Local Government Engineering Department

Sunamganj Community Based Resource Management Project (SCBRMP)

Sunamganj

Component Completion Report of Agriculture & Livestock

Project Management Unit

LGED Bhaban, Mallikpur,
Sunamgonj

January 2014

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IFAD Loan # 567-BD; UNOPS Project # BGD/02/F01

Project Completion Report 2014

Acronyms

ac	Acre (100 decimal; area of land)
AI	Artificial Insemination
ASC	Agriculture Support Coordinator
BADC	Bangladesh Agriculture Development Corporation
BARI	Bangladesh Agricultural Research Institute
BRRI	Bangladesh Rice Research Institute
BLRI	Bangladesh Livestock Research Institute
CO	Credit Organization
CDF	Community Development Facilitator
CSO	Chief Scientific Officer
DAE	Department of Agricultural Extension
DDAE	Deputy Director of Department of Agricultural Extension
FGD	Focused Group Discussion
HH/hh	Households
Ha	Hector (10000 m^2; area of land)
HYV	High Yielding Variety
IFAD	International Fund for Agriculture Development
MoU	Memorandum of understanding
PMU	Project Management Unit
PRA	Participatory Rapid Appraisal
PVS	Participatory Variety Selection
PYT	Preliminary Yield Trial
SAAO	Sub-Assistant Agriculture Officer
SCBRMP	Sunamgonj Community Based Resource Management Project
SUPM	Senior Upazila Project Manager
t	Ton
T. Aman	Transplanted Aman Rice
T. Aus	Transplanted Aus Rice
TOR	Terms of Reference
TK	Taka (Bangladesh currency)

Cropping seasons:

Kharif II	Mid July to mid October (monsoon)
Rabi	Mid October to Mid March (winter/dry)
Kharif I	Mid March to Mid June (pre-monsoon/intermittent rainfall with chances of occasional hailstorms)

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Project Completion Report

1. Introduction

The appraisal document envisaged promotion of livestock and crop production activities under agriculture sub-component to enhance cash income of the beneficiaries. The document identified mainly three roles of the component as:

- intensive assessment and identification of problems through PRA
- participatory research and
- technology demonstration

Before initiated the activities of the agriculture component the project completed the PRA activities once in March to June 2002-03. The coverage of the PRA was in 2 Upazilas: Sadar and Biwamberpur. The work was done by a consulting company. The major existing problems identified in context of crops and cropping are:

- Occurrences of flash floods during May/June
- Non availability of quality seeds of cereals and vegetable crops
- Low yield of T. aman and wheat
- High prices of fertilizers and pesticides
- Lack of accessibility to irrigation equipment for small hh
- Difficult accessibility to product marketing
- Minimum accessibility to money/credit market
- Lack of water in the existing canals during March/April
- Knowledge gap towards modern crop varieties

1.1. Background of Agriculture Systems in Project Area

The farming system of the district (Sunamgonj) is fragile, prone to occasional flash floods with early rains. Rice especially local boro rice (almost 70% rice area of the district covered by boro rice) is the predominant crop grown in the area including sporadic area coverage of low yield potentials mustard, potato, sweet gourd etc. varieties in T. Aman rice areas without following modern cultivation practices (low or no fertilizer and irrigation). The yield of local boro paddy in the project area was estimated in appraisal document as 2 t/ha while HYV as 4.5 t/ha. The cropping intensity (number of crops per plot per year) was too low (110-120%) compare to other regions of the country (180-200%). Considering these poor agricultural systems, the project appraisal document proposed adaptive research trials with boro rice to identify short duration and temperature insensitive variety (s) to overcome (harvest rice before onset of flash flood in April) flash flood and white head (infertile panicles due to low night temperature

below 18^0C in April). Adaptive trials were also recommended for non-rice crops to identify suitable promising varieties to increase crop yield and household income. The major challenge was to reduce the crop damage by flash flood & cold injury and to improve the production of rice per unit area. To diversify the cropping systems in the comparatively upper regions i.e. T. Aman areas with variety of crops with increased production per unit area was another challenged faced by the project implementation. And thus under agriculture component the project financed four distinct activities:

- PRA to identify constraints and research priorities
- Participatory research
- Technology dissemination and
- Support of district staff of DAE and DLS (establishment of linkage with GoB)

At the end the project succeeded to identify and extension of HYVs for T. Aman rice and non rice (wheat, potato, mustard, sweet gourd etc.) crops but introducing short duration or temperature insensitive variety for boro rice in the region would need more investigation and works.

1.2 Goal of the Component

- Sustainable livelihood improvement of the community people in project area

1.3 Objectives of Agriculture and Livestock Component

- to identify the field/farmer's problems/limitations towards higher crop production
- to identify the suitable production technologies following participatory/adaptive research trials
- Capacity building of target population towards higher production
- to disseminate identified agricultural production technologies to the community
- to promote improved feeding and disease management of livestock including breed development
- to introduce and promote value addition activities (processing) of agricultural products

1.4 Operational Sequences Maintained under the Component

- Activities of the project started in 2002-03 through PRA exercise
- Crop demonstration started in 2003-04 in Sadar and Biswamber Pur Upazilas
- Technology demonstration started in Jamalgonj and Tahirpur Upazilas in 2004-05
- Adaptive research programs started in 2005-06 through MOU with BRRI and BARI
- Livestock promotion activities (de-worming, vaccination, demos etc.) started in 2004-05
- MOU signed with BLRI in 2006-07 and research programs started in field
- BRRI and BARI assisted adaptive research trials to implement in the field
- Seed support programs to speed up technology uptake by farmers started in 207-08

2. Performance of the Component

2.1. Partnership Development

The project appraisal document urged to design and implements the on-farm research trials in collaboration with national research institutions under partnership approach. The technologies which are identified as potential nationally but not proven under special physical and socio-economic conditions in the project area are intended to be tested and further developed in participative on-farm research trials. To carry out the adaptive research trials and extension of suitable technologies into the members of credit organization (CO) the project developed strong partnership with the related research organization during the course it's of implementation.

2.1.1. BRRI Collaboration

Following the approach suggested by the appraisal report the project facilitated to sign MoU (Memorandum of Understanding) between LGED and BRRI (Bangladesh Rice Research Institute) on 24 May 2005 to involve the concerned scientists in carrying out adaptive research trials and successive extension activities of the outstanding varieties/technologies in the project area. The project succeeded to establish strong working partnership with BRRI and completed 3 PVS (participatory variety selection) trials in boro rice and numbers of variety trials in boro and T. Aman rice during the project period. Collaboration with BRRI was extended to attach the scientists in extension of improved varieties of T. Aman rice through seed distribution. BRRI supplied the foundation seeds of selected suitable varieties of T. Aman rice to grow in the interested CO members that resulted area expansion HYV of T. Aman in the project area. The scientists of BRRI assisted the project in designing the on-farm and on-station research trials on both boro and T. Aman rice, data collection, processing and reporting of research trials.

2.1.2. BARI Collaboration

In a similar manner that followed for BRRI the project arranged signing of MoU between LGED and BARI (Bangladesh Agricultural Research Institute) on 24 November 2005 to carry out adaptive research trials and materialize extension of improved varieties of dry land crops (mustard, potato, wheat, sweet gourd, pea nut, amaranths, etc) other than rice in the project area. The project hired agriculture consultant to facilitate the process of signing MoU with different research organizations and to plan and materialize the agricultural activities of the project as a whole. Based on MoU the research scientists of BARI assisted the project in developing research trials, carrying out the trials in the project area and reported the results in the national seminars/workshops. The concerned scientists of the institution time to time visited the trials and provided necessary suggestions to the project staff for successful completion of the trials.

2.1.3. BLRI Collaboration

The project signed an MOU with the BLRI (Bangladesh Livestock Research Institute) on 15 October 2006 to establish strong collaboration in poultry and livestock promotional activities in the project area. As per MOU the BLRI scientists are to support the planning and conducting the coordinated livestock promotional programs as well as supervise and assist in implementation of action research on poultry/livestock development assessing the local demand. The research team from BLRI time to time visited the project and formulated programs for joint implementation like:

- Smallholder dairy development
- Cattle fattening
- Scavenging duck production
- Scavenging chicken production
- Small scale commercial chicken farming

2.2 Participatory Adaptive Research Trials

The project started designing adaptive research trials in 2005-06 by recruiting agriculture consultant and establishing collaboration with the reputed national research organizations like BRRI, BARI and BLRI.

2.2.1 Trials on Rice

In association with BRRI the project designed and implemented PVS (Participatory Variety Selection) trials using 18 improved BRRI varieties (boro rice) in rabi season (Nov – Mar) 2005-06. Of the varieties tested the participatory farmers have selected BRRI Dhan 27 and BRRI Dhan 45 as best varieties for their locality. During Kharif II season (July – Oct) in 2006-07 another 15 T. Aman varieties were tested under PVS method and farmers given their choices to BRRI Dhan 44, BRRI Dhan 41and BRRI Dhan 46 as best suited for haors. During rabi season of 2006-07 the PVS trial of boro rice varieties were repeated and seeds of selected boro seasoned varieties distributed to farmers under baby trials (two kg seeds per farmer who were present in the field day in earlier boro season of 2005-06) for multiplication of seeds for individual farmers. The seeds of selected aman varieties distributed to farmers under baby trials in Kharif II (July – November) season of 2007-08. Baby trials conducted in two consecutive rice (both boro and T. Aman) seasons of 2007-08 and 2008-09. After large scale baby trials farmers accepted the aman rice varieties BRRI dhan 44 and BRRI dhan 46 but due to poor performance especially shattering problems after maturity and comparative low yield than BRRI dhan 29 (one of the popular variety of the locality) farmers disagreed to grow the tested variety BRRI dhan 45 and 27. Once the aman variety BRRI dhan 44 and 46 drew attention of farmers project started seed multiplication program with these two aman varieties and BRRI provided 200 kg seed of each variety. Another aman variety BRRI dhan 33 accepted by the farmers during 2006-07 PVS trials

due to its earliness and in next season BRRI provided 100 kg seed to the project for seed multiplication purpose. In boro season of 2008-09 one line (BR 7011-89-3-2) has been found very promising for the area as it is early with high yield potentials.

After a consultative meeting with project officials BRRI scientist decided to suspend PVS trial from 2008-09 and set fertilizer trial on boro rice (BRRI dhan 29) and tested four short duration varieties (BRRI Dhan 27, BRRI Dhan 45, BRRI Dhan 36, BRRI Dhan 28) in the project area. In the successive years BRRI continued to select suitable short duration and cold tolerance boro seasoned rice variety by setting trials under following topics:

2008-09

1. Determination of field duration of BRRI Dhan 29 with varying seedling age
2. Comparison of three short duration boro varieties (27, 28, 36 & 45) in Sunamgonj haor
3. Yield performance of BRRI Dhan 45 using seedling from varying seeding rate/density
4. Validation of fertilizer recommendation in popular boro rice variety
5. Bakanae disease management: with and without seed treatment

2009-10

1. Determine fertilizer rates of BRRI dhan 29 in project area
2. Variety comparison against cold tolerance
3. Determination of field duration of BRRI dhan 29 with varying seedling age

2010-11

1. Rice trials considering cold injury
2. Rice trials considering yield and earliness of lines in project area
3. Variety trial in T. Aman season (BRRI dhan 33, BRRI dhan 44, BRRI dhan 49, BRRI dhan 51, BRRI dhan 52)

2011-12

1. PVS in boro season
2. Evaluation of drought tolerant boro rice varieties
3. Evaluation of alternate waiting and drying (AWD) in boro season
4. Preliminary yield trial (PVT) in boro season
5. Variety selection of T. Aus

Details of adaptive research trials conducted in collaboration with BRRI are shown in **Annex I**. Yield level of T. Aman rice in the project area under adaptive trials is shown below (Table 2.1) as reference.

Table 2.1: Yield level of different varieties of T. Aman in the project area in 2010-11

Variety	Yield per plot (37 m^2) in Kg			Yield (t/ha)
	Location I	Location II	Mean	
BRRI dhan 33	16	14	15	4.05
BRRI dhan 44	19	17	18	4.86
BRRI dhan 49	18	17	17.5	4.72
BRRI dhan 51	15	14.5	14.75	3.98
BRRI dhan 52	15.5	15	15.25	4.12
Mean	16.70	15.50	16.10	4.35

2.2.2 Trials on crops other than rice

The project started adaptive research trials with Rabi and Kharif crops (other than rice) in 2005-06 in collaboration with BARI. The trials set in Rabi seasons are on wheat, maize, mustard, sweet gourd, onion, potato, lentil, chickpea etc in Rabi season and on stem amaranth, Indian spinach, lady's finger, mung bean, brinjal, kangkong etc in Kharif I season. The growth and yield performance of all those crops were not superior but not below the standard of national yield levels. The yields of trial crops and compared against their national average yields (Table 2.2). In Rabi season (Oct – March) of 2006-07 mustard, wheat and sweet gourd have taken under production program (planted in larger plots by providing only seed input) in addition of repeating most of the other trials.

Table 2.2: Yields of rabi seasoned crops at adaptive research trials in Sunamgonj in 2006-07

Sl #	Crop	Trial yield (kg/ha)	National average yield (Kg/ha)	Deviation (+ or -) (Kg/ha)	% Increase/ decrease
1	Sesame	860	600	260.33	30
2	Mustard	805	810	-4.97	-1
3	Maize	4897	4000	897	18
4	Wheat	2401	2230	170.5	7
5	Onion	6998	4176	2,822	40
6	Chickpea	729	729	0.4	0
7	Sweet gourd	8916	8500	416	5

In Kharif I season 2008-09 the project set adaptive research trials on different summer vegetables like country bean, tomato, bitter gourd and radish. The yield levels and gross income per ha of those crops are showed in the following table 2.3.

Table 2.3: Yields of Kharif-I seasoned crops at adaptive research trials in 2008-09 in the project area

Sl #	Name of crop	Yield (kg/ha)	Gross income/ha (Tk)
1	Country bean	13114	196708
2	Tomato	40890	435022
3	Bitter gourd	19106	224616
4	Radish	41059	328473

2008-09

1. Country bean (BARI Sheem I, 4, & local)
2. Radish (Tasakisan, pinki, Rocki 45)
3. Tomato (BARI tomato 3, BARI Tomato 14, local)
4. Bitter gourd (BARI korola I, Tia)
5. Stem amaranth (BARI data I – Laboni, Panna, Bhutan)

2009-10

1. Variety selection of Ground nut
2. Variety selection of sweet potato

2010-11

1. Variety selection of Ground nut
2. Variety selection of sweet potato

2011-12

1. Phosphorus trial with and without lime application in Tomato
2. Phosphorus trial with and without lime application in Potato
3. Application of boron to enhance bold seed in Mustard
4. Application of boron in cauliflower to enhance curd size and quality

Details of adaptive research trials conducted in collaboration with BARI are shown in **Annex II**.

2.2.3 Pilot Production Program

After selecting suitable varieties or crops the project started to operate pilot extension programs for selected crops/varieties to make them popular among the farming community since 2007-08. The operation of pilot extension programs were done through a) block demonstration by input support (mainly seed), b) demonstration of technologies through revolving fund, and c) baby trial (distributed 2 kg seeds of selected variety to the interested farmers) in case of rice. The area coverage of major crops by seed support extension approach is shown in the following table 2.4. Details of area coverage and yield performance of pilot programs are shown in **Annex III**.

Table 2.4: Pilot Production Program through Seed Support in the project

Sl #	Name of crop	Area (ac) of crop coverage by year of achievement					Total	Reference yield (t/ha)
		2008-09	2009-10	2010-11	2011-12	2012-13		
1	Mustard	156	242	136	94	35	663	1.22
2	Wheat	34	16	29	43	38	160	2.42
3	Potato	11	14	26		20	71	16.02
4	Mungbean/B. gram	4	13	17	20		54	1.2
5	Sweet gourd	23	52	53	60	48	236	13.5
6	Sesame	11					11	1.12
7	Vegetable	19			11	70	100	15.65
8	T. Aman		16	312	64		392	4.49
Total		259	353	573	292	211	1688	

2.2.4 Technology Demonstration

The appraisal report estimated to set 7,544 demonstrations during the project period (11 years) at cost of Tk 4000/- to Tk 12000/- per demonstration. The project started crop and livestock demonstrations during 2003-04 in Sadar & Biswamberpur, 2004-05 in Jamalgonj and 2005-06 in Tahirpur. Till June 2010 the project put 5471 demonstrations of which 2111 in agriculture, 2237 in livestock and 1123 in food processing. The cumulative progress of implementation in demonstration is 74%. Table 2.5 below shows the distribution of

demonstrations and field days as per sub-sectors. Details of distribution of demonstrations set in the project by year are shown in **Annex IV**.

Table 2.5: Progress in setting demonstration and field days till June 2014

Sl #	Demonstration	Target of project (#)	Achievement (#) till 2013-14	Progress (%)
1	Agriculture	3300	3558	108
2	Livestock	3300	3414	103
3	Food processing	944	1206	128
4	Total	7544	8178	108
	Field day			
1	Agriculture	700	707	101
2	Livestock	500	544	109
3	Food processing	200	236	118
	Total	1400	1487	106

The project has adopted new or different type of approach in demonstration of crop production technology in the farmers plot. The project did not provide free inputs (seeds, fertilizers etc.) as of traditional demo but provided contractual interest free credit to the selected farmers to cultivate the desired new crop or variety. As per contract the cooperator (farmer) refunded the credit after harvest of the crop and the amount had revolved (redistribute) further into the members of the COs in successive cropping seasons. During project period at least three revolving was done in case of demo fund. The recovery of demonstration-fund found satisfactory. Under livestock demonstration program the project has supported to develop or improve broiler farms (20), duck farming (1), goose farming (3), sheep farming (10) dairy farms (1), layer farms (1), pigeon farms (2) etc. Around 500 beneficiary families received support to develop or improve their livelihoods under the program.

2.2.5 Beneficiary Training

The project appraisal document envisaged two tiers training programs for the project beneficiaries, one at the field level and another bit improved courses at the Upazila levels. After introducing the group members with the project interventions and approaches of development designed the selected more motivated members brought to the Upazila for more specific training courses like crop production technologies, fisheries and group and credit management. Activist trainings are designed for special group of members who are to be employed as vaccinators or paravet, so selection made accordingly. Development of nursery men/women was focused in nursery training. The following table 2.6 summarized the numbers beneficiaries given training on the intended courses. Details of year wise training activities conducted under agricultural component are shown in the **Annex V**.

Table 2.6: Beneficiary Training conducted under Agriculture and livestock development in the Project

Sl #	Training courses	Project target (#)	Achievement till 2011-12	Project

		Male	Female	Total	Male	Female	Total	progress (%)
1	Technology/refresher	100	25	125	92	20	112	90
2	Technical training (field)	14000	48000	62000	14630	48164	62794	101
3	Technical training (center)	2525	5950	8475	2517	5937	8454	100
4	Activist training	140	80	220	135	79	214	97
5	Vaccinator (refresher)	130	110	240	130	104	234	98
6	External course	68	10	78	114	13	127	163
7	Swamp tree nursery	10	550	560	9	646	655	117
Total		16973	54725	71698	17581	54957	72538	101

2.2.6 Technology Promotion

Some of the technology promotion activities were undertaken under special program other than demonstrations and adaptive trials. The project took initiative to accomplish road (constructed by the project in the rural villages) side plantation with appropriate tree species. To conserve the natural heritage massive plantation with traditional plants (hijol/koros) done in the selected beels too. Promotion of vegetable cultivation in the bank of the beels was also successfully completed. The following table 2.7 showed quantity of special programs implemented during project implementation in different years.

Table 2.7: Technology Promotional Activity under the project

Sl #	Item of Activity	Year of implementation					
		2008-09	2009-10	2010-11	2011-12	2012-13	Total
1	Jujube Budding (#)	750	804	2277	648		4479
2	Fruits Garden (#)		32	62			94
3	Road Side Plantation (Km)	22	3	3.5	8		37
4	Compost preparation (#)		77	82			159
5	Nursery Establishment (#)	51	37	4	1		93
6	Coverage of bill by tree plantation (#)		13	45	28		86
7	Swamp tree plantation in beels (#)		24141	84764	67213	10275	186393
8	Promotion of fodder cultivation (#)		26	26			52
9	Integrated crop production in beel (#)		9	28			37

2.2.7 Promotion of Surface Irrigation

The scope of surface irrigation in the locality is being utilized by constructing submergible dams in possible suitable locations and promoting installation of buried pipe scheme to improve the efficiency of irrigation schemes of river Surma and the Branches.

a) Submergible dam

The project constructed three submergible dams, two in Mugai canal and one at Kamarvita canal under Sadar Upazila of Sunamgonj district. The dams opened for operation from the Rabi

season of 2011-12 and farmers started to cultivate large quantity of vegetables in both sides of the concerned canals. A simple short survey results on extension of vegetable cultivation due to those dams is stated in the impact section of the report.

b) Buried Pipe

To increase the conveyer efficiency of irrigation channels (95% instead of 50% in traditional kacha channel) the project adopted buried pipe irrigation systems and started to construct/establish buried pipe irrigation systems in the STW blocks in 2010-11 using technical support from the field engineers of Barind project of North Bengal. So far buried pipe irrigation systems have been established in 8 STW schemes in the project area. With one exception in Sadar Upazila all 7 sites are in function/operation and farmers showed quite enthusiastic upon the installations. In Sharif pur site of Derai Upazila most of the farmers increased their area of cultivation in present season than the last year. No change found in variety grown and yield of rice. Water rent/unit area is yet to be changed (reduced) with time of operation. Details of the schemes are:

Table 2.8: Details of buried pipe installation schemes in the project area

Sl #	Name of site	Upazila	Year of establishment	Expected command area (ha)	# Beneficiary
1	Construction of UPVC buried pipe line at Sarifpur	Derai	2011-12	33.74	150
2	Construction of UPVC buried pipe line at Kalinagar	Derai	2012-13	47.23	175
3	Construction of UPVC buried pipe line at Kadimtali	Derai	2012-13	49.93	250
4	Construction of UPVC buried pipe line at Kaminipur	Jamalgonj	2012-13	51.28	162
5	Construction of UPVC buried pipe line at Balijuri	Tahirpur	2012-13	47.23	250
6	Constrction of UPVC buried pipe line at Haibathpur	Sadar	2012-13	67.48	300
7	Construction of UPVC buried pipe line at Noagaon	Jamalgonj	2013-14	55.35	275
8	Construction of UPVC buried pipe line at Rupabali	Jamalgonj	2013-14	57.25	300

2.3 Livestock Development

The project signed MOU with the BLRI (Bangladesh Livestock Research Institute) in 2006 and established strong collaboration in poultry and livestock promotional activities in the project area. BLRI supported in planning and conducting the coordinated livestock promotional programs as well as supervised and assisted in implementation of action research on poultry and livestock development in a limited scale by assessing the local demand. The areas of collaboration made are on:

- Smallholder dairy development
- Breed development of cattle
- Cattle fattening
- Scavenging duck production

- Small scale commercial chicken farming

2.3.1 Vaccination and De-worming Campaign

The major works done by the project under livestock support is de-worming and vaccination programs for the large animals in the district. These two activities were the on-going interventions for the project since initiation that has created much awareness about the animal health in the region. During field survey it has been observed that majority of the CO (Credit Group) members vaccinated their animals and properly de-worming annually. The table 2.9 below showed the numbers of animals brought under de-worming and vaccination program by years.

Table 2.9: Animal health improvement campaign in the project

Year of implementation	Number of large animal (cattle)		
	Vaccination	De-worming	Total
2003-04 to 2009-10	180847	47088	227935
20010-11	32585	14378	46963
20011-12	32585	15378	47963
20012-13	20421	20421	40842
20013-14	31250	5000	36250
Total	297688	102265	399953

2.3.2 Promotion of Activist/Paravet

The project design put importance to develop livestock activists/paravets and as such made provision for large numbers of skill development training courses on livestock to develop vaccinators and paravets. Accordingly the project started the training courses since 2003-04 and provided regular and refresher courses to 133 males and 81 female activists. Of them almost 120 male and 70 female trained paravet are now working in the field of Sunamgonj. This innovative work assisted 22 male and 15 female to have better employments who are presently earning average Tk 7222 per month. Details are shown in the table 2.10 below.

Table 2.10: Management of animal health through developing paravet/vaccinator

Upazila	# Vaccinator/Paravet			Avg income/month (Tk)		
	Male	Female	Total	Male	Female	Mean
Sadar	14	18	32	9500	5500	7500
S. Sunam	27	4	31	10000	7000	8500
B. Pur	26	16	42	7000	6000	6500
T. Pur	6	9	15	8000	12000	10000
J. Gonj	10	8	18	6000	6000	6000
Derai	14	9	23	8000	5000	6500
Salla	16	2	18	10000	3000	6500
D. Bazzar	16	0	16	12000	0	6000
D. Pasa	4	15	19	10000	5000	7500
Total/Mean	133	81	214	8944	5500	7222

2.3.3 Breed Development Program

Considering the local low productive (milk/meat) small sized cattle breed the project took initiative to improve the cattle breed by using improved breed bull and by make use of artificial insemination techniques. Project developed facility for artificial insemination centers and

assisted the community people to get better breed of cattle by facilitation AI through livestock facilitators.

a) Natural Breeding by Exotic Breed

For the improvement of Cattle breed and increased milk/meat production in the locality the project supplied 09 crossed Holstein Friesian and local Pabna cross Jersey bulls in four Upazila (Sadar, South S.jamalgonj and Deari) in February 2009. Another 06 bulls (3 Pabna, 3 Red Chittagong) distributed to 3 more upazillas (Biswamberpur, Tahirpur and sulla) in February 2010 and in February 2011 project supplied another 14 bulls (Local cross Jersey, Local Pabna Cross Sindhi, Local Pabna Cross Friesian) in 6 Upazillas (Sadar, South sunamganj, Jamalgang , Deari, Duarabazar and Darmapasha Upazilla). These bulls moved in open hoar from morning to evening and also inseminated the local cow (brought to their residence) at home too. The following table 2.11 showed the number of improved cross breed calves produced at home during the period but actual numbers are several times more as these bulls undoubtedly inseminated numerous cows during grazing at hoar which kept out of record.

b) Artificial Insemination

The project supported to establish AI center in different project Upazilas and so far 5 centers established each one in Jamalgonj, Tahirpur, Biswamberpur, DuaraBazzar and Sadar. The activity started in 2008-09 with establishing one AI center at Jamalgonj and so far 790 calves produced in project assisted centers and it is expected that the center would continue the production of AI calves for quite long time.

Table 2.11: Breed improvement program of animal/poultry executed during project period

Activity	Achievement in different project year						
	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Fodder cultivation (# plot)	15	42	22	6	4		89
Number of animal inseminated by bull	356	580	440	232	51		1659
Number of calf produced		259	328	94	30		711
Number of animal inseminated by AI			140	28	1050	1215	2433
Number of calf produced by AI			48	12	720	729	1509
Sand based mini hatchery (# chicks)			932	7114	7876	8000	23922
Household sheep farm					68	31	99
Household poultry (duck and chicken) farm (#)			8	8	14	6	36

c) Promotion of Mini Hatchery

The project introduced establishment of sand based mini hatchery in 208-08 that opened business opportunity for marginal households and so far the owners are continued its operation with success (Table 2.11). Project established 8 sand based mini hatchery in 8

Upazilas with a view to extend the businesses into CO members. Production of these established units are increasing with time and it is expected that they will expand the businesses and some other new investors may come forward to open their own units.

d) Small Scale Sheep and Poultry Farming

Considering the herbivorous nature and diversified advantages (disease resistance, less cost, easy marketing etc) of sheep rearing project initiated small scale sheep farming in 2012-13 by distributing 3 sheep/poor household. In 2013-14 another 31 families included under the program and distributed 3 sheep per family. This is one of the poverty reduction approaches of the project.

3. Women in Agriculture Development

By customary LGED celebrates International Women's Day in every year. The project worked for developing women in various agricultural activities like establishment of fruit/tree/vegetable seedling nursery, paravet/vaccinator, development of duck/poultry farm, establishment of mini hatchery etc. that assisted them to emerge as an entrepreneur. SCBRMP participated in the potential women entrepreneurship competition during its tenure and won multiple awards in 2010 and in other consecutive years till 2014. The following table showed few of the entrepreneurs who awarded during the annual ceremony of women day in national level.

Table: Award receiving project beneficiaries for outstanding performance

Sl #	Name of awardees	Area of Award	Received (Month/Yr)	Status of award
1	Jahanara Begum	Nursery	Mar-10	1st
2	Sabukunnahar	Vaccinator	Mar-10	2nd
3	Chandromala	Nursery	Mar-11	1st
4	Manura Begum	Vaccinator	Mar-12	2nd
5	Jaheda Begum	Poultry Farm	Mar-13	1st
6	Anwara Begum	Hatchery	Mar-14	1st

4. RIMS Follow-up Survey 2010

The project out sourced the RIMS survey to the Mitra and Associates a consulting firm who conducted the survey in August 2010 and compared the results with the baseline survey done in 2006 by the same firm. The results of the RIMS survey related to agricultural component of the project are stated in the following section.

4.1 Farming

As shown in Table 4.1, relatively more households (62%) were found to be involved in farming in 2010 than 2006 (54%). This reflects that people in the project area had got more opportunities to work due to project intervention. The amount of land cultivated in the project

area also appeared to have increased since the baseline survey. In the baseline survey, less than 10% households reported cultivating one hectare or more land; while in 2010 the proportion was up at 16 percent, raising the amount per-household cultivated land from 0.38 ha to 0.53 ha. This could also be an impact of the project facilitating more investment of resources in farming.

Table 4.1: Percent distribution of households by area of land cultivated in 2006 and in 2010

Amount of land cultivated (in hectares)	Baseline 2006	Follow-up 2010
Not involved with cultivation/No farmland	46.1	38.4
< 1 hectare	44.4	45.7
1 to <3 hectare	8.5	13.8
3 hectare and above	1.0	2.1
Total	**100.0**	**100.0**
N[1]	**1200**	**1200**
Mean amount cultivated	**0.38**	**0.53**

[1]N is the number of households included in the sample.

4.2 Possession of domestic animals

There were also increases in the number of domestic animals possessed by those households raising them, another sign of reducing poverty among some households in the project area. As shown in Table 4.2, the average number of chickens/other poultry possessed by all households had an increase from only 8 in the baseline survey to 20 in the follow-up survey. For cattle the increase was from 1.09 to 1.45.

Table 4.2: Average number of domestic animals per households in 2006 and in 2010

Domestic animals	2006	2010
Chicken/other poultry	8.45	20.16
Sheep	0.15	0.18
Goats	0.21	0.26
Cattle	1.09	1.45

4.3 Food insecurity

In assessing changes in the levels of food insecurity among people in the project area, the respondent in a survey was asked if her household had ever experienced a hungry season in the 12 months preceding the survey. Information was also collected about the months a hungry season lasted over. *A hungry season means the number of months a household does not have enough food because its own store is depleted and it does not have money to buy food.* As shown in Table 3.3, there were no notable variations in the levels of food insecurity in the project area between the baseline and follow-up surveys in 2010. As observed in the baseline survey, 72 percent of households reported having suffered food shortages in the past 12 months with 32 percent suffering two episodes of shortages. These proportions appeared about as high in the follow-up survey at 74 percent and 29 percent respectively. There were also little variations in the average number of months of food shortages suffered by

households between the surveys, being 3.6 in the baseline survey and slightly lower 3.1 in the follow-up survey (Table 4.3).

Table 4.3: Distribution of households by number of hungry seasons and hungry months In 2006 and in 2010

Hungry seasons/months	Baseline 2006	Follow-up 2010
Number of hungry seasons experienced		
None	27.6	25.8
One	40.6	44.9
Two	31.8	29.3
Total	**100.0**	**100.0**
Number of hungry months experienced		
None	27.6	25.8
01-02	9.5	11.7
03-04	23.8	34.0
05-06	21.6	21.1
07-12	17.5	7.4
Total	**100.0**	**100.0**
N[1]	**1200**	**1200**
Mean number of hungry months	**3.57**	**3.11**

[1]N is the number of households included in the sample

5. Impact of Agriculture Component

To make use of surface water during dry/rabi season the project constructed 3 submergible dams in 3 locations of Sadar Upazila. Buried pipe irrigation schemes at 8 locations (3 at Derai, 3 at Jamalgonj and 01 each at Sadar &Tahirpur Upazilas) in the project area have also been installed for better use of surface water and to increase the water use efficiency over traditional irrigation schemes. Two simple hands on short studies were conducted to assess the impact of agricultural interventions (adaptive research, demonstrations, field days, dams, canals, buried pipe etc) of the project on crops and cropping and family income mainly by crop products.

5.1 Impact of Technology Promotion

A simple study was commissioned to assess the impact of project interventions on the crops/cropping of CO (credit organizations) members their household livestock asset and as a whole on family income. Total 126 CO members (21 from each of the 6 Upazilas) were interviewed using designed short questionnaire in 6 Upazilas i.e. Sadar, South Sunamgonj, Biswamberpur, Tahirpur, Duara Bazzar and Jamalgonj during 24 to 31st January 2014. From each Upazila 2 field staff was assigned to collect data. An orientation and trial session on the questionnaire was done before send them to the filed for data collection. After data input, processing and required analysis the results of the study is presented in the following sections.

5.1.1 Crop Agriculture

The project activities were focused towards adoption of improved technologies for winter crops and rice (boro & T. Aman), so during the study only those project-supported crops were

considered for data collection. The format/questionnaire used for data collection is shown as **Annex VI**. The results are discussed below against set indicators.

a) Adoption of crop agriculture

The projects interventions not only attracted more numbers of people towards crop cultivation but also ensured crop diversification (cultivation of more numbers of crops instead of boro rice only) in certain extend. Against 11% respondents who were cultivating mustard earlier, now 32% of them found producing mustard; against 18% presently 33% cultivating wheat. Similarly 27% farmers are cultivating tomato instead of 16% cultivated earlier. The changes in cultivation practices of other crops by local farmers are shown in Table 5.1.

Table 5.1: Comparison of number of farmers cultivating the crops before and after project

Sl #	Name of crop	Before Project	After Project	Change (%)
		% Producer cultivated the crop	% Producer cultivated the crop	
1	Boro Rice	85	93	9
2	T. Aman rice	70	83	15
3	Mustard	11	32	65
4	Wheat	18	33	44
5	Potato	35	54	35
6	Sweet gourd	12	21	44
7	Country bean	10	25	59
8	Tomato	16	27	41
Mean		26	37	31

b) Change in crop area

The mean cultivated area/household of supported crops enhanced by 33% with highest increase observed in country bean (67%) followed by mustard (66%), sweet gourd (48%), potato (47%) and tomato (31%). The present and earlier (before project) cultivated area of major crops per household including rice (boro and T. Aman) is plotted in the following table 5.2.

Table 5.2: Changes in area of winter crops per households by project intervention

Sl #	Name of crop	Before Project	After Project	Change (%)
		Area (ha) cultivated/hh	Area (ha) cultivated/hh	
1	Boro Rice	0.69	0.78	12
2	T. Aman rice	0.50	0.59	15
3	Mustard	0.06	0.19	66
4	Wheat	0.10	0.17	42
5	Potato	0.09	0.17	47
6	Sweet gourd	0.06	0.12	48
7	Country bean	0.03	0.10	67
8	Tomato	0.12	0.18	31
Mean		0.17	0.23	33

c) Changes in crop yield

The past and present yield levels of major/popular crops per ha as reported by respondents are plotted in the following table 5.3. Irrespective of crops, the yield/ha has significantly been

increased that ranged from 36-84% with highest in mustard (84%) and lowest in boro rice (36%). The yield increase contributed mainly by variety, water and fertilizer management.

Table 5.3: Changes in yield of winter crops by project intervention

Sl #	Name of crop	Before Project	After Project	Change (%)
		Yield (t/ha)	Yield (t/ha)	
1	Boro Rice	3.16	4.91	36
2	T. Aman rice	2.05	3.29	38
3	Mustard	0.20	1.30	84
4	Wheat	0.86	2.27	62
5	Potato	5.21	13.26	61
6	Sweet gourd	28.21	46.96	40
7	Country bean	9.04	20.08	55
8	Tomato	22.59	48.18	53
Mean		7.13	14.03	43

d) Changes in fertilize use in crops

Appreciable changes have been appeared in use of fertilizers especially urea, TSP and MP per unit area in all the crops under study. As observed highest fertilizer dose is currently being used in tomato followed by potato, and country bean. These crops are being cultivated as commercial ones. This increased input use contributed in increasing yield per unit area of all crops. Detailed of changes and amount used by crops is shown in the following table 5.4.

Table 5.4: Changes in fertilizer use in winter crops in the project area

Sl #	Name of crop	Before Project			After Project			Change (%)		
		Fertilizer used (Kg/ha)			Fertilizer used (Kg/ha)					
		Urea	TSP	MP	Urea	TSP	MP	Urea	TSP	MP
1	Boro Rice	83	22	14	141	64	41	41	66	66
2	T. Aman rice	53	9	3	81	33	16	35	73	80
3	Mustard	21	7	1	118	94	33	82	93	97
4	Wheat	45	4	1	116	98	41	61	96	97
5	Potato	54	48	20	152	203	89	65	76	77
6	Sweet gourd	29	4	3	104	49	31	72	93	90
7	Country bean	35	28	14	137	155	65	74	82	78
8	Tomato	91	69	39	249	247	130	64	72	70
Mean		51	24	12	137	118	56	63	80	78

e) Changes in variety grown by crops

Use of modern variety is another most important factor that contributed in production of crops per unit area. It is noticeable that 100% respondents are currently using modern varieties for boro rice and tomato against 53% and 21% respectively were using in before project situation. More than 80% producers are using modern varieties in case of mustard, potato, wheat, T. Aman and country bean. On the other hand only 6% said they were using modern varieties in T.

Aman, 22% in country bean, 7% in both wheat & sweet gourd before project implementation. None of the farmer was used modern variety in mustard earlier but presently 85% of them using modern variety (Table 5.5). Remarkable changes have undoubtedly been achieved in using modern varieties of crops by the CO members. As informed 21% tomato producers are using hybrid too.

Table 5.5: Changes in variety grown in winter crops by project intervention

Sl #	Name of crop	Before Project	After Project	Change (%)
		% hh used modern variety	% hh used modern variety	
1	Boro Rice	53	100	47
2	T. Aman rice	6	80	93
3	Mustard	00	85	100
4	Wheat	7	93	92
5	Potato	21	75	73
6	Sweet gourd	7	63	88
7	Country bean	22	81	73
8	Tomato*	21	100	79
Mean		14	68	65

*In tomato 21% respondents said they used hybrid seed

5.1.2 Livestock Agriculture

a) Ownership of livestock by Household

During the survey it is observed that more numbers of households owned livestock at present than earlier. Presently 94% of them have cattle, 37% goat, 27% sheep and 51% rearing duck against 79%, 19%, 13% and 28% respectively had the same resources earlier that resulted 17%, 48%, 53% and 45% increased respectively per households over the past such resources (Table 5.6). The result indicates improvement in livelihoods of rural people due to project intervention.

Table 5.6: Changes in percent households owned animals in project area

Sl #	Name of animal	Before Project	After Project	Change (%)
		Percent hh owned animal	Percent hh owned animal	
1	Cattle	79	94	17
2	Goat	19	37	48
3	Sheep	13	27	53
4	Duck	28	51	45

b) Changes in number of animal per hh

By counting numbers of livestock resources per household at present and when it compared with earlier situation positive increase has also been noticed for cattle (7%), goat (30%), sheep

(17%) and duck (74%). Considering numbers of livestock/households greater increase occurred in duck as many of the households (11%) started duck farming with 200-400 number per farm. The survey revealed that presently average numbers of cattle per hh is 4, goat 3, sheep 4 and duck 42 (due to increased numbers of farm). The following table 5.7 elaborated the results.

Table 5.7: Changes in number of animal/hh in project area

Sl #	Name of animal	Before Project	After Project	Change (%)
		# Animal/hh	# Animal/hh	
1	Cattle	3.94	4.25	7
2	Goat	1.83	2.61	30
3	Sheep	3.50	4.24	17
4	Duck	10.71	41.89	74

c) Breed Improvement

As informed by respondent earlier only 1% households had improved breed of cattle that changed to 29% at present due to advocacy and improving facilitation of AI center by project and possibly other stakeholders. No breed improvement identified in case of sheep while 5% hh accepted rearing of improved breed in duck than 3% earlier.

Table 5.8: Changes in improved breed of animal/hh in project area

Sl #	Name of animal	Before Project	After Project	Change (%)
		% hh rearing improved breed	% hh rearing improved breed	
1	Cattle	1	29	96
2	Goat	0	2	100
3	Sheep	0	0	0
4	Duck	3	5	39

d) Changes in Animal Health

Excellent result is observed in improving animal health. The project started health improvement program (vaccination and de-worming campaign) of large animals from the very beginning in 2003-04 that assisted to achieving 98% vaccination/de-worming for cattle, 83% in goat, 74% in sheep and 83% in duck at preset. As informed vaccination and de-worming was practiced earlier too but in a limited scale that changed to much scale due to massive vaccination campaigns during last couple of years by CBRMP. Detailed shown in table 5.9.

Table 5.9: Changes in animal health by project intervention

Sl #	Name of animal	Before Project		After Project		Change (%)	
		% Animal vaccinated	% Animal De-wormed	% Animal vaccinated	% Animal De-wormed	Vaccinated	De-wormed
1	Cattle	32	27	98	98	67	72
2	Goat	4	4	83	83	95	95
3	Sheep	13	6	74	74	83	92
4	Duck	40	11	83	83	52	86

e) Animal Mortality

Animal mortality is directly related with the health management, so it reduced to 3% (by count of total numbers of animal (506) in 126 farm families) from 6% and 8% from 14% in case of duck. Table 5.10 below detailed out the results.

Table 5.10: Changes in mortality of animal by household

Sl #	Name of animal	Before Project	After Project	Change (%)
		Mortality by %	Mortality by %	
1	Cattle	5.8	3.0	(97)
2	Goat	6.8	5.8	(17)
3	Sheep	5.4	0.7	(671)
4	Duck	13.6	8.3	(64)

f) Changes in Household Income from Livestock

As the numbers of livestock resources increased per household after project situation, the income from selling the resources also found increased by 37% for cattle, 38% for goat, 69% for sheep and 47% for duck. Due to selling household livestock including duck/chicken the average income/hh increased by 42%. One average each of the family earned Tk 42785/- from livestock in 2012-13.

Table 5.11: Changes in household income from livestock

Sl #	Name of animal	Before Project	After Project	Change (%)
		Annual income/hh (Tk)	Annual income/hh (Tk)	
1	Cattle	18389	29170	37
2	Goat	2300	3684	38
3	Sheep	1691	5474	69
4	Duck	2362	4458	47
Total		24741	42785	42

5.1.3 Family Income

The survey measured gross family income of 126 households in 2012-13 who are CO (credit organization) members of the project by asking income from different sources (mentioned in the table below). The gross income of agriculture in 2012-13 was confirmed by asking the sale value of different crop products and livestock resources. Collecting family income specially earlier years like 2011-12 and 2010-11 was not easy for all respondents, so in many cases estimated by asking amount sell and market price of commodities. So gross income per family plotted in the tables will have to be considered as close to the correct in lenient view.

a) Family Income by sources

The average family income per year of the CO members of the project is plotted in the following table 5.12 by major sources. The annual income of households as observed in January 2014 is Tk 1,68,000/- of which major contribution made by crop production (51%) followed by livestock (25%) and small trades (14%). The households reported slight income from services (2%), labor wage (2%) and others (5%). The other source mainly reported as remittance.

Table 5.12: Gross family income of respondents by sources in 2012-13 in Sunamgonj

Sl #	Item	Gross family income (Tk)	
		2012-13	Contribution by item (%)
1	Crop production	85942	51
2	Livestock	42785	26
3	Small trades	22875	14
4	Service	3631	2
5	Labor wage	3976	2
6	Others	8787	5
Total		167996	100

b) Family Income by crops

The following table showed the breakdown of family income from crop agriculture by types of crops grown and harvested. As informed by the respondent still major gross income is contributing by boro rice (37%) followed by tomato (18%), T. Aman (15%) and potato (14%). Other crops like wheat, mustard, sweet gourd etc. have insignificant contribution (table 5.13).

Table 5.13: Gross Family income of respondents by crops in 2012-13 in Sunamgonj

Sl #	Item	Gross family income (Tk)	
		2012-13	Contribution by item (%)
1	Boro Rice	31698	37
2	T. Aman rice	13021	15
3	Mustard	2960	3
4	Wheat	2427	3
5	Potato	12339	14
6	Sweet gourd	2764	3
7	Country bean	5194	6
8	Tomato	15540	18
Total		85942	100

c) Comparison of family income

A comparison of family income of 2010-11 to 2012-13 of the CO members under the project is shown in following table 5.14 Present (January 2014) family income of households (CO members) in the project area increased by 45% against fiscal year 2010-11 and 28% against the fiscal year 2011-12.

Table 5.14: Changes in family income by project intervention

Sl #	Item	Gross family income (Tk)			Change (%) from 2011-12	Change (%) from 2010-11
		2012-13	2011-12	2010-11		
1	Agriculture	128727	91622	73250	29	43
3	Small trades	22875	18187	11578	20	49
4	Service	3631	2075	1004	43	72
5	Labor wage	3976	3306	2762	17	31
6	Others	8787	6132	3568	30	59
Total		168996	121322	92162	28	45

5.2 Impact of Submergible Dam

A short survey was conducted with 27 farmers in 3 sites (9 at each location) to assess the improvement in area and production of winter crops especially vegetables due to construction/installation of submergible dams in Mugai canal at KrisnaNagar & Berigaon and at Kamarvita site of Sadar Upazila. A designed format was used to collect the information from the field. The format is attached as **Annex VII**. The farmers were first asked about their current seasoned (Rabi 2013-14) crop area, production and requested to recall the corresponding area, production of those crops during before dam installation. The results are summarized in the following tables.

5.2.1 Changes in Crop Area

The popularly grown crops in Rabi/Winter season at present in study sites (catchment area of 3 submergible dams) are listed in the following table 5.15. At present the mean crop area per household is found as 0.20 ha, which was only 0.09 ha earlier i.e. increased by 50% after installation of submergible dam. The cultivated area of all the crops has been increased from earlier i.e. before dam installation by 40% - 60%. This increase is mainly caused by availability of water at Mugai canal during dry season due to re-excavation and installation of submergible dams. Many farmers informed that the plots where they are now cultivating profitable vegetable crops were either fallow or planted by T. Aman (gross income Tk 25000/ha) or black gram (mashkalai) with gross income of Tk 15000/ha. Availability of improved varieties including hybrid seeds (imported) of vegetables enhanced commercial crop production that convinced farmer to cultivate more area. Availability of land under leasing contract is another factor contributed in increasing cultivated area of vegetables. Marketing of crop product is very easy in the locality as they sold it by plot (whole seller buy plot of the crop rather individual pieces).

Table 5.15: Changes in area of winter crop per households by submergible dam

Sl #	Name of crop	Area/household after dam (ha)	Area/household before dam (ha)	Change (%)
1	Tomato	0.21	0.12	44
2	Cucumber	0.20	0.08	60
3	Country bean	0.20	0.09	56
4	Cauliflower	0.21	0.12	44
5	Potato	0.30	0.07	76
6	Bottle gourd	0.10	0.04	55
7	Brinjal	0.10	0.04	61
8	Chili	0.09	0.07	20
9	Cabbage	0.12	0.10	17
10	Mustard	0.51	0.14	72
Mean		0.20	0.09	50

5.2.2 Changes in Crop yield

Based on information gathered during the interview sessions with producers the production of crops per ha is summarized in the following table 5.16. The present yield level of crops is quite satisfactory that indicates commercial nature of the producers. The earlier yields of crops are quite low because during that time cultivation was mostly under rainfed conditions due to lack of water in the canal. After installation of dams the production of vegetables per unit area has been increased by 50 – 70% in the crops under study.

Table 5.16: Changes in production of winter crops by submergible dam

Sl #	Name of crop	Yield (t/ha) after dam	Yield (t/ha) before dam	Change (%)
1	Tomato	51.68	12.19	76
2	Cucumber	29.97	7.90	74
3	Country bean	16.47	7.41	55
4	Cauliflower	20.13	10.90	46
5	Potato	19.35	6.59	66
6	Bottle gourd	23.53	8.33	65
7	Brinjal	36.70	14.58	60
8	Chili	23.71	11.20	53
9	Cabbage	38.42	12.73	67
10	Mustard	1.32	0.66	50
Mean		26.13	9.25	61

5.2.3 Changes in Production per Household

The production of crops per households after and before dam installation is plotted in the following table 5.17. The production of vegetables per household has been increased by 70 – 90% by installing dams in the canals. The mean crop production per household was only 0.76 ton before dam while it increased to 4.33 t/household in current rabi season of 2013-14 due to construction of submergible dam. Remarkable increase per household has been noticed in production of tomato, cauliflower, potato and mustard.

Table 5.17: Changes in production of winter crops/household by submergible dam

Sl #	Name of crop	Production (t/ha)/household after dam	Production (t/ha)/household before dam	Change (%)
1	Tomato	10.48	1.12	89
2	Cucumber	6.16	0.81	87
3	Country bean	3.06	0.65	79
4	Cauliflower	4.43	1.04	76
5	Potato	5.55	0.64	88
6	Bottle gourd	2.43	0.54	78
7	Brinjal	3.75	0.81	79
8	Chili	2.16	0.65	70
9	Cabbage	4.67	1.29	72
10	Mustard	0.65	0.09	86
Mean		4.33	0.76	80

5.2.4 Changes in Gross Income by Crop Product

The mean gross income from crop products (per ha) of the families who were interviewed are found Tk 2,62,676/- which was reported only Tk 87,947 earlier. Based on gross sale by the household, the best economic return observed from cucumber followed by chili, tomato, brinjal, bottle gourd etc. Considering the income from the crops highest increase contributed by bottle gourd (86%) followed by cucumber (73%), mustard (75%), tomato (73%) etc. (Table 5.18). Farmers of these sites are highly commercial

Table 5.18: Changes in gross income/ha by winter crops induced by submergible dam

Sl #	Name of crop	Gross sale of product (Tk/ha) after dam	Gross sale of product (Tk/ha) before dam	Change (%)
1	Tomato	423193	113045	73
2	Cucumber	431427	95918	78
3	Country bean	188401	78695	58
4	Cauliflower	286908	90502	68
5	Potato	170002	68126	60
6	Bottle gourd	207775	29640	86
7	Brinjal	210735	114056	46
8	Chili	451657	147024	67
9	Cabbage	192111	126464	34
10	Mustard	64549	15996	75
Mean		262676	87947	65

5.2.5 Changes in Irrigation Schedule by Crops

The respondents reported that no irrigation was applied to mustard, cucumber and brinjal earlier (before dam) while 2 to 6 irrigations are being applied at present to these crops due to availability of enough water in the canal retained by submergible dam. The numbers of irrigations applied earlier in crop field ranged from 0 to 2 times during the cropping season that changed 2 to 7 times after using the dam (Table 5.19). The numbers of irrigations being applied to different crops indicate the enough supply of surface water during the dry season retained by the dam. It may be concluded that installation of dams in the canals is one of the successful intervention of the project.

Table 5.19: Changes in number of irrigation by crops due to submergible dam

Sl #	Name of crop	Number of irrigation applied after dam	Number of irrigation applied before dam	Change (%)
1	Tomato	6.6	0.4	94
2	Cucumber	2.7	0.0	100
3	Country bean	4.5	0.8	83
4	Cauliflower	3.6	2.0	44
5	Potato	1.9	0.3	83
6	Bottle gourd	4.8	0.4	92
7	Brinjal	5.7	0.0	100
8	Chili	6.4	1.8	72
9	Cabbage	4.0	0.7	83
10	Mustard	1.3	0.0	100
Mean		4.1	0.6	85

6. Sustainability

The project successfully introduced high yielding varieties like BRRI dhan 46 and 44 in T. Aman rice. Large numbers of farmers in the locality are cultivating these improved varieties and getting benefit of at least 200 kg additional paddy per 30 decimal (care) land. Similarly improved varieties in mustard (BARI Sharisha 9, 11 and 14), wheat (shatabdi), potato (diamond) etc. introduced through adaptive research trials followed by demonstrations. Yield level of all these varieties is at least 30% higher than those were cultivating by the local farmers earlier. These are not hybrid so farmers will continue growing crops by their own seeds sustainably. The installations (submergible dams, buried pipe schemes etc) made for surface irrigations are quite sustainable approach and these units are expected to be in service for 20-30 years. Road side plantation, beel plantation, fruit garden plantation, jujube (kul) budding, development of nursery men/women, creation/development of paravets/vaccinators, AI centers, etc. all these interventions are permanent in nature. To some extend the project activities has changed the attitude of farmers to be commercial ones rather than subsistence cultivators by providing massive technical training, crop demonstrations and introduction of new crop varieties through adaptive trials. By inviting national research institutions (BRRI, BAR, BLRI) to be a part of designing the research trials the project indirectly helps to create interest of those scientists to haor agriculture and expectedly they will continue to work in the area by using national resources.

7. Innovation

In upper haor areas growing mustard/potato before planting boro rice is one of best innovation for the component as it accommodated one additional low cost crop in between Aman and boro rice in some areas (Jamalgonj) of the project. Growing sweet gourd using high yielding varieties by leased in fallow land of haor during rabi season with minimum watering is another good commercial cultivation, the project assisted to make it popular. As a whole through extensive pilot production program with numbers of crops including rice and other crops (mustard, wheat, potato and numbers vegetables) cultivated by seed support the project has changed the attitude of many farmers to be a commercial crop producers rather than subsistence farmer, which can be considered as best innovation of the project. Breed development of livestock assisted to grow interest of many farmers to become a owner of small scale dairy farm.

8. Lesson Learned

The component suffered by dropping the senior officers from the project one upon another. During the project period at least 3 agriculture coordinators have resigned their job. Considering the country's context Sunamgonj is too remote and non-privileged area with maximum area inundated for more than 6 months of the year. To keep the project staff

continued the salary should high enough as of hill tracts and other contractual services. The IFAD Mission had not been included agriculturists in many occasions of field supervision that lacked monitoring and proper feedback upon better implementation of designed activities. Compare to BRRI the collaboration of project with BARI was rather weak and BLRI too weaker as both of the Institutes have no local research station as of BRRI at Habigonj. The possibility of growing commercialization in agriculture is high in the region as it well communicated by inland water ways with Sylhet and Bhairob. The project could not make strong linkage with the allied department of agricultural development (DAE and DLS) so the technologies promoted would face sufferings of monitoring and follow up.

9. Conclusion

The completion report is prepared by reviewing the existing documents and by collecting primary data from project beneficiaries who are basically CO members attached with the project for quite few years. The project activities summarized by reviewing the documents and impact assessment done based on current (January 2014) field data.

The project successfully completed the targeted activities of agriculture component visualized during appraisal. Nevertheless some other innovative programs like road side plantation, integrated crop production in the bills, bill plantation by hijol and koros to conserve natural heritage, introduction of modern varieties of T. Aman, plantation of fruit gardens including introduction of improved varieties of jujube through budding, breed development in cattle using improved bull, introduction of mini hatcheries (duck/chicken) as income generation of CO members etc. promoted in the project area. The project supported to extend surface water irrigation by constructing submergible dams and by installing buried pipe schemes. Good progress has been made in introducing modern varieties in different crops including T. Aman rice.

Skill development training provided to large numbers of beneficiaries in different stages, 1st at the field level on basic production techniques, in 2nd stage the selected beneficiaries brought to the upgraded technical training courses organized at Upazila level and in 3rd stage beneficiaries feed to specialized training develop them as nursery men/women or vaccinator/paravet for assisting in health management of large animals. So far 93 nurseries have been established by the beneficiaries after motivated by training and 214 vaccinators working/employed at field with average monthly income of Tk 7000/-. The project made good success in introduction of modern varieties of numbers of crops in the locality as for example 85% farmers are cultivating mustard with modern variety now whereas only few years back (before project) farmers were unaware about any improved variety of mustard. Similarly 81% households are practicing commercial cultivation of country bean with modern varieties while the situation was totally reverse earlier (before project) when only 22% cultivated improved varieties. T. Aman is

another example where farmers (CO members) are using modern varieties (80%) instead of local varieties grown earlier.

Excellent motivational works have been done by vaccination and de-worming campaigns for livestock including chicken/duck that leads to reduction of mortality of those animals from 14% to 8% only. Almost 100% cattle owners are found to vaccinate their animals. AI is also becoming popular in the areas that would lead increased milk and meat production.

The project tried to introduce short duration variety of rice in boro season but could not be succeeded as the yield of selected variety (BRRI dhan 45 and 27) was lower than BRRI dhan 29 and 28 the most popularly grown boro varieties in the area. So, potential variety of boro rice to escaping flash flood is yet to be identified for the farmers of Sunamgonj.

10. Recommendation

Continuation of project's key staff including project director and consultants is important for achieving the desired target i.e. livelihood development of beneficiaries so project formulation/ appraisal team should make staff friendly remuneration package and other facilities especially for disadvantaged locations.

An inbuilt system within project design should be made so that during the course of implementation strong collaboration between project management and line departments would be established to facilitate exit strategy that ensure sustainability of technical backup and beneficiaries livelihoods

Future agricultural development project should be designed to promote commercial agriculture instead of subsistence once for only marginal farm households; project interventions should be made in such a way that all types of households (not only CO members) including small and medium farms would have equal access to harness project benefits.

Annex I

Table: Varieties used in PVS trials in rabi (boro) and Kharif II (Aman) season 2005-06

Sl #	Cropping season 2005-06		Cropping season 2006-07	2007-08	2008-09
	Rabi	Kharif II	Rabi	Rabi	Rabi
1	BR 1	BR4	BR6723-18-3-6-HR38	Baby trial on rice: Distributed 2 kg seeds of selected variety 45 and 27 to the farmers for observation	Determination of field duration of BRRI Dhan 29 with varying seedling age in Sunamgonj haor
2	BR 3	BR10	BR6894-17-2-1		
3	BR 6	BR11	BR6894-30-2-2		
4	BR 8	BR22	BR6894-63-2-4		
5	BR 9	BR23	BR6898-166-20-7		
6	BR 14	BR25	BR5399-25-1-1-2		Comparison of three short duration boro varieties (27, 28 & 45) in Sunamgonj haor
7	BR 16	BRRI dhan30	BR6895-70-4		
8	BR 17	BRRI dhan31	IR73689-19-1		
9	BR 18	BRRI dhan32	BR6723-1-1-2		
10	BR 19	BRRI dhan33	BR6342-69-5-3		Yield performance of BRRI Dhan 45 using seedling from varying seeding rate/density
11	BR 26	BRRI dhan39	BR7011-89-3-7		
12	BRRI dhan 27	BRRI dhan40	BR7010-54-2-2		
13	BRRI dhan 28	BRRI dhan41	BR6839-41-5-1		
14	BRRI dhan 29	BRRI dhan44	BR7226-19-1-3		Validation of fertilizer recommendation in popular boro rice variety
15	BRRI dhan 35	BR5226	BR7226-35-2-1		
16	BRRI dhan 36		BR7226-52-1-1		
17	BRRI dhan 45		BR7008-61-1-5		
18	BR 48-54=4-1-4-9		BR7010-30-1-3		
19	Local Check		BRRI dhan28		
20			BRRI dhan29		

Annex II

Table: Adaptive research trials set in other than rice crop in Sunamgonj in 2005-06

Sl #	Rabi trials 2005-06	Kharif I trials 2005-06
1	**Mustard** variety trial in upland of haor areas	On-Farm Trials on Stem Amaranth (Variety: Laboni, Katoa & Local)
2	Variety trials of **wheat** with tillage in raised bed haor land	On-Farm Trial of Indian Spinach (Variety: Chitra, Madhuri & Manisha)
3	Variety trial of **maize** both hybrid and composite upper haor-fallow land	On-Farm Trial of lady's finger/Okra (Variety: BARI Derosh-I & Local (hybrid)
4	Variety trials of HYV **potato** (introduction of modern variety) in river sides	On-Farm Trial of Panikachu (Variety: Latiraj & Local)
5	**Sweet gourd** variety trials with and without intercropping of popular crops	On-Farm Trial of Mungbean (Variety: BARI Mung-3, BM-4, BM-5)
6	Production of **onion** under irrigated and non-irrigated environment	On-Farm Trial of Turmeric (Variety: Dimla, Sinduri, & Local)
7	Planting of **chickpea** with minimum and regular tillage practice in kanda or upper haor region	On-Farm Trial of ginger (Variety: BARI ada I, & Local)
8	Establishment of **sesame** with minimum and regular tillage in T. aman land	On-Farm Trial of Brinjal (Variety: BARI Begun-8 & Singnath)
9	Establishment of **linseed** with minimum and regular tillage in raised bed-fallow land	On-farm trial of red amaranth (variety: Altapati and local)
10	Planting of **lentil** with minimum and regular tillage practice in kanda or upper haor region	On farm trial of Kangkong
11	Planting of **grass pea** after harvest of aman rice under relay/minimum tillage	
12	Planting of **mungbean** upper haor fallow/aman land with minimum and regular tillage practice	

Annex II Contd-----

Table: Adaptive research trials set in other than rice crop in Sunamgonj in 2006-07

Sl #	**Rabi trials 2006-07**	**Kharif I trials 2006-07**	**Rabi trials 2007-08**
1	Variety trial of **mustard** in rainfed/irrigated condition	On-Farm Trials on Stem Amaranth (Variety: Laboni, Katoa & Local)	Performance of mustard varieties in Sunamgong haor area
2	Variety trial of **wheat** in rainfed/irrigated condition	On-Farm Trials on Stem Amaranth (Variety: Laboni, Katoa & Local)	Performance of wheat varieties in Sunamgong haor area
3	Variety trial of **sweet gourd** in rainfed/irrigated condition	On-Farm Trial of Brinjal (Variety: BARI Begun-8 & Singnath)	Performance of potato varieties in Sunamgong haor area
4	Variety trial of **potato** in rainfed/irrigated condition	Planting geometry in **lady's finger** [a) close planting:3-4 inches: plant to plant b) normal planting]	Evaluation of different planting methods of onion
5	Production of **onion** under irrigated and non-irrigated environment	On-Farm Trial of Panikachu (Variety: Latiraj & Local)	Performance of BARI released garlic varieties
6	Planting methods in **onion** [a) direct seeding broadcast b) direct seeding in lines and c) transplanting in line: traditional]; variety grown in Biswambarpur during current season is to be used	On-Farm Trial of Mungbean (Variety: BARI Mung-2, BM-5, BM-6)	Varietal performance of chickpea
7	Blackgram planting after rice – BARI Mash – 1 and 2	On-Farm Trial of Turmeric (Variety: Dimla, Sinduri, BARI Halud – 3 & Local)	**Kharif I trial 2007-08**
8	Variety trial of **mungbean** (BARI – 5 & 6) in/late kharif II/early rabi season: immediately after water recede from high land: September planting is suggested	On-farm trial of red amaranth (variety: Altapati and local)	Production program of Mungbean in Kharif I season
9	Variety trial of **chickpea** (BARI Chola – 2 ; 3 & 5) in medium highland after harvest of T. aman	On farm trial of Kangkong	Production program of sesame in Kharif I season
10	Observational trial of **sesame** (BARI sesame – 3 & T – 6) after harvest of T. aman		

Annex III

Table: Pilot production program of T. Aman in 2008-09

Sl #	T. Aman (Variety)	Seed distribution (Kg)
1	BRRI dhan 33	100
2	BRRI dhan 44	200
3	BRRI dhan 46	200
Total		500

Table: Pilot production program of winter crops in 2008-09

Sl #	Crop	# Farmer	Area (ac)
1	Mustard	214	156
2	Wheat	100	34
3	Potato	43	11
4	Sweetgourd	124	23
5	Sesame	15	11
6	Vegetables	24	19
Total		520	218

Table: Pilot production program of T. Aman in 2009-10

Sl #	T. Aman (variety)	Area coverage (ac)	Yield (t/ha)
1	BRRI dhan 33	5.2	3.67
2	BRRI dhan 44	5.9	4.4
2	BRRI dhan 46	5.2	4.06
Total		16.3	3.84

Table: Pilot production program of winter crops in 2009-10

	Crop	# Farmer	Area coverage (ac)	Yield (t/ha)
1	Potato	245	14	
2	Mustard	42	242	1.19
3	Wheat	0	16	2.42
4	Mug bean/Black gram	66	13	1.09
5	Sweet gourd		52	13.5
6	Country bean		52	15.68
Total		353	337	

Table: Pilot production program of T. Aman in 2010-11

Sl #	T. Aman (Variety)	Area coverage (ac)	# Cultivator	Mean yield (t/ha)
1	BRRI dhan-33	2.94	13	3.85
2	BRRI dhan-44	43.23	109	4.51
3	BRRI dhan-46	40.34	172	4.31
4	BRRI dhan-49	3.91	8	5.14
Total		90.42	312	4.49

Table: Pilot production program of winter crops in 2010-11

Sl #	Crop	Area coverage (ac)	Yield (t/ha)
1	Potato	65	
2	Mustard	557	1.22
3	Wheat	115	1.85
4	Mug bean/Black gram	45	1.2
5	Sweet gourd	123	10.39
Total		840	

Table: Pilot production program of T. Aman in 2011-12

Sl #	Name of varieties	Area coverage (ac)	Yield (t/ha)
1	BRRI dhan 44	24.88	4.89
2	BRRI dhan 46	13.91	4.48
3	BRRI dhan 49	19.44	4.72
4	BRRI dhan 33	1.98	4.1
5	BINA 7	4	4.08
Total/Mean		64.21	4.45

Table: Pilot production program of winter crops in 2011-12

Sl #	Crop	Area coverage (ac)	Yield (t/ha)
1	Mustard	94.1	1.48
2	Sweet gourd	60.45	13.6
3	Wheat	43.4	2.1
4	Black gram	20.3	0.89
5	Country bean	11	14.31
6	Others	66.7	
Total		428.45	

Table: Pilot production program of winter crops in 2012-13

Sl #	Crop	Area coverage (ac)	Farmer coverage (#)
1	Mustard	35	50
2	Country bean	12	14
3	Sweet gourd	48	40
4	Wheat	38	48
5	Potato	20	19
6	Tomato	21	25
7	linseed	6	5
Total		180	211

Table: Pilot production program of summer vegetables in 2012-13

Sl #	Supported Crop	Area coverage (ac)
1	Ribbed Gourd	5
2	White Gourd	4
3	Snake Gourd	6
4	Bitter Gourd	5
5	Okra	4
6	Bottle Gourd	8
7	Aroid	0
8	Floating garden (#)	5
Total		37

Annex IV

Table: Number of Demonstration sets during the project period

Sl #	Demonstration	Demonstration set in different project year											
		2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total
1	Agriculture		84	440	47	390	369	520	632	260	397	9	3148
2	Livestock		138	460	823	412	403	415	633	270	143	55	3752
3	Food processing		0	85	529	120	195	228	121	0	0	0	1278
4	Total		222	985	1399	922	967	1163	1386	530	540	64	8178
	Field day												
1	Agriculture		10	40	52	80	133	150	155	44	43	0	707
2	Livestock		5	20	25	56	100	130	139	22	47	0	544
3	Food processing		0	18	25	30	58	75	30	0	0	0	236
Total			15	78	102	166	291	355	324	66	90	0	1487

Annex V

Table: Beneficiary Training conducted under Agriculture and livestock development in the Project

Sl #	Training courses	Duration (days)	2003-04		2004-05		2005-06		2006-07		2007-08	
			Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1	Technology/refresher	1			61	4	14	12	17	4		
2	Technical training (field)	1	195	370	614	1323	1673	2098	521	816	3456	9243
3	Technical training (center)	1	9	42	60	180	172	383	203	550	419	975
4	Activist training	12	24	19	39	13	31	16			18	12
5	Vaccinator (refresher)	3			1	18						
6	External course	6	10	6	50	3	54	4				
7	Swamp tree nursery	3		87		223		225	9	111		
Total			238	524	825	1764	1944	2738	750	1481	3893	10230

Table: Beneficiary Training conducted under Agriculture and livestock development in the Project

Sl #	Training courses	Duration (days)	2008-09		2009-10		2010-11		2011-12		2012-13		Cumulative		Total
			Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
1	Technology/refresher	1											92	20	112
2	Technical training (field)	1	2289	11993	2104	9849	1225	7543	308	807	2245	4122	14630	48164	62794
3	Technical training (center)	1	575	1250	368	962	216	983	255	512	240	100	2517	5937	8454
4	Activist training	12	9	10	14	9							135	79	214
5	Vaccinator (refresher)	3	17	51	36	11	34	11	24	7	18	6	130	104	234
6	External course	6											114	13	127
7	Swamp tree nursery	3											9	646	655
Total			2890	13304	2522	10831	1475	8537	587	1326	2503	4228	17627	54963	72590

Annex VI

Impact Survey

Community Based Resource Management Project (CBRMP)

Name of respondent _____ Village _____

Upazila _____

1. Crop Production

Name of crop	Current year (2012-13)							5 years back						
	Area cultivated (care)	Yield (md/care)	Name of Variety grown	Fertilizer used (kg/care in 30 dec)			# Irrigation applied	Area cultivated (care)	Yield (md/care)	Name of Variety grown	Fertilizer used (kg/care in 30 dec)			# Irrigation applied
				Urea	TSP	MP					Urea	TSP	MP	
Boro Rice														
T. Aman rice														
Mustard														
Wheat														
Potato														
Sweet gourd (Tk)														
Country bean (Tk)														
Tomato (Tk)														

2. Livestock Production

Name of animal	Current year (2012-13)							5 years back						
	Number/ family	# Improved breed	Vaccinated or not	De-wormed or not	Cost/ yr (Tk)	Income/ year (Tk)	Mortality/ year (#)	Number/ family	# Improved breed	Vaccinated or not	De-wormed or not	Cost/ yr (Tk)	Income/ year (Tk)	Mortality/ year (#)
Cattle														
Goat														
Sheep														
Duck														

5. Family Income **Annex VI Contd---**

Crop Product	Current Yr (2012-13)					Item	Current year (2012-13 in Tk)	Last year (2011-12 in Tk)	Other year (2010-11 in Tk)
	Total Prodn (md)	Consume (%)	Sale (%)	Sale vale (Tk)					
Boro Rice						Agriculture (Crop, livestock, fishery)			
T. Aman rice						Small trades			
Mustard						Service			
Wheat						Labor wage			
Potato						Others (Remittance etc)			
Sweet gourd (Tk)									
Country bean (Tk)									
Tomato (Tk)									

Name of Enumerator _____ Date_____

Annex VII

Impact Survey

Community Based Resource Management Project (CBRMP)

Name of respondent _____ Village _____ Upazila _____

3. Surface irrigation (Submergible dam)

Name of vegetable	Current year (2012-13)							5 years back						
	Area cultivated (dec)	Sale/care (Tk)	Name of Variety grown	Fertilizer used (kg/care in 30 dec)			# Irrigation applied	Area cultivated (dec)	Sale/ care (Tk)	Name of Variety grown	Fertilizer used (kg/care in 30 dec)			# Irrigation applied
				Urea	TSP	MP					Urea	TSP	MP	
Tomato														
Cabbage														
Cauliflower														
Brinjal														
Chili														

4. Surface Irrigation (Buried pipe)

Indicator	Current year (2012-13)							Current year (2011-12)						
	Area cultivated (dec)	Yield/care (md)	Name of Variety grown	Fertilizer used (kg/care in 30 dec)			# Irrigation applied	Area cultivated (dec)	Yield /care (md)	Name of Variety grown	Fertilizer used (kg/care in 30 dec)			# Irrigation applied
				Urea	TSP	MP					Urea	TSP	MP	
Boro rice														
Indicator			2010-11	2011-12	2012-13	2013-14								
Command area (care)														
Water rent/season (Tk)/care														

5. Family Income Annex VII Contd----

Crop Product	Current Yr (2012-13)					Item	Current year (2012-13 in Tk)	Last year (2011-12 in Tk)	Other year (2010-11 in Tk)
	Total Prodn (md)	Consume (%)	Sale (%)	Sale vale (Tk)					
Boro Rice						Agriculture (Crop, livestock, fishery)			
T. Aman rice						Small trades			
Mustard						Service			
Wheat						Labor wage			
Potato						Others (Remittance etc)			
Sweet gourd (Tk)									
Country bean (Tk)									
Tomato (Tk)									

Name of Enumerator _____ Date: _____