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
59	Abul Sheikh	182705785 7	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
60	Kamrul sarkar	172788267 1	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant

61	Shamor Aditto		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
62	Shishir Hawladar		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
63	Peas Sarkar	1946525429	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
64	Bhuban Biswas	1925506301	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
65	Shoshi Biswas		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
66	Nibas Hawladr	1825478143	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
67	Palash Hawladar	197284255	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
68	Kamal Hawladar		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
69	Shawpan Biswas		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
70	Shalota Aditto	1949210214	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
71	Wasim Patwary	1987410177	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
72	Orpona Patwary		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
73	Kanchan Hawladar		Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant

74	Poly Mondol	1914226009	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
75	Narayon Mondol	1923063886	Pashchim Dhangmari	Chadpai	Bagerhat	Khulna	Resource Extraction		FGD	1	Consultant
76	Md.A Main	1936045508	CentralKalin agar,Moukh ali	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
77	Miss Jahanara	1917669948	CentralKalin agar,Moukh ali	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
78	Ms.Shefali Khatun	1924662852	Centralkalin agar,Purbap ara	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
79	Firoja		CentralKalin agar,Moukh ali	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
80	Rabeya		Centralkalin agar,Purbap ara	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
81	Parul	1965405862	Centralkalin agar,Paikpar a	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
82	Achiya		Centralkalin agar,Paikpar a	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
83	Md.Hasan		Centralkalin agar,Paikpar a	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
84	Md.Julfikar		Centralkalin agar,Paikpar a	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
85	Ershad		Centralkalin agar,Purbap ara	Munshig onj	Shatkhir	Khulna	Resource Extraction	VCF member	FGD	1	Consultant

86	Tofazzal		CentralKalin agar,Moukh ali	Munshig onj	Shatkhira	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
87	Md.Mujibnagar		Centralkalin agar,Purbap ara	Munshig onj	Shatkhira	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
88	Md.Motahar Hosen	171293862 0	CREL Office Munshiganj	Munshig onj	Shatkhira	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
89	Md.Yunus Ali	171003117 1	CREL Office Munshiganj	Munshig onj	Shatkhira	Khulna	Resource Extraction	VCF member	FGD	1	Consultant
90	Profullo Kumer Sarker				Khulna	Khulna	DFO		Interview	2	Consultant
91	Raj Kumer Biswas	174057810 2		Munshig onj	Shatkhira	Khulna	Upazilla Fisheries Officer		Interview	2	Consultant
92	Mr. Faruk	192420046 6	Munshiganj	Munshig onj	Shatkhira	Khulna	Eco Tour Guide		Interview	2	Consultant
93	Mr. Jafar	192702133 6	Munshiganj	Munshig onj	Shatkhira	Khulna	Eco Tour Guide		Interview	2	Consultant
94	Md. Moniruzzaman	193433553 6	Munshiganj	Munshig onj	Shatkhira	Khulna	Trading	Arotdar- Fish	Interview	2	Consultant
95	Ruhul Amin	177033433 0	Munshiganj	Munshig onj	Shatkhira	Khulna	Farming	Produce r-Fish	Interview	2	Consultant
96	Md. Firoz Ahmed	191666979 7	Munshiganj	Munshig onj	Shatkhira	Khulna	Farming	Produce r-Fish	Interview	2	Consultant
97	Abdus Samad	191316214 3	Munshiganj	Munshig onj	Shatkhira	Khulna	Trading	Arotdar- Fish	Interview	2	Consultant
98	Mr. Abdur Rahman	174228973 2	Munshiganj	Munshig onj	Shatkhira	Khulna	Eco Cottage Owner-		Interview	2	Consultant

							Joar				
99	Ali Hossain	1819112216	Munshiganj	Munshigonj	Shatkhira	Khulna	Upazilla Agricultural Officer		Interview	2	Consultant
100	Md. Rafiqul Islam	1728868812	Sonar more	Munshigonj	Shatkhira	Khulna	Trading	Arotdar-Fish	Interview	2	Consultant
101	Tarun Kumer	1925517240	Munshiganj	Munshigonj	Shatkhira	Khulna	Trading	Fish feed retailer	Interview	2	Consultant
102	Ashit Kumer Mondol	1757521714	Bhetkhali, Munshigonj	Munshigonj	Shatkhira	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
103	Akhil Chandra Mondol	1716098647	Bhetkhali, Munshigonj	Munshigonj	Shatkhira	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
104	Md Jobed Ali Kha		Bhetkhali, Munshigonj	Munshigonj	Shatkhira	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
105	Abu Bakkar Siddique	1735021400	Bhetkhali, Munshigonj	Munshigonj	Shatkhira	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
106	Rabindranath Mistri	1942084376	Bhetkhali, Munshigonj	Munshigonj	Shatkhira	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
107	Pabitra kumer Mondol	1918717415	Bhetkhali, Munshigonj	Munshigonj	Shatkhira	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
108	Tajuddin Ahmed	1718553558	Bhetkhali, Munshigonj	Munshigonj	Shatkhira	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
109	Jabbar gazi		Bhetkhali, Munshigonj	Munshigonj	Shatkhira	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
110	Sharat Mondol		Bhetkhali, Munshigonj	Munshigonj	Shatkhira	Khulna	Farming	Produce r-Fish	FGD	2	Consultant

111	Hukum Ali		Bokultola	Sharankh ola	Bagerhat	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
112	Sohel Forazi	172965444 3	Bokultola	Sharankh ola	Bagerhat	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
113	Mr. Jamal		Bokultola	Sharankh ola	Bagerhat	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
114	Mr. Delowar Hossain	184094198 3	Bokultola	Sharankh ola	Bagerhat	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
115	Rafiqul Islam	173393883 4	Bokultola	Sharankh ola	Bagerhat	Khulna	Farming	Produce r- Sunflow er	FGD	2	Consultant
116	Jahangir Howlader	176209573 6	Rayenda	Sharankh ola	Bagerhat	Khulna	Farming	Produce r-Fish	FGD	2	Consultant
117	Bidhan Chandra Mondol	172381960 5	Rayenda	Sharankh ola	Bagerhat	Khulna	Farming	Produce r-Fish, Sunflow er, Vegetab les	FGD	2	Consultant
118	Krishna Byin		Rayenda	Sharankh ola	Bagerhat	Khulna	Farming	Produce r-Fish, Sunflow er, Vegetab les	FGD	2	Consultant
119	Mojnu Kha		Rayenda	Sharankh ola	Bagerhat	Khulna	Farming	Produce r-Fish, Sunflow er, Vegetab les	FGD	2	Consultant

120	Bibek Mojumder	1724326005	Rayenda	Sharankhola	Bagerhat	Khulna	Farming	Produce r-Fish, Sunflower, Vegetables	FGD	2	Consultant
121	Bidhan Chandra	1727084529	Rayenda	Sharankhola	Bagerhat	Khulna	Farming	Produce r-Fish, Sunflower, Vegetables	FGD	2	Consultant
122	Aminul Khan	1719958258	Rayenda	Sharankhola	Bagerhat	Khulna	Farming	Produce r-Fish, Sunflower, Vegetables	FGD	2	Consultant
123	Chitto Ranjan Mondol		Rayenda	Sharankhola	Bagerhat	Khulna	Farming	Produce r-Fish, Sunflower, Vegetables	FGD	2	Consultant
124	Belal Hossain	1716007708	Rayenda	Sharankhola	Bagerhat	Khulna	Farming	Produce r-Fish, Sunflower, Vegetables	FGD	2	Consultant
125	Sheikh Mansur Ali	1760089355	Rayenda	Sharankhola	Bagerhat	Khulna	Trading	Arotdar-Veg	Interview	2	Consultant
126	Humayun Kabir	1727217901	Rayenda	Sharankhola	Bagerhat	Khulna	Trading	Arotdar-Veg	Interview	2	Consultant
127	Mr. Ferdous Ansari	1781851296	Sharankhola	Sharankhola	Bagerhat	Khulna	Upazilla Fisheries Officer		Interview	2	Consultant

128	Mr. Shoumitra Sarker	1716204280	Sharankhola	Sharankhola	Bagerhat	Khulna	Upazilla Agriculture Officer		Interview	2	Consultant
129	Ronodir	1911295813	Koyra	Koyra	Khulna	Khulna			Interview	2	Consultant
130	Sadananda Biswas	1920117106		Chadpai	Bagerhat	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
131	Bimol Krishna Munda	1924392779		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
132	Mohosin Alam	1943546640		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
133	Md.Asadul Gazi	1929662351		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
134	Abu Bakkar Gazi	1942423727		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
135	Md.Shafiqul Islam	1924219823		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
136	Dinesh Biswas	1917272620		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
137	Md.Anisur Rahman	1920727554		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
138	Md.Yakub Ali Biswas	1925297352		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
139	Md.Mosharraf Hosen	1917153019		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
140	Md.Amirul Islam	1928151934		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs

141	Md. Faur Hossain	1925501854		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
142	Md. Shirajul Islam Gain			Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
143	Md. Abul Hossain Gain	1760109960		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
144	Md. Amena Khatun	1983617886		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
145	Manjurul Ilahi Eza	1710619216		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
146	Ratan Amin Sardar	1943531815		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
147	Md. Jahurulo Islam	1720505770		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
148	Md. Moniruzzaman	1947526952		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
149	Maqsudul Alam	1920587306		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
150	Rajab Ali Sheikh	1917475575		Munshigonj	Satkhira	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
151	Susanto Mistri	1198234070		Chadpai	Bagerhat	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
152	Alamgir Sheikh			Chadpai	Bagerhat	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
153	Shantana Mistri	1963243949		Chadpai	Bagerhat	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs

154	Shaymol Nath	1758078735		Chadpai	Bagerhat	Khulna	Farming	Produce r-Fish	Questionnaire Survey	2	Project Staffs
155	Md.Amjad Sha	1935025		Sharankhola	Bagerhat	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
156	Ms.Momotaj Begum			Sharankhola	Bagerhat	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
157	Md.Abdus Sobhan Hawladar	1751550658		Sharankhola	Bagerhat	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
158	Md.Shree Atul Shadhak	1748274409		Sharankhola	Bagerhat	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
159	Md.Shadul Islam	1917069121		Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
160	Md.Barik Gazi			Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
161	Anwarul Islam,Gazi	1986607415		Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
162	Md.Amirul Islam	1917628232		Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
163	Prakash Barman	1920911226		Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
164	Md.Ali Akbar	1937520606		Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
165	Md.Anisur Rahman	1920727554		Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
166	Ashutosh Mondol	1981683326		Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff

167	Ramesh Biswas	1917272620		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
168	Sukur Ali Gazi	1929315356		Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
169	Pintu Mistri	1934505431		Chadpai	Bagerhat	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
170	Md.Rejawol Sheikh			Chadpai	Bagerhat	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
171	Rashid Hawladar			Chadpai	Bagerhat	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
172	Salam Hawladar			Chadpai	Bagerhat	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
173	Subash Biswas	1727739253		Chadpai	Bagerhat	Khulna	Farming	Produce r-Veg	Questionnaire Survey	2	Project Staff
174	Md.Awal Jomadar	1930401649		Sharankh ola	Bagerhat	Khulna	Farming	Produce r- Sunflow er	Questionnaire Survey	2	Project Staff
175	Md.Asadur Jaman Khan	1734879171		Sharankh ola	Bagerhat	Khulna	Farming	Produce r- Sunflow er	Questionnaire Survey	2	Project Staff
176	Md.Amjad Ali Sha	193506671		Sharankh ola	Bagerhat	Khulna	Farming	Produce r- Sunflow er	Questionnaire Survey	2	Project Staff
177	Md.Delwar Hossain Sha	1924383550		Sharankh ola	Bagerhat	Khulna	Farming	Produce r- Sunflow er	Questionnaire Survey	2	Project Staff

178	Ms.Rojina Begum			Sharankhola	Bagerhat	Khulna	Farming	Produce r-Sunflower	Questionnaire Survey	2	Project Staff
179	Md.Jahangir Hawladar	1762095736		Sharankhola	Bagerhat	Khulna	Farming	Produce r-Sunflower	Questionnaire Survey	2	Project Staff
180	Shree Ratan Bain			Sharankhola	Bagerhat	Khulna	Farming	Produce r-Sunflower	Questionnaire Survey	2	Project Staff
181	Shree Aboni Ekbar	1733473003		Sharankhola	Bagerhat	Khulna	Farming	Produce r-Sunflower	Questionnaire Survey	2	Project Staff
182	Shree Susanto Bain	1751752735		Sharankhola	Bagerhat	Khulna	Farming	Produce r-Sunflower	Questionnaire Survey	2	Project Staff
183	Shree Premananda Somaddar	1731320372		Sharankhola	Bagerhat	Khulna	Farming	Produce r-Sunflower	Questionnaire Survey	2	Project Staff
184	Md.Mojibur Mir	1749914439		Sharankhola	Bagerhat	Khulna	Farming	Produce r-Sunflower	Questionnaire Survey	2	Project Staff
185	Shree Bidhan Chandra Mondal	1723815605		Sharankhola	Bagerhat	Khulna	Farming	Produce r-Sunflower	Questionnaire Survey	2	Project Staff
186	Pial Halder	1765105036	south kainmari, mongla, bagerhat	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff

187	Morjina Begum		amurbunia, morolgong	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
188	Rijia Begum	174849835	north kainmari,mo ngla,bagerh at	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
189	Afzal Khan	194752133 0	mongla ,bagerhat	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
190	Ajim Sarder	194272250 6	gabbunia,ba gerhat	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
191	Md. Kabir Hawlder	175716444 9	burburea ,mongla	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
192	Baijit Sheikh	175420161 1	goraburbure a,mongla	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
193	Kulsum Begum		bashtola,mo ngla	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
194	Md. Awal Hung		geodhara,m orolgong	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
195	Mikail Mridha	191628581 3	south kainmari,mo ngla,bagerh at	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
196	Hanif Sheikh	194293958 2	shout bashtola	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
197	Sobahan Sheikh		hoglabunea, bagerhat	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
198	Chan Mia Hawlder		shout bashtola	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff

199	Francis Biswas	1920818057	kainmari,mongla,bagerhat	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
200	Abu Jafar Khan	1762585892	joymoni mongla	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
201	Minara begum		hoglabunea,bagerhat	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
202	Probhat Sarder	1917268427	kanai nagor mongla,	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
203	Mannan Mridha		haldibunia,bagerhat	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
204	Farida Begum		bodwmari,mongla	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
205	Zakir		dawman,mongla	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
206	Lutfar Bepari	1839259333	dawman,mongla	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
207	Fard Sheikh		joymoni mongla	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
208	Ayub Ali Fakir		south chila,mongla ,bagerhat	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
209	Bashar Sarder		South chila,mongla ,bagerhat	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
210	Ekhla Shikder		joymoni mongla	Chadpai	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff

211	Jamal Talukder	177020774 5	Rayenda,sh aronkhola	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
212	Abul Hossain		Rayenda,sh aronkhola	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
213	Al Amin Mollah	193186998	Rajeshsor,s harankhola	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
214	Md. Zaker Majhi	176258676 2	Bogi,sharan khala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
215	Md. Rafiqul Farzi	178030351 9	Bogi,sharan khala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
216	Md. Kabir Hossain	173173298 7	Bogi,sharan khala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
217	Md. Ali Hossain Hawlder		Bogi,sharan khala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
218	Md. Ismail Mollah	193318699 8	Rajeshsor,s harankhola	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
219	Md. Abul Mridha		Rayenda,sh aronkhola	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
220	Md. Hares Mullick		Rayenda,sh aronkhola	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
221	Md. Nurmia Hung		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
222	Md. Ruhul Hung		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
223	Krishna Bain	178030379 6	lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff

224	Md. Hanif Hung		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
225	Md. Shah Alam	1748641625	lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
226	Md. Anis Mollah		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
227	Md. Jalil Pahlwan		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
228	Md. Shahadat Hossain		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
229	Md. Profan Hung		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
230	Md. Ishak Mollah		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
231	Md. Khoyer Mia		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
232	Md. Mostofa Hawlader		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
233	Md. Noya Mia		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
234	Alam Gazi		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
235	Md. Helal Hung		lakurtola,sha rankhala	Sharankh ola	Bagerhat	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
236	Md. Ismail Hung		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff

237	Md. Anowar Hung		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
238	Md. Zakaria		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
239	Jalil Hung		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
240	Abdul majid Gazi		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
241	Jahirul Islam Milon		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
242	Najma Begum		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
243	Shahanara parvin		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
244	Anjuara khatun		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
245	Shahidul Islam		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
246	Mikail Islam		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
247	jahurakhatun		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
248	mahmmuda khatun		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
249	aklima khatun		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff

250	nurneda begum		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
251	nasir uddin		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
252	shahida parvin		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
253	rijea khatun		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
254	kalachad dhali		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
255	Md. Moslem Shana		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
256	Ashraful Mullick		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
257	Nurjahan		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
258	Saiful Islam		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
259	Ershad Ali Gazi		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
260	Rehana Begum		Dacope/Koyra	Dacope/Koyra	Khulna	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
261	Abdul Majid Gazi		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
262	Monoara Begum		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff

263	Sirajul Islam		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
264	Saifunnahar		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
265	Ebadul Sheikh		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
266	Md. Abdus Samad		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
267	Rokeya Begum		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
268	Shahanara		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
269	Jaideb Munda		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
270	Kamran Gazi		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
271	Habibur Rahman		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
272	Bishkha Mondol		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
273	Ashim Mahalder		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
274	Ayub Sheikh		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
275	Bidhan Munda		Munshigonj	Munshigonj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff

276	Anowara Begum		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
277	Md. Abdul Salam Sarder		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
278	Rebecca Sultana		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
279	tuni rani		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
280	bemol krishno		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
281	debor nudon sharkar		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
282	Owajed Ali		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
283	Rokea begum		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
284	Anisur rahman		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
285	Sattar gaji		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
286	Kamrujjaman		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
287	Khalil dali		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
288	Shantos sharkar		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff

289	Mostafejur rahman		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
290	Ferdous begum		Munshigonj	Munshig onj	Satkhira	Khulna	Resource extractor		Questionnaire Survey	1	Project Staff
291	Horo Prosad		Borobari	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
292	Shiladitto		Borobari	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
293	Ziaur Rahman		Borobari	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
294	Sohidul Islam	191706912 1	Hayetkali	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
295	Asutos Mondol		Borobari	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
296	Shila Ditto	192439514 5	Borobari	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
297	Ali Akbar		Borobari	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
298	Kobita		Borobari	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
299	Sukur Ali gazi		Hayetkali	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
300	Romesh Biswas	191727262 0	Borobari	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
301	Senaho Mukul	193403137 0	Borobari	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff

302	Anisur Rahman	1920727554	Borobari	Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
303	Prokas Bormon	1920911226	Borobari	Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
304	Asutos Mondol	1981683326	Borobari	Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
305	Ali Akbar	1937520606	Borobari	Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
306	Romesh Biswas	1917272620	Borobari	Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
307	Anisur Rahman	1920727554	Borobari	Dacope/Koyra	Khulna	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
308	Shohag	01735-588994	South Gulishakhali, Nishanbaria	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
309	Md. Alamgir Jamadder	01756-889039	West Amurbunia, Nishanbaria	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
310	Kamal Khan	1767-788552	West Jiodhara, Nishanbaria	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
311	Shahidul Fakir	01912-964430	South Gulishakhali, Nishanbaria	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
312	Tapan Mistri	01742-401934	West Amurbunia, Nishanbaria	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
313	Monir Farazi	01948-937873	South Gulishakhali, Nishanbaria	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
314	Zakia Begum	01723-727231	West Jiodhara, Nishanbaria	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff

315	Shamaresh Sarder	01926-629210(Aby)	West Dhangmari, Baniashanta , Dakope	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
316	Ashraf Ali	01759-153382	Ratia Rajapur, Dhanshagor, Sharankhola	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
317	Jayatma Bain	01931-821832	Khejuria, Baniashanta , Dakope	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
318	Shitangshu Kumer Barman		East Dhangmari, Baniashanta , Dakope	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
319	Mohidul Howlader	01764-235885	Ratia Rajapur, Dhanshagor, Sharankhola	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
320	Dulal Farazi	01733-472413	Ratia Rajapur, Dhanshagor, Sharankhola	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
321	Gesripada Bir	01920-697413	Khejuria, Baniashanta , Dakope	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
322	Subhash Mandal		Khejuria, Baniashanta , Dakope	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
323	Haripada Mandal	01926-629210(Aby)	West Dhangmari, Baniashanta , Dakope	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
324	Shohid Kesh	01733-472413(Aby)	Dhanshagor, Sharankhola	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff

325	Subhash Biswas		South Haldibunia, Chila, Mongla	Chadpai	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
326	Krishna Bain	1781332128	Lakurtola	Sharankhola	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
327	Dulal Gharami	0	Lakurtola	Sharankhola	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
328	Nirban Howlader	1718774558	South Tafalbari	Sharankhola	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
329	Dhirendranath Bain	1751752735	Lakurtola	Sharankhola	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
330	Aramna Rani	1734097280	South Tafalbari	Sharankhola	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
331	Parimal Howlader	1736078925	Lakurtola	Sharankhola	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
332	Bakibillah	1766782228	Bokultola	Sharankhola	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
333	Asad Howlader	1789358297	South Tafalbari	Sharankhola	Bagehat	Khulna	Farming	Produce r-Veg	CBA	2	Project Staff
334	Nilkantha Rai	01945-712086	Chadpai-Mongla	Chadpai	Bagehat	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
335	Md. Afsar	01721-917616	Chadpai-Mongla	Chadpai	Bagehat	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
336	Sanjai Kumer Barman	1933630015	Chadpai-Mongla	Chadpai	Bagehat	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff

337	Suresh Rai	Aby:01765 051259	Chadpai- Mongla	Chadpai	Bagehat	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
338	Rafiqul Islam	Aby:01765 051260	Chadpai- Mongla	Chadpai	Bagehat	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
339	Rabindranath Barman	192632366 9	Munshigonj	Munshig onj	Satkhira	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
340	Johura Begum	191681884 9	Munshigonj	Munshig onj	Satkhira	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
341	Shawkat Gazi	192736761 7	Munshigonj	Munshig onj	Satkhira	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
342	Babar Ali Gazi	bvB	Munshigonj	Munshig onj	Satkhira	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
343	Asia Begum	193965045 9	Munshigonj	Munshig onj	Satkhira	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
344	Akbar Sorder	193778216 5	Koyra	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
345	Abdur Rahim Sorder	192740140 0	Koyra	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
346	Salma Begum	194657421 0	Koyra	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
347	Osman Goni Dhali	198168355 3	Koyra	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff
348	Afsar Sorder	192703510 6	Koyra	Dacope/ Koyra	Khulna	Khulna	Farming	Produce r-Fish	CBA	2	Project Staff

Annex 6: References

1. Master Plan for Agricultural Development in the Southern Region of Bangladesh
2. <http://www.khulnanews24.com/index.php/local-news/255-initiatives-for-sunflower-production-in-saline-environment-of-southern-bangladesh.html>.
3. O. Quader, Sept. 2010, Coastal and marine biodiversity of Bangladesh (Bay of Bengal), Space Research and Remote Sensing Organization (SPARRSO), Proc. of International Conference on Environmental Aspects of Bangladesh (ICEAB10), Japan
4. Saheed S.M., 2006, The state of Land, Water and Plant Nutrition Resources of Khulna Division of Bangladesh, Country Report
5. Anshu Singh, Prodyut Bhattacharya, Pradeep Vyas, Sarvashish Roy, 2010, Contribution of NTFPs in the Livelihood of Mangrove Forest Dwellers of Sundarban, International Centre for Community Forestry, Indian Institute of Forest Management
6. BCCSAP, 2009, Bangladesh Climate Change Strategy and Action Plan, Ministry of Environment and Forestry, 2009
7. IPCC Fourth Assessment Report: Climate Change 2007 (AR4), Chapter 4
8. Ulrich Kleih, Khursid Alam, Ranajit Dastidar, Utpal Dutta, Nicolien Oudwater, Ansen Ward, 2003, Livelihoods in Coastal Fishing Communities, and the Marine Fish Marketing System of Bangladesh, DFID
9. Master Plan for Agricultural Development in the Southern Region of Bangladesh. Ministry of Agriculture, GOB & FAO, March 2013.
10. <http://www.khulnanews24.com/index.php/local-news/255-initiatives-for-sunflower-production-in-saline-environment-of-southern-bangladesh.html>

