Demo Plot Establishment

After receiving the training, the beneficiaries also needed the first hand evidence of the benefits that can be achieved from the sack gardening technique. With this thought in mind, initial input support was provided to all 500 beneficiaries for establishing 15 sacks for gardening.

For the total 500 project beneficiaries demo plots were established for two seasons, Kharif - 2 (July to November) and Rabi (November to March). For the first season (Kharif 2), each household was given 15 sacks each with a total of 7,500 sacks, 15 ton vermi-compost, 1.875 ton oil cake, 375 kg Urea, 375 kg TSP, 187 kg MOP, 375 kg flour, 375 kg molasses, 90 ft. PVC pipe and various seeds distributed in total among the 500 households in the month of July.

All the materials were distributed to the WMG as per the selected groups maintaining a master roll. In the distribution ceremony the union chairman and agriculture officer were invited. All 500 project beneficiaries prepared the sacks in their respective nearby household land, especially at the edge of the pond or on the road side or backyards while maintaining the guideline for the appropriate procedures for sack gardening. The list of seeds that has being distributed under the project are as follows, bean, bottle gourd, sweet gourd, bitter gourd, ridge gourd, ladies finger, water melon, sponge gourd and cucumber. Each household focused on cultivating around three crops with their 15 sacks. All the beneficiaries had setup trellis in their demo plot as well to help with the climbing plants to grow.

During the heavy rainfall they covered the sacks with the debris branch to protect from over watering. However, during high temperature and sunny days, the farmers watered their sack sufficiently to protect the plants from shrivelling or drying out.

Almost all the plants of sack were seen bearing fruits, with maximum beneficiaries consuming vegetables with their family member. Some of them were also seen selling their excess production to the nearby market. Mostly bottle gourd, sweet gourd, cucumber and bitter gourd have seen a bumper production with households selling their excess production after their personal consumption for the season of Kharif - 2.

For the Rabi season seed and materials for five sack were distributed in the 500 BHGs. Musk melon, Rock melon, water melon, Bombay chilli and Brinjal seedlings were given to them during November 15 – 17, 2019. Further materials were also given including, 250 gm of urea, 250 gm of TSP, 125 gm of MOP, 250 gm of flour and 250 gm of molasses.

It is usually promoted to focus on 3–4 types of vegetables for the production. In the first cycle, nine types of seeds were distributed among the farmers among which they were prompted to choose three to four types of vegetables to plant in the sacks. The farmers mainly chose bottle gourd, sweet gourd, cucumber and bitter gourd. For the second cycle, partial support was provided through the project. In terms of seeds, as melons have high demand in the project areas, they were provided along with brinjal and Bombay chilli. However, it was seen that in general the farmers, due to the exceptionally dry and cold season this time, watering was a challenge as water dried rapidly. Thus the households mainly focused on producing Bombay chilli, beans and bottle gourd which they found required less attention than the melons for the winter season.
Considerable replication and upgradation of the sack gardening technique has been observed during the project period. In Musollabad, there has been cases of household who are not part of the project beneficiary households, adopting the technique in their households at their own cost after seeing the benefits of the sack gardening.

Moreover, for the project beneficiaries, initially only 15 sacks per household was given for initiating the sack farming technology. Now we have seen a number of our beneficiary households increasing their sack number to 30 at their own costs and selling their excess produces in the market. Farmers have also planted vegetables using their own seeds which they thought would be beneficial for them. We have seen cases of many farmers planting Bombay Chilli in addition to their sacks as they fetch high market price.

We have also seen cases of innovative forms of keeping the sack in shade, putting leaves on top, burying a certain portion of the sack in the soil in this dry season, so that plants do not dry out quickly. All these cases show ownership of the technology by the farmers and adapting to their benefits.

![Figure 4: Sack gardening demonstration at farmer's households](image-url)
Dissemination of agro-met advisory

The project has incorporated ICT enabled agro-meteorological advisory services, where the farmers get the advanced information as climate smart agriculture (CSA) that sustainably increases productivity, enhances resilience and adaptation ensuring proper data localization and interpretation process. This enhances existing knowledge on sack farming practices as a sustaining extension of optimizing farm yard/homestead gardening.

Weather advisories were disseminated throughout the last six months of the project through established voice text channel to the 500 beneficiaries’ mobile phones as per requirement. The messages mainly focused on informing the farmers about the weather condition, method for sack preparation, as well as necessary preparation to take for their crops during high rainfall prediction or dry season prediction. During the cyclone Fanit that came in early November, the necessary government precautionary messages were also disseminated. All the messages ended with linking the farmers to the Krishi Call Centre (16123) for further information if required. This created a complete linkage of information dissemination as the farmers had a channel to ask further questions if required.

One of the challenges initially seen was that not all the calls were received by all the beneficiaries. However, when cross-checked in the field it was seen that most of the farmers knew about the disseminated message. It was mainly attributed to the fact of verbally disseminating the message among nearby households, even those who did not receive the call. All beneficiaries acknowledged that they benefited from the advisories received through the voice call and also have made calls to the Krishi Call Centre (KCC) for further required information.

Market Linkage

Linkage was made between the project beneficiaries and polders farmers with the input & output market actors, LSP – Local Service Providers and local private company representatives ensuring the availability of quality input materials and buy-back their harvest at a reasonable price.

Forty group meetings were arranged in the field for market group formation. Taking three members from each group 20 marketing groups were formed with two main groups for linkage with the whole seller and input companies. These 3-member marketing committees from each of the initial farmer groups were responsible for organizing collective selling/buying and initial point of communication with the retailers for their respective groups when appropriate.

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*Figure 5: Sellers coming to the household level to buy vegetables produced through sack gardening technique*
These three members from 20 groups (total 60 members) formed another 02 larger groups, who were overall responsible for maintaining liaison and bargaining prices with the whole seller and input companies.

A farmer’s database was also developed assessing which groups would benefit the most from linkage: with the markets as many of the groups are already based near the markets and already have strong linkage. It was found that 410 farmers out of the 500 beneficiaries would benefit most from additional market linkage.

**Video show**

A total of four video show programs was arranged in the community on sack farming and technology transfer. To further increase the participation of these dissemination sessions, all the programs were shown after announcing in the community by microphone. By taking this decision to inform the community beforehand a lot of community people participated in those video show. In these programs Sack preparation, valuable crop selection, water management, hand pollination, harvesting technology, etc. were shown and discussed. A lot of further queries and interest has been received on the sack gardening and agro-meteorological advisories from the community.

![Figure 6: Video documentary on how to prepare sack for gardening](image)

**Learning sharing workshop**

At the end of the project period a learning sharing workshop was organized with the participation of project beneficiaries at Balitoli Union Parishad under Kalapara Upozila of Patuakhali District. Sub Assistant Agriculture Officer, Upazila Chairman along with other key resources were present in the workshop. In the workshop, the successful beneficiaries shared their experience on how they achieved success through cultivating vegetables through Sack technology. The DAE officials acknowledged the importance of such technology in climate vulnerable areas.
3.2 RESULTS ACHIEVED

An endline survey was conducted to analyse the overall outcome of the project.

3.2.1 Demographic information of households

The results of this endline evaluation are the summary of data collected from households. This segment mainly deals with various socio-economic characteristics of the respondents, i.e. gender distribution, age distribution, educational status, occupation, family income and expenses, etc.

**Sex distribution**

The endline survey was conducted among 121 respondents at the household level. Chart 1 embodies the gender identity of the surveyed respondents. The survey identified that 95% of the household respondents who were involved in sack farming were female, and the remaining 5% are male. Usually, in this project implementing area, female members are more engaged in homestead farming than males.

**Educational status**

Education is just as important because education gives people the knowledge and skills they need. Table 2 represents the educational status of the HH respondents. From Table 2, it is clear that the majority of the respondents (54.5%) completed primary education level. Around 31% of the respondents were found illiterate and only 14.9% of the individuals were educated up to Secondary School Certificate (SSC) level. Unfortunately, the study team did not find any respondents who were educated up to Higher Secondary Certificate (HSC) level or higher.

### Table 2: Educational status of the HH respondents

<table>
<thead>
<tr>
<th>Educational status of the HH respondent (%)</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>37</td>
<td>30.6</td>
<td></td>
</tr>
<tr>
<td>Up to Primary</td>
<td>66</td>
<td>54.5</td>
<td></td>
</tr>
<tr>
<td>Up to SSC</td>
<td>18</td>
<td>14.9</td>
<td></td>
</tr>
<tr>
<td>Up to HSC</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Higher Degree</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
Occupation of the respondents

Chart 2 represents the occupational status of the respondents at HH level in the project implementing area. From the figure it is evident that most of the surveyed respondents in the HH level were housewives occupying around 70%. About 26% of the respondents were involved in different types of agricultural works and about 3% of the respondents were involved in the business profession. The rest of the respondents (only 1%) dealt with the fishing sector.

Fishermen 1%
Businessmen 3%
Agriculture 26%
Housewife 70%

Chart 2: Educational status of the HH respondents

Family income and expenditure

The monthly family income and expenditure of the HHs is represented in Table 3. In endline study, the average monthly income of the HHs was around 17,100 BDT, and the average expenditure of the HHs was around 11,200 BDT. The respondents who were reported housewife, the monthly income and expenditure of the HHs were around 14,400 BDT and 10,700 BDT, respectively. The respondents who were reported that they were engaged in agriculture profession, the monthly income and expenditure of these HHs were around 25,000 BDT and 12,100 BDT, respectively. The respondents who were reported that they were engaged in fish related profession, the monthly income and expenditure of these HHs were around 30,000 BDT and 20,000 BDT, respectively. The respondents who were reported that they were engaged in business, the monthly income and expenditure of these HHs were around 11,300 BDT and 9,500 BDT, respectively. Therefore, it could be concluded that the monthly income and expenditure is higher in households who were engaged in fishing sector and the result is as expected as the selected area is a coastal area of Bangladesh.

Table 3: Family income and expenditure (per month in BDT) of the respondents in according to different occupation categories.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Monthly family income (avg. in BDT)</th>
<th>Monthly family expenditure (avg. in BDT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housewife</td>
<td>14,382.35</td>
<td>10,682.35</td>
</tr>
<tr>
<td>Agriculture</td>
<td>24,870.97</td>
<td>12,064.52</td>
</tr>
<tr>
<td>Fisherman</td>
<td>30,000.00</td>
<td>20,000.00</td>
</tr>
<tr>
<td>Business</td>
<td>11,250.00</td>
<td>9,500.00</td>
</tr>
<tr>
<td>Total average</td>
<td>170,954.04</td>
<td>110,743.38</td>
</tr>
</tbody>
</table>
3.2.2 Environmental or climate vulnerability

Types of climate vulnerability

The main challenge that the project activities were addressing was building resilience towards the climate adversities faced in these areas. Chart 3 shows the main types of climate vulnerabilities that the respondents feel is the most prominent in their locations. The majority expressed salinity, cyclone and flooding as the major forms of climate disasters and vulnerabilities that they face.

![Chart 3: Different types of climate vulnerability](image)

Sources of climate related info

According to this study findings, most of the respondents usually got information about climate or disaster through mobile phone (82%), from neighbours and friends (73%), and through local disaster management committee (65%). This can be seen as a drastic increase from the baseline which were at just 18% and 10% respectively. These change can be attributed to the fact that the project had provided agro-advisory services during the last months of the project. Out of the 82% respondents receiving information through mobile phones, more than 70% had received agricultural or climate related information through mobile voice calls. All these respondents who got information through mobile phone think that this information is very useful for them.
Chart 4: Source of climate/disaster related information (Baseline vs endline)
Types of information get through mobile

Chart 5 illustrates the types of information usually respondents got through mobile phone in surveyed area. According to the result, 100% of the respondents reported that they usually receive weather or disaster related information or warning through mobile phone whereas 62% of them reported they also got post-disaster management related information. Around 95% of the respondents received agriculture related information. Moreover, 62% of the individuals reported they got livelihood related information along with information related to fish culture (31%), and livestock (12%). The information related to agriculture (Baseline vs endline: 23% vs 95%) and post disaster management (Baseline vs endline: 0% vs 62%) had noticeably increased during endline survey than that of in baseline.

Knowledge about Krishi Call Center (KCC)

It was seen that 93% of the respondents had knowledge about KCC which was nil at the baseline. According to Chart 6, there were various sources of knowledge about KCC in this area. As the respondents were the beneficiaries of the project, 99.1% of the respondents reported the they had known about KCC form the Sack Farming project. They had also known about KCC from other source along with the project.
Comparative figure of vegetable production

From Chart 7, it is clear that the amount of vegetable cultivated land outside of sack has decreased in endline (6.7 decimal) than the baseline survey (9.3 decimal) but the production of vegetables has increased in endline survey (276.5 kg per year) than baseline survey (217.2 kg per year). From the figure it is clear that people of these coastal areas are now producing more vegetables in less land utilization, i.e., they are producing more vegetable through sack gardening.

Chart 7: Comparative figure in vegetable production (Baseline vs endline)

Comparative figure on income from vegetable production

Chart 8 shows the comparative income per year (in BDT) of the HHs from vegetable production and selling. The overall income of surveyed HHs increased during endline survey to around 8,200 BDT per year (from both land and sack cultivation) from around 5,819 BDT per year (from just land cultivation) that was found in baseline survey. So, it can be concluded that sack farming is bringing economic solvency of the respondents.

Chart 8: Comparative figure on yearly income from selling vegetables
3.2.4 Promotion of Sack Farming

According to the endline survey, each of the beneficiaries started sack farming with 15 sack counts. Around 35% of the respondents reported that they had increased their sack count on vegetable production.

**Sack farming by other people out of project beneficiaries**

According to Table 5, to respondent’s knowledge, there were around 22 people who were encouraged and started to produce vegetables in sack who were not part of the project beneficiaries. In union segregation, 15 people in Mithagonj union, 6 people in Baliyatoli union, and 1 person in Dalbugonj union were producing vegetables in sack who were not part of the project beneficiary.

Table 6 shows the sack count of those farmers (outside of project beneficiaries) who were also producing vegetables through sack farming process during endline survey. In Mithagonj and in Baliyatoli the average sack count was around 4, and in Dalbugonj the sack count was 3, respectively. These statistics indicates well popularity of sack farming which is spreading among the people of this area.

According to endline study, 100% of the surveyed beneficiaries were willing to continue the sack farming and other activities of the project as this has brought significant benefits to the people of these area who were partially or fully engaged with farming and vegetable production. Becoming a member of a market group has also given them benefits like saving time and transportation cost (for 92.6% cases), high price for goods (for 70.2% cases), easy selling of vegetables (for 86.8% cases), etc.

<table>
<thead>
<tr>
<th>Union</th>
<th>People Count (Mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mithagonj</td>
<td>15</td>
</tr>
<tr>
<td>Baliyatoli</td>
<td>6</td>
</tr>
<tr>
<td>Dalbugonj</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Union</th>
<th>Sack Count (Mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mithagonj</td>
<td>4</td>
</tr>
<tr>
<td>Baliyatoli</td>
<td>4</td>
</tr>
<tr>
<td>Dalbugonj</td>
<td>3</td>
</tr>
</tbody>
</table>

**Chart 11: Benefits of be a member of market group**

- By saving time and transportation cost: 92.6%
- By getting higher price for vegetables: 70.2%
- By selling vegetables: 86.8%
- By buying agri-equipments: 38%
3.2.5 Cost Benefit analysis of sack farming

The results of the two production cycle (July to November and November to January) indicates the average production per sack was around 9 kg. The composite selling price ranged from BDT 16.0 to 56 per kg.

The calculated cost (BDT 162 per sack) accounted largely for the sack and soil including organic matter followed almost equally by fixed costs and crop protection. The following figure indicates the seedling and other fixed costs were comparatively low.

The total revenue was calculated as BDT 5,697 per farmer from 15 sacks, having a cost benefit ratio of 1:1.34. To guarantee a regular supply of vegetables for a household of four to five people, eight to ten sacks are expected to be required.

It is expected that a family using its own labour (husband and wife) can earn a monthly income of around BDT 1,500 - 2,000 using 2-3 decimal land for sack garden in average of 30 sacks. Therefore, sack gardening entrepreneurship has potential to become a women-driven handsome supplementary family income.

Chart 12: Cost of sack gardening
3.3 CASE STUDIES

Planting for Progress

We have seen many case of adaptation of the technology to suit own needs as well as reaping benefit from selling their excess produce. Such is the case of Rabeya Begum.

She is a widow with two young children depending on her for support. Presently, her only source of income is as a house maid working for the local Chairman’s house. She barely meets her family’s needs and constantly worries how she will be able to afford better future for her children.

After she was introduced to the sack farming technology through the Blue Gold Program, and with the initial support, she has been able to produce enough vegetable to earn additional income to help meet the basic need of her daughters. For the next cycle she has increased her production to further 5 sacks and plan on cultivating sponge gourd, sweet gourd, beans.

She hopes to be able to earn enough of supplementary income to give her daughters a better lifestyle that she couldn’t see.
4. LESSONS LEARNT

Addressing climate smart water resilient agriculture through growing vegetables in stressed homestead land to aid in vegetable and nutritional security was proven through the implementation of this project. There has also been few learning which can be taken away as resourceful findings for future implantations, which are given in the following.

i. A reasonable cost–benefit return along with good supplementary family income driven by women.

ii. Accessing soil and seeds in areas, which are frequently flooded are difficult. Sack gardeners need to ensure collecting enough soil before the rainy season.

iii. Average life-span of a sack would be maximum of 12 months; needs replacement of sacks annually.

iv. Need sufficient water, especially during the dry season to prevent crops from wilting.

v. In the wall of the sacks plants could not be grown from seeds. So, ensuring seedlings should be an essential practice of this gardening.
CONCLUSION

This project through its concept on 'Sustaining Sack Farming' practices has addressed poverty and vulnerability in the south west by developing local capacity to agricultural production and market access, lasting cooperation between rural communities, their organizations, local governments and technical agencies such as DAE and forms the core of this capacity and strengthen the livelihoods of the beneficiaries in the Blue Gold Program.

In addition to waterlogged and saline prone ecosystem, this technology has potential to be adopted in:

1. densely populated areas with scarcity of arable land preventing traditional gardening,
2. areas with contaminated soil,
3. high chance of natural disasters such as floods or mudslides,
4. not enough ground-level sunlight to grow vegetables, and
5. drought or limited water access.

This technology can be adopted in community development initiatives and programs aiming to address community vulnerabilities, and it can complement school garden initiatives as an untraditional urban gardening techniques.

The technique may be tested using various size and shape of sacks to ascertain its further economic viability. Selection of vegetable species, as warranted by climate and market, could be an important criterion for its sustainability.
6. ANNEX

1. Monthly Reports
2. Training Module on Sack Farming in Bengali
3. Video Documentary
4. Sack Farming Technical Brief
5. Promotional Posters on Sack Farming
Ingenuity can build

RESILIENCE
THAT PROTECTS